



Occupational Stress among Nigerian Orthodontists and Orthodontic Residents: A Cross-Sectional Study

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: The job of the orthodontist involves long working hours and interaction with each patient for many years before the conclusion of treatment thus orthodontists may experience peculiar levels of stress. Occupational stress has been proven to have negative consequences and can result in not only burnout but also hypertension and even suicide. The aim of this study was to assess the areas of orthodontic practice that cause stress among orthodontists and orthodontic residents practicing in Nigeria as well as to evaluate various personal and practice characteristics that affect these reports of occupational stress.

Methods: Data was collected over a three-month period using an online self-administered modified version of the Occupational Stress Questionnaire which was sent through the Nigerian Association of Orthodontists WhatsApp group and to the personal emails of all members. Data was collated and analysed using SPSS version 21.

Results: A total of 69 (71% response rate) responses were received. Males and older orthodontists experienced higher levels of stress. Seven items had mean severity scores equal to or greater than 3.75 and were considered the most concerning stressors in orthodontic practice.

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These included “Lack of patient compliance with treatment instructions is painful” and “Treating a case with an unfavorable prognosis is disturbing”.

Conclusions: The most concerning stressors in orthodontic practice as perceived by Nigerian orthodontists and orthodontic residents are those related to time management and patient motivation.

Keywords: Orthodontists; orthodontic residents; occupational stress; Nigeria.

1. INTRODUCTION

Stress is commonly recognized as a “consequence of the failure of an individual to respond adequately to mental, emotional, or physical demands.” [1] Stress can also be defined as the biological reaction to any adverse internal or external stimulus, physical, mental or emotional which tends to disturb the organism’s homeostasis. [2] Stress is a feeling of emotional or physical that is evoked by any event or thought that results in frustration, anger, or nervousness. The dental profession has been associated with high levels of stress at both undergraduate and postgraduate levels. [3] Also dental specialty practice has been found to be more stressful when compared to medical specialty practice.[4] High levels of occupational stress have been proven to have negative consequences and can result in not only burnout but also hypertension and even suicide. [5]

The job of the orthodontist involves long working hours and interaction with each patient for many years before the conclusion of treatment thus orthodontists may experience peculiar levels of stress due to this. Such stress if not recognized and checked may lead to depression and/or mental disturbances. [6] Orthodontists around the globe have experienced different levels of occupational stress caused by various factors. [4,7] Moroccan orthodontists were highly stressed by patient dissatisfaction, treatment of adult patients, and the lack of communication with patients. [7] Canadian orthodontists ranked patients late or missing their bonding sessions, patients with broken appliances, the constant pressure of time, acceptance of treatment outcome with compromises, treatment of cases with a poor prognosis among high stressors [4] Saudi Arabian orthodontists were most stressed by factors associated with the patient. [8] It is important to note the high stressors in any profession in order to increase wellbeing of the individual professional.

Although some studies have been carried out to assess levels of stress among orthodontists in other parts of the world, however after a literature

search no such study was found among orthodontists and orthodontic residents in Nigeria, therefore we found it expedient to carry out this study. It is important for the mental and physical health of orthodontists that this parameter be assessed as it will cause the orthodontists to be mindful of the aspects of their career that may cause an increase in their stress levels [9,10]. Stress which many times is unrecognized by an individual has been linked to various diseases and even death. Such data is not available in this region of the world and thus will be useful as a baseline for both practice as well as teaching of orthodontics in the country. The knowledge acquired from this study will enable orthodontists to recognize their individual and personal occupational stressors and adequately manage situations that cause stress which will ultimately enhance their practice, prevent diseases and improve overall wellbeing. Therefore, the aim of this study was to assess the areas of orthodontic practice that cause stress among orthodontists and orthodontic residents practicing in Nigeria as well as to evaluate various personal and practice characteristics that affect these reports of occupational stress.

2. MATERIALS AND METHODS

This was a descriptive cross-sectional study conducted among all consenting Nigerian orthodontists and orthodontic residents in active clinical practice. Prior to carrying out the study.

2.1 Sample Size Calculation

The required sample size was calculated using the slovin’s formula [11]

$$N = N / (1 + NE^2)$$

where:

N = number of samples,

N = total population (109 orthodontist)

E = error tolerance (level), 92% confidence level

$$N = 109 / (1 + 109 \times 0.08^2)$$

$$N = 109 / 1.6976$$

$$= 64.2$$

Sample size was therefore 65.

Inclusion Criteria

1. Orthodontic residents in training and orthodontic practitioners with a degree in orthodontics.
2. Those who have their orthodontic practices in Nigeria.

Exclusion Criteria

1. Orthodontic practitioners and orthodontic residents whose practices are outside Nigeria.
2. Those who have retired from active practice.

2.2 Data Collection

Data was collected over a three-month period (January 2021 to March 2021) using a modified version of the Occupational Stress Questionnaire, based on the classification system of Roth et al. [5] Anonymity was ensured as the request to participate was sent through the Nigerian Association of Orthodontists WhatsApp group. In addition, personal emails were sent to all members with informed consent information and request to return the filled copy of the questionnaire without any personal disclosures. The web-based survey was password protected and only one of the authors (AA) had access to it. The first mailing resulted in 58 returned questionnaires. Follow up mailing with email reminders yielded an additional 11 questionnaires.

2.3 Survey Instrument

Demographic information of the respondents which included gender, region of practice, age, training, experience, clinical practice setting and work hours was collected. The final survey instrument

(<https://forms.gle/dHrVAehfpUWJuGLA7>)

included a total of 35 stressors and had questions relating to orthodontic occupational stress and the personal and practice characteristics of participants was pre-tested with a sample of 3 practicing orthodontists for ease of administration, validity, and reliability. The severity of occurrence of each stressor was scored using a five-point Likert scale as follows: Strongly disagree = 1, disagree = 2, fair = 3, agree = 4 and strongly agree = 5 respectively.

2.4 Statistical Analysis

The data collected from the questionnaire were coded and tabulated for statistical analysis using

Microsoft Excel spreadsheet software (Microsoft Office 2013, Microsoft, Redmond, Washington). Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software (version 21.0, IBM, Armonk, New York). Descriptive statistics were used to describe the categorical and quantitative variables.

2.5 Assessment of Stressors

The mean severity score was calculated for each stressor and a score equal to or higher than 3.75 was interpreted as being the most concerning stressors. [8]

2.6 Factors Affecting Occupational Stress

The resultant effect of personal and occupational characteristics on the overall occupational stress score was estimated. Characteristics represented with nominal variables were evaluated with independent sample t tests, one-way analysis of variance and Tukey post hoc test was used for categorical variables, while two-tailed Pearson correlation coefficients were used for scalar variables. The mean severity score was used as the dependent variable in a regression analysis. All personal and practice characteristics were included as independent variables.

3. RESULTS

At the time of data collection, there were approximately 97 orthodontists and orthodontic residents practicing in Nigeria who met the criteria.[12] A 71% response rate was attained with responses from 35(50.7%) males and 34(49.3%) females of which 32(46.4%) were orthodontic residents and 37(53.6%) were specialists. The mean number of days in a week at work was 4.5 ± 1.08 with 27.5% of respondents working in 2 or more practice settings. A summary of socio-demographic characteristics of the respondents are presented in detail in Table 1.

A wide range of responses to the potential stressors were found. Each of the 35 items had a range of severity scores from 1 to 5. Table 2 shows a descriptive data of responses from the survey.

The most stressful aspects of orthodontic practice, based on mean severity scores, are presented in Table 3. Seven items had mean severity scores equal to or greater than 3.75 and were considered the most concerning stressors in orthodontic practice. The questionnaire item

#2, "Lack of patient compliance with treatment instructions is painful" was considered the greatest stressor with a mean score of 4.28.

Comparison of the mean severity scores for stressors in relation to the sociodemographic characteristics of orthodontists and orthodontic residents showed statistically significant differences in relation to their gender. The mean severity score for stress was higher among males when compared to female respondents ($t = 3.405$; $P = 0.001$). However, there was no statistically significant differences in mean stress severity scores in relation to other variables (Table 4). Gender ($r = -0.384$; $P = 0.001$) and the

region of practice ($r = 0.242$, $P = 0.045$) showed statistically significant correlations with the stress severity scores but no statistically significant correlation was observed between mean stress severity scores and number of days or hours in a week at work (Table 5).

Multiple regression analysis revealed a seven-component model that predicted 23.6% of the variation in mean stress severity scores (Table 6). The regression model showed a significant effect of gender (Unstandardized $B = -0.260$; $p = 0.018$) on mean stress severity scores while all other examined factors were not significantly associated to the primary outcome (Table 6).

Table 1. Socio-demographic characteristics of participants

Characteristics	N	Percentage
Demographics		
Age group (Years)		
<30	7	10.1
31-40	26	37.7
41-50	23	33.3
51-60	9	13.0
>60	4	5.8
Gender		
Male	35	50.7
Female	34	49.3
Cadre		
Resident	32	46.4
Specialist/Consultant Orthodontist	37	53.6
Years in residency training		
≤ 1 year	6	18.7
2 years	7	21.9
3 years	4	12.5
4 years	3	9.4
≥ 5 years	12	37.5
Years of orthodontics practice		
<3 years	6	16.2
3-8 years	9	24.3
9-15 years	11	29.7
16-25 years	7	18.9
>25 years	4	10.8
Region of practice		
North central	9	13.0
North west	3	4.3
South east	2	2.8
South-south	17	25.6
South west	38	55.1
Practice Setting		
Private Practice	3	4.3
General Hospital	8	11.6
Teaching Hospital	38	55.1
Military Hospital	1	1.4
2 or more settings	19	27.5
Number of days at work in a week (Mean ± SD)		4.5 ± 1.08
Number of hours in a week at work (Mean ± SD)		28.3 ± 9.91

Table 2. Descriptive data of orthodontic occupational stress survey (N = 69)

Possible stressor	Minimum Stress Score	Maximum Stress Score
#1 Motivation of patients with poor hygiene strains me a lot.	1	5
#2 Lack of patient compliance with treatment instructions is painful.	3	5
#3 Patients who are late than the scheduled time, stress me.	2	5
#4 Treating a case with an unfavourable prognosis is disturbing.	2	5
#5 I am tense when patients come with broken appliances.	1	5
#6 Performing clinical tasks on a difficult or uncooperative patient is frustrating to me.	3	5
#7 Motivation of patients with poor elastic and/or headgear compliance stresses me.	2	5
#8 A backache or pain in the back and other musculoskeletal problems caused by prolonged working bothers me a lot.	1	5
#9 I am upset when patients are late or missing adjustment appointments.	2	5
#10 Maintaining high levels of concentration for long periods of time without breaks make me tense.	1	5
#11 Managing "burnt-out" patients makes me tense.	1	5
#12 I am distressed due to the pressure from patients and/or parents to remove appliances before treatment is completed to my satisfaction.	1	5
#13 I am burnt-out by long work hours and constant work pressure.	1	5
#14 I become tense over equipment breakdown and defective materials.	1	5
#15 Patients' leaving of their treatment halfway and getting them transferred to another clinic is stressful.	1	5
#16 Significant paperwork and administrative duties assigned to me at my workplace affects my professional capabilities and stresses me.	1	5
#17 Threat of unfavourable prognosis significantly affects the way of my practice.	1	5
#18 Patients not understanding why appointments are not available.	1	5
#19 Question 19. [Emergency patient's treatment is upsetting.	1	5
#20 Lack of clear communication with other dental specialties stresses me	1	5
#21 The reaction/dissatisfaction of patients due to the prolonged orthodontic treatment stresses me at large.	1	5
#22 Health hazards: physical, chemical, and biological are significant sources of worry.	1	5
#23 I am worried about contracting infection at work place.	1	5
#24 Fear of relapse in retention patients causes stress.	1	5
#25 I am burnt-out seeing the long waiting lists.	1	5
#26 My work schedule is not flexible.	1	5
#27 Retention phase of orthodontic treatment often stresses me after treating the patients.	1	5
#28 I have adequate time for relaxation.	1	5
#29 Meeting patients' aesthetic or functional expectations is a stressful mission.	1	5
#30 Working as an orthodontist is not a stressful job.	1	4
#31 Significant numbers of my patients have unrealistic expectations regarding the outcome of orthodontic treatment.	1	5
#32 Interpersonal problems with colleagues often stress me a lot.	1	5
#33 I have adequate time for my personal and family life.	1	5
#34 I face staff-related problems (absenteeism, personal friction etc.), which disturb me.	1	5
#35 I feel stressed due to fear of sharp injuries caused by a small operating field, frequent patient movement, and the variety of sharp instruments (e.g. cutter) or materials (e.g. orthodontic wire or pins).]	1	5

Scale from 1 (completely disagree) to 5 (completely agree)

Table 3. Rank order of potential stressors evaluated in the study based on the mean severity score

Rank	Possible stressor	Mean severity score	SD
1	[†] Lack of patient compliance with treatment instructions is painful.	4.28	0.68
2	[†] Treating a case with an unfavorable prognosis is disturbing.	4.16	0.70
3	[†] Performing clinical tasks on a difficult or uncooperative patient is frustrating to me.	4.12	0.68
4	[†] I become tense over equipment breakdown and defective materials.	3.93	0.93
5	[†] Motivation of patients with poor hygiene strains me a lot.	3.84	0.78
6	[†] A backache or pain in the back and other musculoskeletal problems caused by prolonged working bothers me a lot.	3.84	0.83
7	[†] Patients who are late than the scheduled time, stress me.	3.84	0.68
8	I am worried about contracting infection at work place.	3.74	1.01
9	Motivation of patients with poor elastic and/or headgear compliance stresses me.	3.65	0.70
10	Health hazards: physical, chemical, and biological are significant sources of worry.	3.64	1.10
11	The reaction/dissatisfaction of patients due to the prolonged orthodontic treatment stresses me at large.	3.62	0.94
12	I am upset when patients are late or missing adjustment appointments.	3.61	0.77
13	Significant paperwork and administrative duties assigned to me at my workplace affects my professional capabilities and stresses me.	3.46	1.05
14	Patients not understanding why appointments are not available.	3.45	1.04
15	I am burnt-out by long work hours and constant work pressure.	3.38	1.11
16	I am tense when patients come with broken appliances.	3.36	0.99
17	Fear of relapse in retention patients causes stress.	3.35	0.98
18	Patients' leaving of their treatment halfway and getting them transferred to another clinic is stressful.	3.35	1.04
19	Threat of unfavorable prognosis significantly affects the way of my practice.	3.30	0.98
20	I am distressed due to the pressure from patients and/or parents to remove appliances before treatment is completed to my satisfaction.	3.30	1.06
21	Managing "burnt-out" patients makes me tense.	3.28	0.94
22	Lack of clear communication with other dental specialties stresses me	3.22	0.95
23	Maintaining high levels of concentration for long periods of time without breaks make me tense.	3.16	1.05
24	I am burnt-out seeing the long waiting lists.	3.14	1.05
25	I face staff-related problems (absenteeism, personal friction etc.), which disturb me.	3.04	1.04
26	Meeting patients' aesthetic or functional expectations is a stressful mission.	3.03	0.89

^a Scale from 1 (completely disagree) to 5 (completely agree). Only those with mean severity score greater than or equal to 3.0 are presented SD, standard deviation; [†]Most Concerning Stressors in Orthodontics with mean severity scores equal to or greater than 3.75

Table 4. Comparison of mean stress severity score in relation to the sociodemographic and professional characteristics of study subjects

Variable	N	Mean	SD	F value/t value	P value
Gender					
Male	35	3.52	0.43	3.405	0.001**
Female	34	3.18	0.38		
Age group (Years)					
<30	7	3.25	0.45	1.365	0.256
31-40	26	3.37	0.37		
41-50	23	3.25	0.43		
51-60	9	3.51	0.63		
>60	4	3.70	0.30		
Cadre					
Resident	32	3.36	0.49	0.222	0.825
Specialist/Consultant	37	3.34	0.40		
Region of practice					
North central	9	3.36	0.46	1.112	0.359
North west	3	3.57	0.42		
South east	2	3.19	0.42		
South-south	17	3.51	0.49		
South west	38	3.27	0.41		
Practice Setting					
Private Practice	3	2.95	0.46	1.982	0.108
General Hospital	8	3.44	0.44		
Teaching Hospital	38	3.29	0.42		
Military Hospital	1	2.91	0		
2 or more settings	19	3.53	0.43		

** Significant at $P < 0.01$

4. DISCUSSION

Stress is defined as the biological reaction to any adverse internal or external stimulus, physical, mental or emotional which tends to disturb the organism's homeostasis.[13] It is considered as a factor that could either stimulate and motivate to peak performance or reduce to ineffectiveness.[14] High levels of stress have been associated with work-life conflicts[15] and can lead to depression.[16]

Several studies have shown that dentistry generates more stress than other professions because of the nature and the working conditions of dentists.[17] Over half of orthodontists and orthodontic residents in Nigeria responded to the present survey. The descriptive data showed that a wide range of practice and personal characteristics were represented.

Analysis of the potential stressors revealed 26 items that received a mean severity score of 3.0 or greater. Only seven items received mean severity scores of 3.75 or greater and were considered the most concerning stressors in orthodontic practice. It was previously suggested that these items should be considered stressful by most orthodontists and should occur more frequently than once a month.[5]

These findings agree with previous studies conducted among orthodontists in different countries [5,8] which reported similar most frequent sources of stress in orthodontic clinical setting. These factors include factors related to patient's motivations such as lack of patient's compliance and treating uncooperative patients and those related to time management such as patients arriving later than their scheduled appointment time. These attitudes from patients towards orthodontic treatment were found to be prevalent and sources of stress to orthodontic practitioners despite the different ethnicities.

The need to deliver quality health-care services consistently is putting an unprecedented strain on the well-being of health-care workers and their productivity is negatively affecting organizational health indices.[18] There is a positive association between work-related illness and exposure to psychosocial stress.[19] Among the European Union member nations, psychosocial stress, affected 22% of workers from 2000 to 2005, contributing to 60% of all lost working days, with cost amounting to 4% of gross national product lost.[20] Occupational hazards among health-care workers in a tertiary hospital in Bida, Niger State, Nigeria was examined, and the overall prevalence of psychosocial stress was found at 46%.[21] In Holland, 13% to 16% of dentists suffer from professional stress.[22]

Table 5. Results of correlation between mean stress severity score and work-related variables

Variable	N	Mean	SD	r	P value
Gender					
Male	35	3.52	0.43	-0.384	0.001**
Female	34	3.18	0.38		
Region of practice					
North central	9	3.36	0.46	0.242	0.045*
North west	3	3.57	0.42		
South east	2	3.19	0.42		
South-south	17	3.51	0.49		
South west	38	3.27	0.41		
Age group (Years)					
<30	7	3.25	0.45	0.171	0.161
31-40	26	3.37	0.37		
41-50	23	3.25	0.43		
51-60	9	3.51	0.63		
>60	4	3.70	0.30		
Number of working days in a week	69	4.50	1.08	-0.123	0.316
Number of working hours in a week	69	28.30	9.91	-0.052	0.674

** Significant at $P < 0.01$; * Significant at $P < 0.05$

Table 6. Multiple Regression for mean stress severity score

Model	B	SE	Beta	Significance
Gender	-0.260	0.106	-0.298	0.018*
Region of practice	0.044	0.037	0.142	0.243
Age groups (Years)	0.099	0.072	0.230	0.173
Cadre	0.130	0.143	0.149	0.366
Practice settings	0.063	0.048	0.164	0.194
Number of working days in a week	-0.063	0.055	-0.154	0.258
Number of working hours in a week	0.004	0.007	0.086	0.562

$R^2 = 0.236$, $F(7,61) = 2.695$, $P = 0.017$

* Significant at 0.05 level; SE = Standard Error

These results suggest that focusing on patient education, oral hygiene maintenance and strict adherence to instructions, may help alleviate occupational stress among orthodontists [5] Furthermore, clinicians can also decrease occupational stress by considering ways to improve their time-management skills and examining patient's expectations and motivation for orthodontic treatment.

Comparison of the mean severity scores for stressors in relation to the sociodemographic characteristics of orthodontists and orthodontic residents showed that the mean stress severity score for stress was higher among males when compared to female respondents (Table 4), with gender being the only significant predictor of mean stress severity score (Table 6). This finding is contrary to previous studies which found that females perceived more stress than males, [14,23,24] but similar some studies which reported that males perceived more stress than female. [25,26] Results from the present study concurs with report that men have the perception of greater pressure from quantitative demands such as working fast and working under time pressure than women. [27] It also aligns with the

findings that support from co-workers and supervisors have been found to reduce job stress with greater impact on level occupational stress among women. [27]

Personality and individual differences may have an influence on response to stress. [28] The final regression model was only able to account for approximately a quarter of the variation in the mean stress severity score. This suggests that stress severity is influenced more by other factors, such as personality, than by the combined effects of the variables used in this survey.

Our study offers several practical implications for designing organisational policies aimed at reducing occupational stress among orthodontists. Because male orthodontists and orthodontic residents were found to perceive more stress than females, preventive policies such as improved organisation of tasks and encouraging improvements in time management among the workers should be encouraged. For women, stress prevention can also be improved by social support using a more suitable design of the workgroups.

This study has a number of limitations, one of which is that environmental differences may affect the perceptions of impact, thus it may not be able to directly extrapolate some of the results of this study to orthodontists practicing in other countries. The perceptions as recorded are subjective and may also be confounded by individual circumstances of each respondent that may affect their perception of some of the situations assessed in the study. Thus, further examination of longitudinal data to examine the effects of changes in environmental factors on work-related stress for orthodontists and orthodontic residents is recommended. Further research should be carried out on whether the differences between men and women undergo variations depending on the variable that is used as an indicator of occupational stress.

5. CONCLUSION

Evaluation of the occupational stress and determination of the potential stressors perceived by orthodontists and orthodontic residents in Nigeria showed that the most concerning stressors in orthodontic practice are those related to time management and patients' motivation. Therefore, time management, proper patient selection and patient education can address the most concerning stressors and result in improved treatment outcomes. Elimination of inherent causes of these stressors through precise identification can help in developing effective coping mechanisms.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Ethical clearance was sought and obtained from the University of Port Harcourt Teaching Hospital Research and Ethics Committee.

DISCLAIMER

This research did not receive any specific grant from any funding agency in the public, commercial or not-for-profit sector and there is no relationship with any party that may present a potential conflict of interest.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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