Original Article

Occupational Stress Among Moroccan Dental Practitioners: A Cross-Sectional Analysis Using Karasek's Demand-Control-Support Model

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ABSTRACT

Background

Dental practice is recurrently implicated in occupational health discourse as a profession uniquely disposed to psychosocial strain by virtue of its technical precision imperatives, its intimate, anxiety-laden patient encounters, its economic self-reliance architecture, and its temporally compressed decision environment. Karasek's Demand-Control-Support model offers an analytically tractable framework for decomposing this strain into constituent organizational dimensions.

Objective

To characterize occupational stress among Moroccan dental practitioners, delineate the distribution of Karasek job strain quadrants, and identify sociodemographic and professional correlates of the stress ratio.

Methods

An observational cross-sectional design was implemented among 223 Moroccan dental practitioners. The French-language version of the Job Content Questionnaire (JCQ) was administered, capturing psychological demands, decision latitude, skill discretion, decision authority, supervisor support, and coworker support. Internal consistency was evaluated via Cronbach's alpha. Inferential analyses employed chi-square tests, Mann-Whitney U, Kruskal-Wallis tests, and Spearman rank correlations.

Results

The sample was predominantly female (59.2%), with a mean age of 36.6 ± 10.2 years and mean professional experience of 11.1 ± 9.0 years. The mean psychological demands score was 2.72 ± 0.39; mean decision latitude was 2.92 ± 0.52; and mean social support was 2.65 ± 0.58. The mean job stress ratio was 0.97 ± 0.24. Among classifiable participants, 31.7% occupied the active quadrant, 24.4% the high-strain quadrant, 23.1% the passive quadrant, and 19.0% the low-strain quadrant. Practice sector was significantly associated with the stress ratio (Kruskal-Wallis $H = 6.58$; $p = 0.037$), with the semi-public sector exhibiting the highest tension levels. Both age ($\rho = -0.146$; $p = 0.033$) and professional experience ($\rho = -0.173$; $p = 0.011$) were negatively correlated with the stress ratio.

Conclusion

Occupational stress constitutes a substantive and heterogeneously distributed burden among Moroccan dentists, with nearly one in four practitioners operating under high-strain conditions. Sector-specific organizational pressures and early-career vulnerability emerge as prioritized intervention targets.

Keywords

occupational stress; job strain; Karasek model; dental practitioners; decision latitude; social support; Morocco.

1. INTRODUCTION

The epidemiology of occupational stress in healthcare settings has undergone a conceptual transformation over the past four decades from a narrowly behavioral phenomenon attributable to individual coping inadequacy, toward a transactional, systemic construct co-produced by the interaction between work environment characteristics and individual appraisal mechanisms[1-2]. Within this reoriented paradigm, Karasek's Demand-Control model[3], subsequently augmented by the Social Support axis[4-5], has emerged as one of the field's most durable and productively applied theoretical architectures. Its parsimony reducing the complexity of occupational stress to the interplay between three fundamental dimensions belies an analytical potency that has survived translation across professions, cultures, and decades of empirical scrutiny.

Dental practice represents an analytically

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privileged target for this framework. The profession concentrates, within the boundaries of a single clinical encounter, an unusually dense array of adversogenic dynamics: real-time management of patient anxiety and pain anticipation; precision execution of technically demanding manual procedures within a constrained anatomical field; economic self-regulation in the context of private practice entrepreneurship; accumulation of medico-legal liability; and administrative burden increasingly disconnected from clinical reward. These features collectively expose dental practitioners to a configuration of demands that can readily outpace available control resources particularly when institutional support structures are thin, as they often are in solo or small-group private practice settings[5-8].

The consequences of chronic high-strain exposure in dental practitioners are not merely subjective. The literature documents elevated rates of burnout[9,10], anxiety and depressive symptomatology[11], compromised sleep quality, musculoskeletal disorders, and in some cohorts, premature career exit. The economic and organizational ramifications extend beyond the individual practitioner: workforce attrition, degraded patient care quality, and increased medico-legal exposure constitute collective societal costs that health system planners cannot sustainably absorb[12,13].

Within the Moroccan context, the dental profession has undergone substantial structural transformation over the preceding two decades: practitioner density has increased markedly; modes of practice have diversified across private, public, and semi-public sectors; and patient expectations have escalated under the combined influence of digital media, consumer culture, and expanded healthcare coverage. Despite this evolving landscape, empirical evidence documenting the psychosocial burden borne by Moroccan dental practitioners remains strikingly thin. The present study addresses this evidence gap through a structured application of Karasek's Demand-Control-Support framework[14] to a sample of 223 dental practitioners across Moroccan practice settings.

The specific objectives were: (i) to characterize the internal consistency of JCQ subscales in this population; (ii) to describe mean scores across psychological demands, decision latitude, and social support dimensions; (iii) to classify practitioners within Karasek's four canonical job strain quadrants; and (iv) to examine the associations between the job stress ratio and relevant sociodemographic and professional variables, including sex, age, experience, and practice sector.

2. METHODS

2.1 Study Design and Population

An observational cross-sectional study was conducted among dental practitioners exercising across Morocco. The final enrolled sample comprised 223 participants recruited through a self-administered questionnaire strategy that paired standard sociodemographic and professional items with the validated French version of Karasek's Job Content Questionnaire[15]. Practitioners were distributed across three practice-sector modalities private, public, and semi-public enabling sector-comparative analyses.

2.2 Variables

Sociodemographic variables included sex, age (continuous), and professional experience in years (continuous). The primary professional variable was practice sector (private, public, semi-public). Psychosocial dimensions operationalized from the JCQ included: psychological demands, skill discretion, decision authority, decision latitude (composite of skill discretion and decision authority), supervisor support, coworker support, and overall social support (aggregate of supervisor and coworker support). The job stress ratio was computed as psychological demands divided by decision latitude; higher values indicate greater tension.

2.3 Instrument

The Job Content Questionnaire rests upon Karasek's Demand-Control-Support model and solicits responses on a four-point Likert scale. Subscale scores were derived by item averaging following reverse-coding of applicable items. Decision latitude combines skill discretion and decision authority into a composite dimension. The social support aggregate integrates supervisor and coworker support. The job stress ratio operationalizes Karasek's core theoretical proposition: strain arises not from demand per se, but from its excess relative to the practitioner's perceived decisional control. Iso-strain a particularly adverse configuration combining high strain with low social support was conceptually addressed in the theoretical framing, though not formally analyzed as a discrete categorical outcome.

2.4 Job Strain Quadrant Classification

Participants were allocated to one of four canonical quadrants: Active (high demands, high control), High Strain (high demands, low control), Passive (low demands, low control), and Low Strain (low demands, high control). This typological scheme permits both a dimensional and a categorical reading of psychosocial work characteristics. Categorization was feasible only for participants possessing valid scores on both the demands and latitude subscales; the remaining participants were excluded from quadrant-based counts but retained in dimensional analyses.

2.5 Statistical Analysis

Descriptive statistics were reported as frequencies, percentages, means, standard deviations, and medians as appropriate for the measurement scale. Internal consistency was estimated via Cronbach's alpha coefficient (threshold benchmarks: $\alpha \geq 0.70$ acceptable; $\alpha \geq 0.80$ good). Between-group comparisons used the Mann-Whitney U test (two groups) and the Kruskal-Wallis test (three or more groups) for continuous outcomes failing normality assumptions, and the chi-square test for categorical outcomes. Monotone associations between continuous variables were quantified with Spearman's rank correlation coefficient (ρ). Statistical significance was set at $\alpha = 0.05$ throughout.

2.6 Methodological Considerations

As with all cross-sectional self-report studies, results require cautious interpretation. Response tendencies toward social desirability may attenuate endorsement of demand-related items. Practical independence of practitioners particularly those in solo private practice renders the supervisor support subscale conceptually ambiguous and contributes to the elevated missingness observed for that dimension. Cross-sectional architecture precludes causal attribution; the documented associations should be read as hypothesis-generating rather than hypothesis-confirming.

3. RESULTS

3.1 Sample Characteristics

The analytic sample comprised 223 dental practitioners. Female practitioners constituted 59.2% of the sample and males 40.4%. Mean age was 36.6 ± 10.2 years, reflecting a young-to-intermediate professional cohort. Mean professional experience was 11.1 ± 9.0 years, a spread consistent with a sample spanning from recent graduates to moderately senior practitioners. The private sector dominated the sector distribution (n = 174, 78.0%), with the public sector (n = 35, 15.7%) and the semi-public sector (n = 13, 5.8%) constituting smaller but analytically meaningful subgroups (Table 5).

Table 5. Sociodemographic and professional profile of the study sample (N = 223).

Variable	Category / Summary	n	% / Value
Sex	Female	132	59.2%
	Male	90	40.4%
Age	Mean ± SD	—	36.6 ± 10.2 yr
Professional Experience	Mean ± SD	—	11.1 ± 9.0 yr
Practice Sector	Private	174	78.0%
	Public	35	15.7%
	Semi-public	13	5.8%
Total Sample	—	**223**	**100%**

3.2 Internal Consistency of JCQ Subscales

Cronbach's alpha values are presented in Table 1. Coworker Support demonstrated the most robust internal consistency ($\alpha = 0.812$). Skill Discretion ($\alpha = 0.718$) and Decision Authority ($\alpha = 0.702$) achieved acceptable reliability. The Psychological Demands subscale exhibited the most modest reliability ($\alpha = 0.563$), a finding not without precedent in non-Western and heterogeneous occupational samples, and one that warrants interpretive caution for this particular dimension. Supervisor Support ($\alpha = 0.664$) occupied a borderline zone, potentially reflecting the conceptual ambiguity of this dimension in a sample where many practitioners operate independently.

Table 1. Internal consistency (Cronbach's α) of JCQ subscales (N = 223).

Subscale	No. of Items	Cronbach's α	Interpretation
Skill Discretion	6	0.718	Acceptable
Decision Authority	3	0.702	Acceptable
Psychological Demands	9	0.563	Modest — interpret cautiously
Supervisor Support	5	0.664	Questionable
Coworker Support	6	0.812	Good

3.3 Descriptive Statistics of Psychosocial Dimensions

Mean scores across JCQ subscales are reported in Table 2. Psychological demands averaged 2.72 ± 0.39 a value that, on the questionnaire's 4-point scale, suggests a perceptible but non-extreme level of perceived work pressure. Decision latitude averaged 2.92 ± 0.52, composed of a skill discretion component (mean 3.01) that outstripped decision authority (mean 2.83). Social support appeared structurally asymmetric: coworker support (mean 2.76) exceeded supervisor support (mean 2.43), plausibly reflecting the flattened hierarchy characteristic of many dental practice environments. The mean job stress ratio was 0.97 ± 0.24, with a median of 0.94 a distribution skewed moderately right, indicating a minority of practitioners experiencing demands that substantially outpace their decisional control.

Table 2. Descriptive statistics for JCQ psychosocial subscales and job stress ratio.

Subscale	n	Mean	SD	Median	IQR*
Psychological Demands	217	2.72	0.39	2.67	—
Decision Latitude	218	2.92	0.52	2.92	—
Skill Discretion	223	3.01	—	3.00	—
Decision Authority	223	2.83	—	3.00	—
Supervisor Support	—	2.43	—	2.40	—
Coworker Support	—	2.76	—	2.83	—
Overall Social Support	199	2.65	0.58	2.72	—
Job Stress Ratio	**217**	**0.97**	**0.24**	**0.94**	**—**

* IQR = interquartile range; (—) = not reported for this subscale due to partial missingness. Differential n values reflect item-level data availability per subscale.

3.4 Distribution of Job Strain Quadrants

Among the 157 participants for whom quadrant classification was calculable, the Active quadrant accounted for the largest share (31.7%), followed by High Strain (24.4%), Passive (23.1%), and Low Strain (19.0%) (Table 3). The plurality in the Active configuration suggests that high work demands, while prevalent, are commonly accompanied by sufficient decisional latitude to preclude the most physiologically and psychologically deleterious strain configuration. Nevertheless, the substantive representation of High Strain participants nearly one in four constitutes a clinically meaningful subgroup warranting targeted preventive attention.

Table 3. Distribution of Karasek job strain quadrants among classifiable participants (n = 157).

Quadrant	Definition	n	%
Active	High demands + High control	51	31.7
High Strain	High demands + Low control	39	24.4
Passive	Low demands + Low control	37	23.1
Low Strain	Low demands + High control	30	19.0
Calculable Total	—	**157**	**100.0**

3.5 Bivariate Analyses

Sex was not associated with job strain category (χ^2 = 2.61; p = 0.456) nor with the continuous stress ratio (Mann-Whitney U = 6022.5; p = 0.390), indicating that the structural determinants of occupational stress in this sample operated comparably across genders. Practice sector, by contrast, differentiated stress ratio distributions significantly (Kruskal-Wallis H = 6.58; p = 0.037), with the semi-public sector producing the most elevated tension profile, followed by the private and public sectors respectively.

Age correlated inversely with the stress ratio (ρ = -0.146; p = 0.033), and professional experience correlated even more strongly in the same negative direction (ρ = -0.173; p = 0.011), suggesting a progressive attenuation of perceived strain across the professional

lifespan. Experience also correlated negatively with psychological demands (ρ = -0.165; p = 0.016), while its relationship with decision latitude did not attain statistical significance (ρ = 0.113; p = 0.098). Full bivariate results are reported in Table 4.

Table 4. Bivariate analyses of sociodemographic and professional variables in relation to job stress ratio and strain categories.

Variable	Statistic	p	Sig.
Sex vs. Job Strain Category	$\chi^2 = 2.61$	0.456	NS
Sex vs. Stress Ratio	U = 6022.5	0.390	NS
Sector vs. Stress Ratio	H = 6.58	0.037	*
Age vs. Stress Ratio	ρ = -0.146	0.033	*
Experience vs. Stress Ratio	ρ = -0.173	0.011	*
Experience vs. Psych. Demands	ρ = -0.165	0.016	*
Experience vs. Decision Latitude	ρ = 0.113	0.098	NS

NS = not significant; * p < 0.05. Sector categories: Private (n = 174), Public (n = 35), Semi-public (n = 13).

4. DISCUSSION

This investigation offers a structured empirical portrait of occupational stress in Moroccan dental practice, viewed through the organizational optic of Karasek's demand-control-support framework. Several findings merit theoretical and practical unpacking, as they collectively point toward a psychosocial burden that is real, structurally conditioned, andcritically differentially distributed across sectors, career stages, and individual resources.

The predominance of the "Active Job" quadrant over the "High Strain" quadrant observed in this sample of Moroccan dentists should not be interpreted as reassuring or indicative of an absence of psychosocial risk. According to the Demand–Control–Support model of Karasek, the "Active" configuration refers to a situation in which professionals are exposed to high psychological demands while simultaneously benefiting from sufficient decision latitude, enabling them to mobilize their skills and partially regulate their workload[17-19].

However, this configuration reflects less a stable state of well-being than a dynamic and potentially fragile balance between pressure and autonomy. While decision latitude may buffer some of the adverse effects of high demands, it does not eliminate them. When psychological demands remain persistently elevated such as time pressure, clinical complexity, patient expectations, and administrative burden even high levels of autonomy may become insufficient to prevent cumulative stress[21-23]. In such contexts, the regulatory capacity associated with autonomy may gradually erode, particularly if recovery opportunities are limited.

This balance can initially promote positive outcomes, including strong professional engagement, continuous skill development, and an enhanced sense of self-efficacy. Active jobs have historically been associated with cognitive stimulation and professional empowerment, as individuals retain control over task organization, problem-solving strategies, and decision-making processes [21-23]. For dentists, this may translate into clinical autonomy, adaptability in patient care, and opportunities for mastery.

Nevertheless, the long-term sustainability of this "active" configuration depends on several moderating factors. The absence or insufficiency of social support whether from colleagues, assistants, or the broader professional environment may shift this balance toward a more detrimental profile. Similarly, chronic exposure to high demands without adequate institutional support, recognition, or resources may lead to emotional exhaustion, depersonalization, and ultimately burnout[24-25]. In this sense, the "Active Job" quadrant can be understood as a transitional or conditional state rather than a protective one.

Furthermore, the internalization of high professional standards and responsibility, common among healthcare providers, may exacerbate the risk. Dentists may maintain high levels of involvement and performance despite increasing fatigue, thereby masking early signs of strain. This overcommitment can delay the identification of psychosocial distress and reduce help-seeking behaviors[26-27].

Therefore, interpreting the predominance of the "Active Job" profile requires caution. It highlights not only the presence of adaptive resources (i.e., autonomy and skill

use), but also the coexistence of significant demands that may, over time, compromise mental health if not adequately supported. Preventive strategies should aim to preserve decision latitude while reducing excessive demands and strengthening social support systems, in order to prevent a potential shift toward high-strain conditions and associated adverse outcomes.

The 24.4% prevalence of High Strain positions warrants sustained concern. High strain configurations have been systematically linked to adverse mental health outcomes depression, anxiety, emotional exhaustion as well as physiological sequelae including hypertension and cardiovascular risk elevation [28]. Within a dental context, these effects may be further aggravated by the profession's chronic exposure to fine-motor precision demands, anticipatory anxiety management, noise and ergonomic constraints, and the emotional labor of containing patient distress while maintaining clinical composure[29].

The psychometric profile of the JCQ in this sample merits acknowledgment. The modest alpha for Psychological Demands (0.563) should not be interpreted as evidence against the construct's clinical relevance; rather, it reflects the multidimensional, culturally shaped texture of what counts as psychologically demanding in Moroccan dental practice. Demands here likely encompass a heterogeneous composite: the clinical intensity of restorative and surgical procedures, the social complexity of patient management across diverse educational and expectation backgrounds, the entrepreneurial pressures of practice economics, and the ambient insecurity of navigating a healthcare system in structural transition. A unidimensional scale may insufficiently capture this diversity of demand forms.

The sector finding is analytically illuminating. Semi-public sector practitioners exhibited the highest stress ratios a result that, upon reflection, carries intuitive face validity. The semi-public sector occupies a structurally ambiguous position: practitioners navigate simultaneously the rigidity of institutional accountability and the productivity expectations characteristic of market-oriented settings, often without the organizational clarity, resource adequacy, or hierarchical support that a well-functioning public institution might provide. This dual exposure to institutional constraint and performance pressure creates conditions under which decisional control may be illusory rather than substantive, amplifying the perceived ratio of demands to resources.

The negative correlation between professional experience and the stress ratio is perhaps the finding with the most unambiguous preventive implications. More experienced practitioners appear to experience lower occupational tensionnot because their objective workloads are necessarily lighter, but because accumulated professional capital translates into more sophisticated demand-management strategies. These include refined temporal organization, more fluent patient communication, greater tolerance of clinical uncertainty, and a more discriminating allocation of attentional resources across competing task demands. Early-career practitioners, by contrast, remain in a developmental phase characterized by incomplete schema formation, heightened sensitivity to clinical error, economic precarity, and limited access to collegial normalization a constellation of vulnerabilities that increases susceptibility to high-strain configurations.

The gender non-difference in stress ratio is noteworthy and should not be read as an indication that female and male practitioners experience dental work identically. It suggests, rather, that the organizational dimensions captured by the JCQ — demands, latitude, support — operate similarly across genders at the group level, at least in this sample. The possibility of differential within-gender experience trajectories, or of gender-specific mediators that the JCQ is not designed to capture (emotional labor asymmetries, role conflict, boundary management), cannot be excluded and merits dedicated investigation.

4.1 Strengths

This study mobilizes an internationally validated and theoretically grounded framework, applies it to a practice setting characterized by significant empirical underrepresentation in the occupational health literature, and achieves a sample size sufficient for meaningful sector-level and experience-stratified analysis. The multidimensional JCQ profile capturing demands, latitude, and support concurrently — enables a more textured reading of occupational stress than single-dimension instruments would permit.

4.2 Limitations

The cross-sectional design cannot establish causal directionality or longitudinal trajectories. Self-report vulnerability to social desirability biases may attenuate demand endorsement. Missing data on supervisor

support particularly prevalent among solo practitioners may introduce systematic bias in social support estimates. The absence of multivariate adjustment leaves the possibility of confounding unaddressed. Finally, the modest JCQ-demands alpha constrains the interpretive confidence for this particular subscale.

4.3 Future Directions

Longitudinal designs would illuminate career-stage trajectories of occupational stress, distinguishing genuine stress attenuation through professionalization from selective survival effects. Future investigations should incorporate complementary constructs effort-reward imbalance, emotional labor, burnout symptomatology, sleep quality, and cognitive schema characteristics to extend explanatory coverage. Qualitative methods could enrich the quantitative architecture by capturing the phenomenological texture of occupational strain as lived by Moroccan dental practitioners across different sector contexts.

5. Conclusion

Occupational stress is a tangible and meaningfully heterogeneous phenomenon among Moroccan dental practitioners. The coexistence of a substantial Active workforce majority with a non-negligible High Strain minority reveals a profession navigating complex psychosocial terrain — one where the organizational architecture of work, rather than individual psychological fragility alone, constitutes the primary determinant of stress exposure. Sector-based structural differences and the protective effect of accumulated professional experience constitute the most actionable findings from this investigation. Preventive responses should resist the reductionist impulse to locate the stress problem within individual practitioners, and should instead prioritize organizational redesign, early-career support architecture, and sector-specific intervention. The Karasek framework, by centering demands and control as co-constitutive determinants of strain, provides exactly the theoretical scaffolding needed to translate these findings into credible, systemic preventive action.

Declarations

Conflicts of Interest: The authors declare no conflicts of interest in relation to this work.

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