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Leadership, work environment and caries prevention – what is good for the staff, is also good for the patients

Hanne Berthelsen^a , Mikaela Owen^b  and Hugo Westerlund^c 

^aCentre for Work Life and Evaluation Studies (CTA) & Faculty of Odontology, Malmö University, Malmö, Sweden; ^bCentre for Workplace Excellence, University of South Australia, Adelaide, Australia; ^cThe Stress Research Institute, Department of Psychology, Stockholm University, Stockholm, Sweden

ABSTRACT

Objectives: Dental caries is a health problem that can be prevented. The aim of this study is to analyse if the quality of leadership, in Swedish Public Dental Health clinics, influences the extent to which patients with caries receive preventive care, and if any such effect is mediated through a collaborative work climate, clear role expectations and a low average level of burnout among staff.

Methods: The multilevel cross-sectional design includes work environment data from surveys of 75 general public dental clinics, register-based data on preventive measures provided to 5398 patients who received a dental filling due to a caries diagnosis, and patient demographics. Using a multilevel path analysis with logistic regression, we tested a model with one direct and three indirect pathways, controlling for the potential confounding effect of patient demographic factors.

Results: Leadership quality, as assessed by the staff at the clinic, was associated with increased odds of patients with caries receiving prevention, controlling for patient demographic factors. Leadership quality was also positively related to a collaborative work climate, clear role expectations and a low average level of burnout among staff. Against expectations, however, no indirect effect from leadership quality on prevention through the other work environment factors was found.

Conclusions: In conclusion, the quality of leadership in Swedish Public Dental Health clinics was positively related to a good work environment for staff and to delivery of preventive care to patients experiencing caries.

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Introduction

Dental caries is the most common dental disease [1], and it adds substantively to the global burden of disease [2]. This highlights a need for health promoting and preventive strategies for caries management [1,3,4]. There is a gap in delivery of preventive dental care between low- and high-income countries, and it remains a challenge to especially low- and middle-income countries to implement the WHO policy on Universal Health Coverage [5]. However, even high-income countries face their challenges. In Sweden, more than half of the adult patients that receive restorative caries therapy are diagnosed with new caries within a two-year period [6]. In addition, preventative measures are delivered to an unacceptably low extent to patients at high risk for caries despite a high attendance rate for dental check-ups [7]. This indicates that implementing evidence-based preventive care into practice is complicated. An effective leadership is recognized as crucial for quality of care, as well as for creating healthy work environments for the staff in the healthcare sector [8]. Among key factors for successful implementation of evidence-based preventive care in dental practice are re-orientation of resources such as space, routines,

and fee-schedules, which requires a strong leadership and team efforts [9,10]. In the present study, we will investigate the potential importance of leadership quality, collaborative work climate with clarity in role expectations and low levels of burnout among staff in the dental clinic for the extent to which preventive care is provided to caries patients.

According to the Job Demands-Resources (JD-R) model, the psychosocial factors in the work environment can be categorized into two main groups: job demands and job resources, which vary according to the setting and occupations under study. Job demands refer to those aspects of a job that require sustained physical and/or psychological effort and are therefore associated with physiological and/or psychological costs. Job resources can be understood as aspects of work that are important for dealing with job demands, achieving work goals and stimulating personal growth. The model posits that job demands can be triggers of a health deteriorating path, while job resources can trigger a process boosting motivation and performance [11,12]. In a suggested extension of the JD-R model, leadership can act as an antecedent to these two paths due to the opportunities for influencing demands and resources for the

CONTACT Hanne Berthelsen  Hanne.Berthelsen@mau.se  Malmö University, Faculty of Culture and Society, CTA, 205 06 Malmö, Sweden

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employees in addition to a possible direct impact on the outcome of work processes [13].

Dentistry in Sweden is organized by the regions and is partly covered by the National Social Insurance whether the service is provided at a private or public clinic. Subsidies are the same for the two sectors that in principle treat the same types of patients and almost half of the adult patients choose care delivered at a public clinic [14]. The Public Dental Services (PDS) are organised with an overall regional management in authority for geographically separate clinics led by a local clinic leader, who in most cases is a dentist by education. Typically, the clinic leaders are in charge of economics, development of the practice and responsible for the staff. In that way, local leaders have an important role in creating a safe psychosocial work environment for employees, setting priorities and following-up on production (quality and economics) [9,15].

The caries treatment provided in the Swedish public dental practices is administered as part of a teamwork process. In a recent systematic review of qualitative and quantitative research, good teamwork has been identified as driving dentists towards providing advice on dental caries prevention for their patients [16]. While dentists provide restorative caries therapy, preventive care is typically provided by licenced dental hygienists or is a task delegated to dental nurses [17]. This involvement of several clinical stakeholders in patient-centred care requires a solid understanding and practicing of team-based dentistry to coordinate tasks [17,18]. Further, experiences from implementation of guidelines for services delivered in teamwork indicate a need for high clarity about the roles and responsibilities of each team member and sufficient capacity such as overflow chairs to avoid a need for an additional appointment [19]. In that way, we consider role clarity and good collaboration at the clinic to be central job resources that will increase the likelihood for caries patients to also receive preventive care when having a restorative treatment.

Burnout is prevalent across various settings in the dental industry (for a recent review, see e.g. [20]). Especially, emotional exhaustion, a core dimension of burnout, has frequently been associated with low care quality (for recent reviews, see e.g. [21,22]). Burnout can impact the care quality in various ways, for example, the draining of emotional energy may lead to less commitment providing a good care, decreased ability to concentrate on performing important details of the work, or becoming more directive rather than collaborative and patient centred [23]. Thereby, we expect that a low level of burnout among staff will increase the likelihood of caries patients to receive preventive care.

In accordance with the JD-R model, previous research has found leadership quality linked to higher levels of role clarity, collaboration, and lower levels of burnout, which all correspond to higher levels of staff-reported quality of work [24,25].

The aim of this study is to analyse if the quality of leadership, in Swedish Public Dental Health clinics, influences the extent to which patients with caries receive preventive care; and if any such effect is mediated through a collaborative

work climate, clear role expectations and a low average level of burnout among staff.

Material and methods

This study has a cross-sectional design including work environment data from workplace surveys combined with register-based data on preventive measured performed and patient demographics.

Work environment (predictors)

Questionnaire data were collected in 2014–2015 from staff at all public dental practices in four regions of Sweden. Each employee received a personal link to an online questionnaire. The inclusion criteria specified a minimum of three respondents from each included general dental practice, who were either non-managerial dentists, dental hygienists, or dental nurses. Data from 75 clinics, based on 872 individual staff ratings, are thus included in the analyses and with a response rate of 73% after two reminders. The average size of the clinics included in the study was 16 non-managerial staff members (range 3–43).

Leadership quality (4 items), Role clarity (3 items), Collaboration (3 items), and Burnout (4 items) were rated on 5-point Likert scales and operationalised by the second version of the Copenhagen Psychosocial Questionnaire (COPSOQ II) in its Swedish version [26,27]. Scales ranging from 0–100 were constructed, setting the scale scores as missing if respondents had answered fewer than two items on a scale.

Individual responses from staff members working at the same clinic were aggregated to clinic scores to reflect the work environment. To justify aggregating the individual-level scale scores for Leadership Quality, Collaboration, Role Clarity, and Burnout to average clinic scores, Intraclass Correlation Coefficients (ICC(1), ICC(2)) and the interrater agreement index, $r_{wg(j)}$, were calculated using the Multilevel package version 2.6 in R. ICC(1) represents the amount of variance in the employees' responses that can be explained by the clinic they work in; values of 0.05 can be considered a small to medium effect while higher values indicate stronger effects [28]. ICC(2) is an estimate of the reliability of the aggregated group means [29]. Values < 0.5 indicate poor reliability, 0.50–0.75 indicate moderate reliability and > 0.75 indicate good reliability of group-level means [30]. Finally, $r_{wg(j)}$ reflects the consistency in response within the groups, that is, the extent to which there is within-group agreement

Table 1. Mean (M) and standard deviations (SD), intraclass correlation coefficients (ICC), $r_{wg(j)}$ and Cronbach's alpha for work environment measures.

	Clinic level		Individual level					
	M	SD	M	SD	ICC(1)	ICC(2)	$r_{wg(j)}$	Cronbach's alpha
Leadership quality	59.9	13.5	61.5	22.1	0.30	0.83	0.84	0.90
Collaboration	79.4	7.0	79.4	14.5	0.10	0.56	0.92	0.81
Role clarity	80.2	6.1	80.2	14.4	0.07	0.47	0.88	0.71
Burnout	41.0	11.5	40.6	24.3	0.10	0.55	0.66	0.91

in the workplace [29], with values of 0.70 or above generally considered to be acceptably consistent with other measures of reliability [31]. As shown in Table 1, the ICC(2) value for Role Clarity 0.47, but with reasonable values for ICC(1) and rwg(j). Burnout had a rwg(j) value of 0.66. However, as previously noted [28], the 0.70 cut-off value may be too high under certain conditions. Burnout is an individual health experience and as such likely to result in lower levels of agreement. Overall, the scale scores were acceptable to proceed with analysis.

Preventive care (outcome)

Register data on dental care quality were in 2018 obtained from the Swedish Quality Registry for Caries and Periodontal Disease (SKaPa) that automatically extracts data from the electronic patient records at public clinics. For dental fillings (class 2 and class 3 composite fillings in premolars and molars, which were made at the included clinics during a 3-month period surrounding the work environment survey) made due to a caries diagnosis, information was obtained about whether the patient had received preventive care during a 5-month period surrounding the work environment survey. Preventive care included information, instruction, applied behavioural medicine and application of fluoride. Patients having at least one filling done due to a caries diagnosis were included in the present study.

Patient demographics (covariates)

Data on the age, gender, income level and place of birth of patients were obtained from Statistics Sweden.

Analysis

Using a multilevel path analysis with logistic regression, the model (Figure 1) from work environment at clinics to prevention given to caries active patients controlling for covariates was analysed using maximum likelihood restricted (MLR)

estimation in Mplus v8. The structure of the data was multi-level with patients being nested within clinics (patient level, level 1), and the clinic work environment comprised of staff ratings (clinic level, level 2), hence, requiring multilevel analysis. Aggregated staff ratings of leadership quality, burnout, role clarity, and collaboration were modelled at the Clinic Level (level 2), and preventive care provided to patients with active caries were modelled at the Patient Level (level 1). Patients' demographics were also controlled for at the Patient Level as covariates; patient age, gender (male), education (three levels), income (level of 100,000 SEK per year), and country of birth (Scandinavia/other). It was proposed that leadership quality would directly and indirectly link with preventive care, *via*, burnout, role clarity, and collaboration. As such, the current study employs a multilevel path analysis, specifically a 2-2-1 model [32].

Ethics

The study was approved by the Regional Ethical Review Board in Southern Sweden (dnr: 2017 323).

Results

Of the 5398 included patients, 49.2% were women, 89.4% were born in a Scandinavian country, the average age of patients was 47.3 years, SD 16.1, and the average total yearly income was SEK 281 312, SD 155 997 (100 SEK was equivalent to 9.1 USD on 2 January 2017). Among patients, 29.6% had primary, 38.7% secondary and 25.7% higher education; for 6.0%, the educational level was unknown. In total, 9.8% of the included patients had received preventive care alongside operative caries therapy during the observation period of 5 months.

The model fit indices for the proposed model from Leadership Quality to preventive care, *via* Collaboration, Role Clarity and Burnout, are 4220.08 (-2LL; -2 LogLikelihood) with 23 free parameters. The AIC score was 4266.09 with a BIC score of 4430.48.

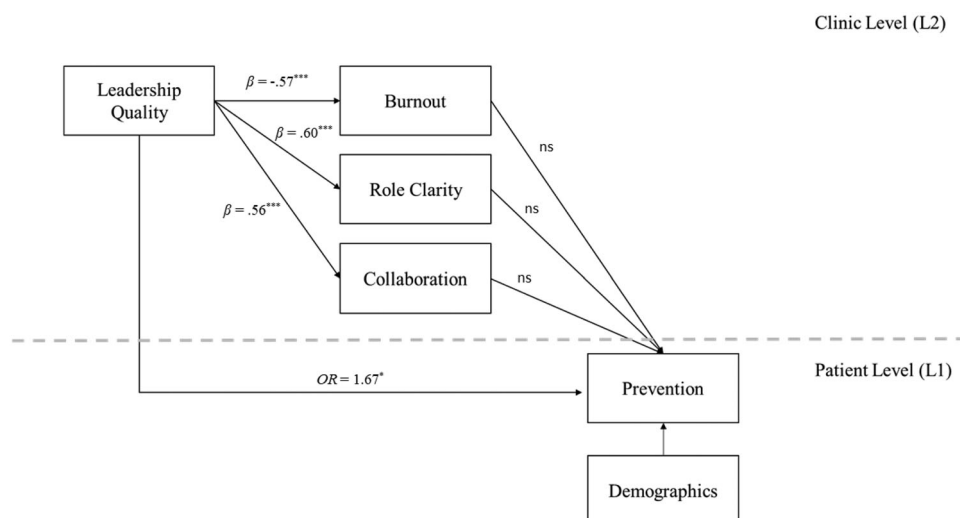


Figure 1. The proposed multilevel model of leadership quality to prevention *via* burnout, role clarity, and collaboration.

As anticipated, higher levels of Leadership Quality at the clinic directly increased the odds of patients receiving preventive care ($OR = 1.67$, 95%CI [1.02, 2.32], $p < .05$), was positively correlated with Role Clarity ($\beta = .60$, 95%CI [.41, .79], $p < .001$) and Collaboration ($\beta = .56$, 95%CI [.36, .76], $p < .001$), while negatively with Burnout level at the clinic ($\beta = -.57$, 95%CI [-.78, -.36], $p < .001$). However, the effect of Leadership Quality on preventive care was not mediated by Role Clarity, Collaboration, and Burnout. Role Clarity ($OR = 0.82$, 95%CI [0.51, 1.13], $p = .299$), Collaboration ($OR = 0.79$, 95%CI [0.48, 1.11], $p = .249$), and Burnout ($OR = 1.29$, 95%CI [0.82, 1.76], $p = .170$) did not significantly affect preventive care provided to patients,

At the patient level, we controlled for demographic factors onto preventive care. We found that the odds for receiving preventive care was higher for male than for female patients ($OR = 1.28$, 95%CI [1.07, 1.54], $p < .01$), higher for patients born outside Scandinavia ($OR = 1.40$, 95%CI [1.07, 1.83], $p < .05$), lower with increasing educational level (three levels, $OR = 0.81$, 95%CI [0.72, 0.92], $p < .01$), lower with increasing age (years, $OR = 0.98$, 95%CI [0.97, 0.98], $p < .001$), while the patient income level was not related to the odds of receiving preventive care (100 000 sek, $OR = 1.00$, 95%CI [0.94, 1.06], $p = .860$).

Discussion

Leadership quality, as assessed by the staff at the clinic, was associated with increased odds of patients with caries receiving prevention, controlling for patient demographic factors. Leadership quality was also positively related to role clarity and collaboration at the clinics and negatively to the level of burnout among staff at the clinic. Against expectations, however, we found no indirect effect from leadership quality onto prevention through the other work environment factors (e.g. burnout, role clarity, and collaboration).

The leadership quality as perceived by the staff at the clinic was associated with higher odds that their patients received preventive care in addition to restorative caries therapy. This finding is consistent with a recent Australian implementation study emphasising the importance of a committed leader for reorienting private clinics from a restorative towards a preventive approach [9]. Furthermore, in the Swedish context, the leadership at local clinics is considered key for realizing the visions of a continuous oral health improvement among the patients and a strong market position for the PDS in Sweden [14]. Changing the work climate towards a stronger preventive focus requires motivating staff, reorientating the use of space and updating routines and processes at the clinic [9,16]. It is likely that a leader who is considered fair, just and supports professional development among staff will have a better starting point for organisational change processes for improved public health.

The better the leadership quality, the more role clarity, the greater collaboration, and the lower levels of burnout were reported by clinic staff. These expected findings are consistent with the theoretical rationale of the extended JD-R model [13], and with the findings from the multiple

validation studies for the COPSOQ (i.e. [24,25,33]). In a competing market for dentistry, interviews with regional chief dental officers from the Swedish public dental sector underline that becoming attractive employers is of high importance [14]. Leadership quality has previously even been shown to be of high importance for a range of other outcomes, such as work ability, [34] physical exertion in the job [35], psychological distress, job satisfaction, and positive affectivity [36], and long-term sickness absence [37]. The findings from the present study adds to the body of research pointing to the relevance of paying attention to leadership quality for securing an attractive work environment that sustains occupational health.

Leadership quality mainly addresses staff leadership as operationalized by the COPSOQ instrument [26]. Previous research has found teamwork to be important for dental professionals adherence to caries prevention [16], and that good cooperation is an important resource for dentist's job performance [38]. In the light of this, it was somewhat surprising not to find any indirect effects of leadership quality on prevention through role clarity and collaboration at the clinic. In addition, we had expected an indirect effect through burnout based on review studies from general healthcare settings [21,22]. These review studies mainly found an impact on outcomes related to safety and medical errors, and staff-reported care quality [21,22], while our focus was on preventive care. The lack of indirect effects through work factors in our study indicates that other mechanisms are at play for how leadership exerts its influence on employees regarding caries prevention.

Just fewer than one in 10 patients included in our study received, according to the register data, preventive care in addition to restorative therapy. Ideally, choice of treatment is a joint decision-making process between the patient and healthcare provider. Caries patients experience caries as a problem due to the associated costs in terms of economy, pain and time spent at the dental clinic [39]. They are typically aware of their need for extra prevention, and value being made aware of opportunities for prevention [40,41]. Dentists, on the other hand, achieve intrinsic rewards and a meaningful work from seeing their patients succeed [42]. Further, preventive methods are typically integrated in curriculum for dental education. Thus, the potential for a joint decision on preventive measures should be in place. However, many dentists find it harder to sell prevention than restorative treatments and are not inclined to offer prevention to patients who are not considered motivated and cooperative [10]. In addition, they tend to believe that lack of understanding and motivation keep patients away from performing preventive measures [16]. Repeated preventive visits and a considerable effort from patients are typically required for getting control over the caries disease through changed health behaviours. In this phase, the patients can experience feelings of personal defeat, guilt and sense of vulnerability in the treatment situation, which makes it difficult challenging decisions or asking questions, in particularly if the staff seem stressed [40]. In this way, a negative communication spiral can arise, which points to a need for a

leadership with focus on actively promoting a work climate that minimalizes barriers for patients to voice and that enhances staff priority of working preventive.

Previous research has pointed to lack of economic incentives as the most important factor driving dentists away from providing preventive measures [16]. In the public sector, all staff are employed on a fixed salary basis, which adds further to the importance of leadership for a preventive focus among staff.

A basic ethical principle behind the Swedish healthcare legislation is that the healthcare system provides quality and equality in their services for the entire population, and in particular, priority is given to those in the greatest need of care. We found that younger patients, patients of a lower educational level, born outside Scandinavia, and who were male, were more likely to receive caries prevention, while income level had no impact. Except for age, this corresponds with findings from the latest yearly report from The Swedish Quality Registry for Caries and Periodontal Diseases [6] and from a regional study [43] regarding groups having a greater need for caries treatment. Our findings indicate that groups at highest risk tend to receive most prevention independent of their income level, thus counteracting social inequality in health as intended by the regulatory framework.

Limitations and strengths

The cross-sectional design of the study did not allow for conclusive causal inferences regarding the direction of relationships. The combination of questionnaire data on work environment with register data on the prevention was an advantage as it eliminates the risk of common methods bias. In addition, the study design allowed for the integration of additional socioeconomic patient data from Statistics Sweden and thus control for potential confounding factors due to patient characteristics.

The data on work factors were based on the internationally recognized COPSOQ instrument, specifically validated for workplace surveys, and often used in risk assessments of the psychosocial work environment [26]. This increases the credibility of the measurement and facilitates transferral of research into practice. Survey data including the individual staff members responses to the questionnaire were aggregated to clinic level and thus represented a collective experience of the work environment among staff. This provides a more accurate and objective estimate of work environment. Given the amount of variance left to be explained at individual level, however, it would be relevant to consider modelling work environment factors also at individual level in future research, and this applies in particularly to the more individual oriented construct of burnout. Unfortunately, the ethical permission did not allow for this in the current study. Another limitation is the limited statistical power due to a relatively low number of clinics. In addition, our analyses are based on work conditions and treatments that were provided during 2014–2015. However, no large reforms or changes in dental educations or in regulations have taken place in recent years.

It will be important to replicate our study in other settings in the future, to further investigate the mechanisms between leadership quality and provision of preventive care at dental clinics, and to have a multilevel design including repeated measures. In addition, qualitative studies could be useful for a better understanding of the mechanisms through which leadership quality impacts preventive care provision in different oral healthcare systems.

Implications for practice

The recruitment situation regarding dentists and dental hygienists is problematic in Sweden, in particularly it is problematic to recruit qualified and experienced dentists and dental hygienists outside the larger cities [44]. This also applies to recruitment of clinic leaders. There are different personal motivations for choosing a career as leader in dentistry [45]. Our findings underline the importance of a competent leadership for benefit of staff and patients. Building up career pathways, creating attractive positions and establishing working conditions, which support the leaders and their professional growth seems crucial.

Conclusion

In conclusion, we found that the quality of leadership was positively related to a good work environment for staff and to delivery of preventive care to patients experiencing caries.

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Disclosure statement

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

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ORCID

Hanne Berthelsen  <http://orcid.org/0000-0002-4573-4548>
 Mikaela Owen  <http://orcid.org/0000-0002-8346-6943>
 Hugo Westerlund  <http://orcid.org/0000-0002-8806-5698>

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