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Temporomandibular dysfunction among working Australian adults and association with workplace effort-reward imbalance

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Objectives: To explore the prevalence of temporomandibular dysfunction (TMD) among working Australian adults and examine whether workplace effort-reward imbalance is associated with TMD. ***Method***: Data were from Australia's National Survey of Adult Oral Health (NSAOH) 2004-06, a cross-sectional stratified clustered sample of Australian adults. The NSAOH data included information from a Computer Assisted Telephone Interview, self-complete questionnaire and oral epidemiological examination. Data included demographics, socio-economic characteristics, caries experience, diagnostic criteria for TMD, the Perceived Stress Scale (PSS) and a modified version of the Effort-Reward Imbalance instrument (ERI) where ERI ratio is the weighted ratio of workplace effort/reward subscales. Subpopulation analysis for working adults was conducted including complex sample descriptive statistics, bivariate and multivariable logistic regression models. ***Results***: NSAOH had 4014 participants with 2329 (65.1%, SE=1.3%) working adults included in the subpopulation analysis. Among working adults, TMD prevalence was 9.4% (SE=1.0%), which was slightly less than population prevalence (PR=9.9%, SE=0.8%), and was higher for females (PR=12.4%, SE=1.4%), people aged <35 years (PR=11.2%, SE=2.2%) and uninsured (PR=11.8%, SE=1.7%). TMD prevalence was associated with the ERI ratio (OR=2.5, 95% CI: 1.3-4.5) and PSS scores (OR=1.1, 95% CI: 1.0-1.09) in bi-variate associations. In multivariable logistic regression, TMD was associated with being female (OR=2.1, 95% CI:1.3-3.6), university qualified (OR=0.43, 95%CI: 0.21-0.88) and with the ERI ratio (OR=2.63, 95% CI: 1.47-4.72). ***Conclusion***: Greater effort-reward imbalance in the workplace is a psychosocial risk factor for TMD. This finding might need to be considered by clinicians managing TMD patients with need for investigating the efficacy of workplace stress management interventions.

Keywords*: effort-reward imbalance, work environment factors, temporomandibular dysfunction, national survey, Australia*

Introduction

Temporomandibular dysfunction (TMD) is a group of degenerative musculoskeletal disorders that affects the morphology and function of the masticatory system (Murphy *et al.*, 2013). The aetiology of TMD is not yet certain but is believed to be a multi-factorial (Murphy *et al.*, 2013). These factors might include, but are not limited to, parafunctional habits, occlusal derangement, lack of posterior support, bruxism, stress, autoimmune disorders and trauma (Sharma *et al.*, 2011). Along with the compound anatomical and functional nature of the temporomandibular joint (TMJ), these factors make this joint liable to a wide range of signs and symptoms (Fletcher *et al.*, 2004). TMD signs and symptoms include orofacial pain, joint clicking, grating or deviation, and trismus (Fletcher *et al.*, 2004). Although TMD prevalence vary between studies (Lomas *et al.*, 2018), an Australian national study identified a prevalence of 10% (Sanders and Slade, 2011). TMD-related orofacial pain is more prevalent among females than among males (Murphy *et al.*, 2013), explained to some extent by a low perception of control (Sanders and Slade, 2011). In addition, the high prevalence of TMD is observed in the age range of 20-50 years, which is unusual for degenerative disorders (Van Loon *et al.*, 2002) and might be attributed to stress, which is known to be a risk factor (Chisnoiu *et al.*, 2015). Sources of such stress could include life events and work-related factors that are prevalent in this age group (The Australian Psychological Society, 2011; Zacher and Schmitt, 2016). Accordingly, it is necessary to study the prevalence, and associated factors, of TMD among working adults, an area of research which is currently scarce for this subpopulation.

One of the important risk factors for TMD is perceived stress, which, in general, is known to be associated with poor health status (Yaribeygi *et al.*, 2017) including TMD (Ahuja *et al.*, 2018; Sanders and Slade, 2011). Several pathways have been proposed to explain the association between stress and TMD (Gameiro *et al.*, 2006). These pathways include stress-induced muscular hyperactivity, deregulation of the hypothalamic–pituitary–adrenal axis and the central serotoninergic system activation (Yaribeygi *et al.*, 2017). Similar to stress and its pathophysiological pathways for TMD, working adults might be exposed to an additional form of stress in the workplace known as work-related stress. Work-related stress might also have an association with TMD. While a study by Sanders and Slade (2011) explored the association of stress with life events and TMD among Australian adults, no Australian study has investigated the association between work-related stress and TMD.

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Work-related stress is an individualized dynamic response to the experience of work pressure and demands that challenge the individual's knowledge, skills and ability to cope. For measuring work-related stress, two approaches have been used: observational assessment of stress in the workplace and self-reported measurement, with the latter being more suitable for population-based surveys. Self-reported measures of workplace stress vary in terms of theoretical framework, domains, items, scoring systems and analytical approach (Tabanelli *et al.*, 2008). One popular self-reported measure of work-related stress is the Effort-Reward Imbalance (ERI) Instrument which is based on the Effort-Reward Imbalance model. The ERI model assesses the exchange relationship between the employee and the organization in terms of effort and lack of reward which, if violated, results in psychological stress. While high effort and low reward in the workplace is associated with musculoskeletal pain (Koch *et al.*, 2014), little is known about whether high effort and low reward has an association with TMD. Knowledge of such an association might be important in evaluating and planning prevention or in providing early conservative management approach for TMD in patients experiencing workplace effort-reward imbalance. Additionally, we can assess the role of workplace environments on the oral health status of the workers. Thus, this study aimed to quantify the prevalence of temporomandibular dysfunction among working Australian adults and examine whether workplace effort-reward imbalance is associated with TMD.

Methods

Data were sourced from the 2004-06 National Survey of Adult Oral Health (NSAOH) (Australian Institute of Health and Welfare, 2017). The NSAOH collected data from a random representative sample of Australian adults aged 15 years and over in all Australian states and territories. The NSAOH included a Computer Assisted Telephone Interview (CATI), self-complete questionnaire and a standardized oral examination. Ethical approval for the NSAOH was obtained from the University of Adelaide Human Research Ethics Committee. Participants in the NSAOH provided a verbal consent before answering the interview questionnaire while a signed consent was obtained from participants before proceeding to the clinical examination. Data collection was carried out between July 2004 and September 2006. Data were checked for quality and weighted according to the age and gender distribution for the selected strata which was provided by the 2005 Australian Bureau of Statistics Estimated Residential Population Data (Slade *et al.*, 2007).

The NSAOH is a cross-sectional survey that used a three-stage stratified clustered sampling (a combination of stratified and cluster sampling methods) of Australia's residents aged 15 years and over who lived in a household that had a telephone number listed in the "Electronic White Pages" (Australia on Disc, 2004). The three stages of sampling involved selecting postcodes, then selecting households from the selected postcodes and finally, selecting the target person from the selected household. The selected postcodes from all Australian states and territories were stratified into two strata: capital city and rest of the state except for the Australian Capital Territory (ACT) which was considered as a single stratum major city. The postcode selection was based on probability proportional to the size of the geographic cluster, determined by the number of listed households within the geographic cluster. More details of the NSAOH sampling can be found in Slade et al. (2007). The NSAOH had 4014 participants with complete records across the three NSAOH datasets (please refer to the section below for more details about the NSAOH datasets). Among the total NSAOH participants, 2329 (65.1%, SE=1.3%) were identified as engaged in paid work (part-time or full-time) and were included in our study.

The Computer Assisted Telephone Interview (CATI) component of the NSAOH collected socio-demographic characteristics such as age, gender, educational attainment, employment status, annual household income, having private dental insurance, occupation, country of birth and smoking status.

The standardized dental examinations were carried out by 30 calibrated dentists (Do *et al.*, 2008). The intra-examiner reliability was checked for five participants for each dentist. The oral examination was carried out using a self-illuminated dental mirror and a periodontal probe (with 2mm marking). While the oral examination collected data on the number of missing teeth, it did not include TMJ examination (Sanders and Slade, 2011). Details of the NSAOH oral examination protocol can be found in Do et al. (2008).

The mailed NSAOH self-completed questionnaire collected data on TMD diagnosis, work-related stress and perceived stress. The diagnostic criteria questionnaire for TMD had seven questions related to TMD and was adopted from a Canadian study that showed high levels of sensitivity and specificity with the clinical diagnosis for TMD (Locker and Slade, 1989). There were two domains: pain (three questions) and symptomatic TMD (four questions) with the responses recorded as 'Yes' or 'No' (Table 1). The criteria adopted for the presence of TMD was recording a positive response for one or more pain questions and one or more positive responses for the symptom questions. The research diagnostic criteria were recommended by Dworkin and Leresche (1992) and used by Sanders and Slade (2011).

The NSAOH contained a modified version of the short version of the Effort-Reward Imbalance (ERI) instrument (Siegrist, 1996). The instrument consisted of eleven items on three subscales: effort spent at work (3 items), lack of reward (6 items) and over-commitment (2 items) (Siegrist *et al.*, 2014) (Table 1), all scored on a 5-point Likert-like scale ranging from 1 for 'Strongly disagree' to 5 for 'Strongly agree'. Some item scores were reverse coded to account for item wording. The core indicator of the ERI model is the ERI ratio; a weighted ratio of the sum scores of the effort subscale to the sum score of the reward subscale. The ratio accounts for the difference in the number of items in the two subscales. We used the ERI ratio and the summed scores of the over-commitment subscale to represent the ERI model.

The Perceived Stress Scale (PSS) was developed by Cohen et al. (1983) as a measure of subjective stress. It consists of 14 items representing how unpredictable, uncontrollable, and overloaded participants feel in their life over

Table 1. Questionnaire for the TMD diagnostic criteria and effort-reward imbalance instrument (abbreviated version)

TMD diagnostic criteria questions		
Domains	*Items*	
Pain	1	Do you have pain in the jaw joint(s) when opening your mouth wide?
	2	Do you have pain in the jaw joint(s) while chewing?
	3	Do you have pain in your face just in front of the ears?
Symptomatic TMD	4	Does your jaw lock or get stuck so that you cannot open your mouth freely?
	5	Do you find it difficult to open your mouth as wide as you would like?
	6	Are the muscles around your jaws tender when you wake up in the morning?
	7	Do your jaw muscles ever feel tired or stiff?
Work-related effort-reward imbalance instrument		
Effort	1	I have constant time pressure due to heavy workload.
	2	I have many interruptions and disturbances in my job.
	3	Over the past few years my job has become more and more demanding.
Reward	4	I receive the respect I deserve from my superiors.
	5	I receive the respect I deserve from my colleagues.
	6	I experience adequate support in difficult situations.
	7	My job promotion prospects are poor.
	8	Considering all my efforts and achievement, my work prospects are adequate.
	9	My job security is poor.
Over commitment	10	When I get home, I can easily relax and 'switch off' from work.
	11	People close to me say I sacrifice too much for my job.

the last month. Items were scored on 5-point Likert-like scales ranging from 0 for 'Never' to 4 for 'Very often'. Scores for seven items were reverse coded to account for item wording. The PSS scale score ranges from 0—56 with higher scores representing higher perceived stress.

Data were analysed using the complex sample module in SPSS statistics for Windows version 26 (Ibm Corp, 2019) to account for the complex sampling design used in NSAOH (Ibm Corp, 2013). All analyses accounted for the sample weighting, cluster and stratum used in NSAOH. To obtain prevalence of TMD among Australian working adults, complex samples subpopulation descriptive analyses were obtained. These estimates were calculated to account for the hierarchical structure of the data and the sample weighting. To assess the bivariate association between TMD and potential confounders, complex sample bivariate binary logistic regression models were performed. To examine the relationship between the ERI and TMD experience while adjusting for potential confounders, we used block-wise complex sample logistic regression models.

Results

Among working Australian adults (*n*=2329), approximately 40% were aged 35–54 years with 33% aged <35 years (Table 2). Slightly more than half (54.8%) were males, 81.7% born in Australia, 40% had vocational education and 58.3% were working in professional, managerial or administrative roles. Most working adults lived in a household with an annual income of $60k or more (59.4%) and 50.3% had private dental insurance. The mean number of missing teeth was 4.50 (95% *CI*: 4.30-4.73), the mean ERI ratio was 0.99 (95% *CI*: 0.97-1.01), and the mean overcommitment score was 5.37 (95% *CI*:5.21-5.54) with the Cronbach's Alpha for the ERI Instrument being 0.61. The mean PSS-14 score was 22.23 (95% *CI*: 21.8-22.7) with the Cronbach's Alpha of the PSS-14 scale being 0.86.

Among working Australian adults, TMD prevalence was 9.4%, which was slightly less than that for the total NSAOH population (9.9%) and for unemployed adults (10.8%). Among working adults, TMD prevalence was higher in females (12.4%), people aged <35-years (11.2%), and those uninsured (11.8%). In bivariate associations, females were more likely to have TMD when compared with males *(OR*=1.9, 95% *CI:* 1.1-3.2) while those having private dental insurance were less likely to have TMD when compared with those uninsured (*OR*=0.6, 95% *CI: 0*.4-0.9). Greater ERI ratio (*OR*=2.5, 95% *CI*: 1.3-4.5) and greater PSS-14 scores (*OR*=1.05, 95% *CI*: 1.02-1.09) were associated with TMD experience (Table 2).

The association between ERI ratio and TMD experience was strong and statistically significant while adjusting for various potential confounders (Table 3). In all the models, the odds ratio for ERI ratio and TMD remained stable and significant, with the fully adjusted model reporting over

Table 2. Characteristics of working Australian adults and bivariate association with TMD symptoms

	Working Australian adults		*TMD experience in working Australian adults*			
	Unweighted Count	*Percentage (standard error)*	*TMD percentage (standard error)*	*OR*	*95% CI of OR Low – High*	*P-value*
Total	2329	100 (0.0%)	9.4 (1.0%)			
Age group						
<35	488	33.4 (1.6%)	11.2 (2.2%)	4.16	0.94–18.38	.060
35-54	1318	39.6 (1.2%)	9.2 (1.0%)	3.36	0.80–14.14	.098
55-64	458	13.7 (0.7%)	4.7 (1.1%)	1.64	0.40–6.70	.492
>65	65	13.3 (0.7%)	2.9 (2.1%)	Ref	-	-
Sex						
Female	1379	45.2 (1.7%)	12.4 (1.4%)	1.87	1.11–3.16	.019
Male	950	54.8 (1.7%)	7.0 (1.5%)	Ref	-	-
Country of birth						
Australia	1860	81.7 (1.4%)	9.4 (1.1%)	1.00	0.57–1.75	.998
Other	468	18.3 (1.4%)	9.4 (2.2%)	Ref	-	-
Educational attainment						
University qualification	673	29.5 (1.6%)	7.0 (1.1%)	.68	0.38–1.21	.190
Vocational education	958	40.1 (1.8%)	12.2 (2.2%)	1.26	0.67–2.36	.477
Secondary school or less	698	30.4 (1.5%)	9.9 (2.1%)	Ref	-	-
Household income						
Less than $60k	1025	40.6 (1.9%)	11.3 (1.3%)	1.48	0.93–2.3	.095
$60k or more	1193	59.4 (1.9%)	7.9 (1.4%)	Ref	-	-
Occupation						
Professional/managerial/admin	1544	58.3 (1.9%)	8.6 (0.9%)	1.05	0.56–1.97	.878
Intermediate (sales or trade)	523	27.6 (1.7%)	11.4 (2.6%)	0.77	0.36–1.63	.488
Manual	247	14.1 (1.4%)	8.9 (2.4%)	Ref	-	-
Have private dental insurance						
Yes	1279	50.3 (1.8%)	7.3 (1.0%)	.59	0.38–0.93	.023
No	1036	49.7 (1.8%)	11.8 (1.7%)	Ref	-	-
Current smoker						
Yes	358	16.8 (1.4%)	11.6 (2.3%)	1.33	0.78–2.26	.293
No	1971	83.2 (1.4%)	9.0 (1.1%)	Ref	-	-
		Estimate (95% CI)	*Estimate (95% CI)*	*OR*	*95% CI of OR*	*P-value*
No of missing teeth		4.5 (4.30-4.73)	4.2 (3.5-4.8)	0.97	0.92–1.03	.361
ERI instrument						
Effort-reward ratio		1.00 (.97-1.02)	1.14 (1.02-1.27)	2.45	1.32–4.54	.005
Overcommitment		5.37 (5.21-5.54)	5.83 (5.30-6.37)	1.13	0.97–1.32	.124
PSS-14		22.23 (21.8-22.7)	24.6 (22.8-26.4)	1.05	1.02–1.09	.004

*Analyses accounted for cluster and stratum used in NSAOH sampling strategy, as well as sampling weights to ensure representativeness of the estimates.

twice the odds of TMD among those with greater ERI ratio (OR=2.63, 95% CI: 1.47-4,72). Additionally, in the fully adjusted multivariable complex binary logistic regression model for TMD, being female was more likely to be associated with TMD than being male (*OR*=2.1, 95% *CI*: 1.2-3.6) while those having a university qualification were less likely to experience TMD (*OR*=0.4, 95% CI: 0.2-0.9) (Table 3). The over-commitment subscale scores of the ERI instrument were not significantly associated with TMD (*OR*=1.02, 95% *CI*: 0.86-1.2).

Discussion

The study quantified the prevalence of TMD among working Australian adults in addition to assessing whether TMD was associated with effort-reward imbalance in the workplace. Our findings suggest that TMD prevalence among working adults was slightly less than the population prevalence. A higher ERI ratio was associated with TMD experience and this association remained strong and significant after adjusting for potential confounders.

Table 3. Block-wise complex sample logistic regression model to examine the relationship between ERI instrument and TMD experience.

	Block 1		*Block 2*		*Block 3*		*Block 4*		*Block 5*	
	OR	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*
ERI instrument	-	-	-		-	-	-	-		-
ERI ratio	2.49	1.32-4.69	2.73	1.43-5.21	2.85	1.53-5.33	2.82	1.54-5.15	2.63	1.47-4.72
Overcommitment subscale	1.03	0.89-1.20	1.02	0.88-1.1-9	1.04	0.88-1.21	1.04	0.89-1.22	1.02	0.86-1.20
Age group	-	-	-	-	-	-	-	-	-	-
<35	-	-	5.00	0.60-41.75	4.47	0.53-37.33	2.97	0.34-26.13	2.61	0.30-23.10
35-54	-	-	3.98	0.50-31.44	3.54	0.45-28.09	2.51	0.30-20.90	2.41	0.29-19.95
55-64	-	-	2.33	0.32-17.16	2.01	0.27-14.78	1.72	0.23-13.10	1.71	0.22-13.09
>65	-	-	Ref	-	-	-	Ref	-	Ref	-
Sex (Female)	-	-	2.05	1.18-3.56	2.21	1.27-3.85	2.34	1.34-4.08	2.07	1.21-3.56
Country of birth (Australia)	-	-	-	-	1.47	0.83-2.61	1.44	0.81-2.56	1.36	0.78-2.36
Educational attainment	-	-	-	-	-	-	-	-	-	-
University qualification	-	-	-	-	.43	0.22-.87	.44	0.21-.90	.43	0.21-0.88
Vocational education	-	-	-	-	.91	0.44-1.89	.90	0.43-1.88	.82	0.39-1.69
Secondary school or less	-	-	-	-	Ref	-	Ref	-	Ref	-
Usual occupation	-	-	-	-	-	-	-	-	-	-
Professional/managerial/ admin	-	-	-	-	1.13	0.53-2.39	1.09	0.51-2.32	1.30	0.60-2.82
Intermediate (sales or trade)	-	-	-	-	1.28	0.53-3.10	1.25	0.51-3.08	1.51	0.62-3.70
Manual	-	-	-	-	Ref	-	Ref	-	Ref	-
Annual household income	-	-	-	-	-	-	-	-	-	-
Less than $60k	-	-	-	-	1.17	0.64-2.16	1.20	0.66-2.18	1.17	0.64-2.14
$60k or more	-	-	-	-	Ref	-	Ref	--	Ref	-
Have a private dental insurance (Yes)	-	-	-	-	.63	0.38-1.05	.65	0.39-1.09	.65	0.39-1.10
Currently a smoker (Yes)	-	-	-	-	-	-	1.31	0.70-2.45	1.20	0.64-2.24
Number of missing teeth	-	-	-	-	-	-	.95	0.88-1.02	.95	0.88-1.02
PSS-14	-	-	-	-	-	-	-	-	1.02	0.99-1.06

*Analyses accounted for cluster and stratum used in NSAOH sampling strategy, as well as sampling weights to ensure representativeness of the estimates.

The fully adjusted multivariable logistic regression model showed that working Australians with greater effort-reward imbalance ratio and who were female were more likely, while those holding a university qualification were less likely to experience TMD.

The slightly higher TMD prevalence among unemployed adults, in comparison to employed adults, might be explored in future research. However, it might be explained by the impact of unemployment on individual physical and mental health (Harris and Harris, 2009). Accordingly, clinicians might need to pay attention to the presence of TMD among the unemployed and provide them with conservative management, which is believed to manage symptoms effectively for 50–90% of TMD patients (Lomas *et al.*, 2018).

Females were twice as likely to report TMD than males, which is consistent with a recent systematic review and meta-analysis (Bueno *et al.*, 2018). The exact reason for a gender difference in TMD is not yet clear, but believed to be multifactorial, including hormonal difference, coping with stress, pain sensitivity and social factors (Bueno *et al.*, 2018; Sanders and Slade, 2011). This higher prevalence might be an important consideration when assessing and providing treatment.

Those with university qualifications were less likely to report TMD. Educational attainment is positively associated with better self-reported oral health (Australian Institute of Health and Welfare, 2010) which might be attributed to healthy behaviours, self-esteem and better access to health care. However, caution must be taken in the interpretation of the associations that are outside of the primary analyses, as the models were built for the estimations for the primary aim of this study.

Our principal finding was that the association between TMD and work-related effort-reward imbalance ratio was strong and significant after adjusting for potential confounders. Adjusting in blocks allowed for the examination of the effect of these variables on the outcome

estimates, and suggests that the effect on the estimate was minimal. This also suggests that the association between the ERI ratio and TMD experience is robust and significant. This finding adds a new prospect to the relationship between psychosocial factors and TMD, since there is some evidence of the association between global perceived stress and TMD (Ahuja *et al.*, 2018; Augusto *et al.*, 2016). However, the increase in perceived stress was not associated with TMD in the adjusted analysis. The negative findings of global perceived stress could be due to the ERI ratio in the model, that accounts for a stress creating situation.

Our findings related to the ERI are consistent with a recent systematic review of the relationship between musculoskeletal pain (not including TMD) and work-related stress, which found that an increase in the ERI ratio was associated with musculoskeletal pain, while the role of the over-commitment subscale of the ERI was inconclusive (Koch *et al.*, 2014). Although there was some evidence of the association between work-related factors and TMD observed by Han et al. (2018), their study was limited to factors such as working hours in full-time working females and did not directly measure work-related psychosocial stress. Our findings of an association between ERI ratio and TMD might be important for clinicians to consider when managing patients with TMD. While workplace stress management interventions have shown long-term benefits for ERI (Li *et al.*, 2017), it might be worthwhile to investigate whether such interventions can be effective in the management of TMD—a suggestion for future research direction. Furthermore, our findings might be considered by Work Health and Safety policy makers to promote healthy work environment via enhancing stress prevention measures, such as arrangements for regular exercise, relaxation breaks, team meetings to discuss workload/stress, as well as enabling the implementation of workplace stress management interventions (Havermans *et al.*, 2018).

One possible limitation of this research is the use of the diagnostic criteria question for TMD as the standardized oral epidemiological examination of the NSAOH did not include clinical examination of the TMJ. However, the diagnostic criteria for TMD has been validated using clinical data and has been used previously (Sanders and Slade, 2011). Another potential limitation is the use of a modified version of the ERI instrument, although this approach has been used before and we established convergent validity with the PSS-14 score (not presented). On the other hand, the study has several strengths. We used a nationally representative sample of Australian residents and the datasets have several measures to ensure data quality. Our analyses accounted for the complex sample design to correct the confidence intervals in the estimates. This study adds to the knowledge in the field by quantifying the association between psychosocial stress in the workplace and TMD. This study also contributes to clinical practice, as clinicians can consider workplace psychosocial stress when providing management to TMD patients. Moreover, this study highlights the impact of work-related stress on employee health. These findings suggest the need for future research measuring the association between workplace psychosocial stress with TMD and its sequalae on the oral health-related quality of life.

Conclusion

TMD was slightly less prevalent among working Australian adults when compared with unemployed Australian adults. Greater effort-reward imbalance in the workplace was associated with more TMD experience. Clinicians providing managment of TMD patients might consider psychosocial stress as a relevant area of intervention for the management of TMD. While workplace stress management intervention has shown long-term efficacy, the impact of such an intervention on TMD needs further research. Work health and safety policy makers could consider promoting a healthy workplace environment by implementing policies to prevent work-related stress as well as facilitating the provision of stress management interventions programs. Furthermore, these data suggest the need for further studies of the impact of workplace effort-reward imbalance and on oral health-related quality of life.

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Declaration

The authors declare no conflict of interest.

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