

Research · Science Forschung · Wissenschaft Recherche · Science

Publisher

Herausgeber
Editeur

Schweizerische Zahnärzte-
Gesellschaft SSO
Société Suisse
d'Odonto-Stomatologie
CH-3000 Bern 7

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Ich bedanke mich bei den unten aufgeführten Kolleginnen und Kollegen für ihre wertvolle Mitarbeit, die sie in den vergangenen zwei Jahren geleistet haben.

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Stress and burnout among Swiss dental residents

Key words: stress, burnout, dental education, residents, dental students

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Accepted for publication:

30 November 2011

Summary Stress and burnout have been well-documented in graduate medical and undergraduate dental education, but studies among dental graduate students and residents are sparse. The purpose of this investigation was to examine perceived stressors and three dimensions of burnout among dental residents enrolled in the University of Bern, Switzerland. Thirty-six residents enrolled in five specialty programmes were administered the Graduate Dental Environment Stress (GDES30) questionnaire and the Maslach Burnout Inventory (MBI). Individual stress items and overall GDES30 scores were used to quantify perceived stress. To measure burnout, proportions of burnout “cases” and MBI subscale scores were computed in the domains of emotional exhaustion (EE), depersonalization

(DP) and reduced personal accomplishment (PA). Analyses relied on descriptive and bivariate methods. The mean GDES30 score was 2.1 (SD = 0.4). “Lack of leisure time”, “meeting the research requirement of the programme” and “completing graduation requirements” emerged as the top three stressors. Thirty-six percent of respondents were burnout “cases” on the PA scale, while this proportion was 17% for EE and 8% for DP. Both stress and burnout levels increased according to year of study, whereas younger residents and females had consistently higher stress and burnout scores compared to older ones and males. Overall, low levels of perceived stress and burnout were found among this group of Swiss dental residents.

Introduction

Advanced training and specialisation in health sciences is a complex educational procedure which poses unique challenges to young professionals. Residents of all specialties often have multiple clinical, teaching and research assignments, long work hours, and additional strains that typically accompany a young individual’s life, including financial issues, parallel employment, family obligations, and others (THOMAS 2004). Compounding these, residents have little control over several perceived stressful events and procedures, a condition that, if

perpetuated, can be debilitating (GEURTS ET AL. 1999, ROSEN ET AL. 2006, SCHMITTER ET AL. 2008). Indeed, several reports link perceived stress and fatigue with reduced clinical performance and increased rates of medical errors (HILLHOUSE ET AL. 2000, SHANAFELT ET AL. 2002, WEST ET AL. 2009).

In dental education, stress and its symptoms are frequently articulated concerns among students (HENZI ET AL. 2007, DIVARIS ET AL. 2008, ALZAHM ET AL. 2011). Although “some stress” is to be expected in clinical practice and is a potentially beneficial learning stimulus, it is common ground that an ideal educational environment should not be overly pressing. Evidence

from diverse settings, however, reveals that substantial proportions of dental students demonstrate signs of psychological morbidity during their training (PÖHLMANN ET AL. 2005, GORTER ET AL. 2008, BADRAN ET AL. 2010). Most concerning have been findings indicating that some dental students may exhibit early signs and symptoms of burnout, a term used to describe the development of emotional exhaustion, depersonalization and reduced personal accomplishment among professionals (MASLACH AND JACKSON 1983, DAVIS ET AL. 1989).

Dental residents, interns and postgraduate students, while being exposed to both academic and professional stressors, comprise a sensitive group that has received little attention. These trainees are involved in direct clinical care, have teaching or attending duties, and are often involved in research, which makes them a very active and strategic component of a dental school or hospital setting (FORMICOLA ET AL. 2006). While substantial work with regard to stress and burnout has been carried out in the arena of undergraduate dental education, similar studies among dental residents have been sparse. To date, data among dental residents have been reported only in three studies, by investigators in the United Kingdom (HUMPHRIS ET AL. 1997), Spain (ALEMANY MARTINEZ ET AL. 2008) and Greece (DIVARIS ET AL. 2012). To this end, and to add to the knowledge base of stress and burnout among dental interns, the purpose of this investigation was to examine perceived stressors and three dimensions of burnout among dental residents enrolled in the University of Bern, Switzerland.

Subjects and Methods

All residents officially enrolled in the University of Bern, School of Dental Medicine, and attending mandatory classes during the spring semester of 2011 comprised the target population ($n=43$) and were invited to participate in the study. Contact rate was 100%. The study sample included residents in six clinics: Oral Surgery and Stomatology; Orthodontics and Dentofacial Orthopedics; Periodontology; Preventive, Restorative and Paediatric Dentistry; Prosthodontics and Fixed Prosthodontics. The residency programmes of these clinics lead to a Certificate and/or a Masters of Advanced Studies (MAS) degree. The programmes have three- or four-year duration and residents receive salary or stipend during their training.

To measure perceived stress, the Graduate Dental Environment Stress (GDES30) questionnaire was used (DIVARIS ET AL. 2012). The GDES30 is a modification of an early inventory of items used by Garbee and colleagues (GARBEE ET AL. 1980), and consists of thirty items pertaining to academic and clinical stressors encountered in a dental education setting. Participants are asked to rate these items on a four-point Likert scale as 1: "not stressful at all", 2: "somewhat stressful", 3: "quite stressful", 4: "very stressful", or "prefer not to answer/non-applicable". To quantify burnout the 22-item Maslach Burnout Inventory (MBI) (MASLACH ET AL. 1996) was employed, as in previous investigations (GORTER ET AL. 2008, DIVARIS ET AL. 2012). The three dimensions of burnout that we measured were emotional exhaustion (EE; nine items), depersonalization (DP; five items) and personal accomplishment (PA; eight items). Participants were asked to rank these items on a seven-point Likert scale where 0 means "never", 1: "a few times a year", 2: "monthly", 3: "a few times a month", 4: "weekly", 5: "a few times a week" and 6: "every day". Furthermore, the subscale score thresholds that are recommended by the MBI manual (MASLACH ET AL. 1996) were used to identify individuals who met the criteria of burnout "cases" – EE: >26 , DP: >12 , and PA: <32 . Additional

information was collected on participants' gender, age, and programme type. All study instruments were administered in print and in English language. Residents were invited to complete the questionnaires with pen or pencil and completion required approximately 20 minutes. The anonymous nature and the purpose of the study were explained to all participants, and participation was voluntary.

Descriptive and bivariate methods were used for data presentation and analysis. Summary statistics (proportions, mean and standard deviation [SD]) were used to summarize the responses to the thirty stress items, as well as the participants' demographic information. Cronbach's *alphas* were computed as measures of the GDES and the MBI internal consistency. Prior to computing stress and burnout subscale mean scores, we used an item mean substitution approach (HUISMAN 2000) to address missing data in a non-biased manner, while retaining the initial sample size. Subsequently, overall and covariate-stratified mean GDES30 and MBI subscale scores were computed. In addition, proportions of burnout "cases" were calculated among the entire sample of residents, and stratified by gender, age group (less than 30 versus 30 years or older), and year of study (first, second, and third or higher). Due to the small analytical sample size and the low statistical power of the study, we did not embark in any formal hypothesis testing, but rather report on empirical differences in these mean scores and proportions. The statistical program Stata® 12.0 (StataCorp LP, College Station, Texas) was used for data analysis.

Results

Of the 43 dental residents that were contacted, 36 (84%) agreed to participate and completed the survey instruments. Cronbach's *alphas* for the stress and burnout scales were GDES30: 0.90, EE: 0.90, DP: 0.78, and PA: 0.82. Respondents had mean age of 30 years and were balanced in terms of gender (Tab. I). Among the respondents 5 (14%) were residents in Oral Surgery

Tab. I Descriptive information of the 36 dental residents at the University of Bern

	N (percent*)
Demographic	
Gender	
Female	18 (51)
Male	17 (49)
missing	1
Age (years; mean, standard deviation)	
	29.8 (2.4)
≤ 30 years	22 (63)
> 30 years	13 (37)
missing	1
Year of study	
First	11 (31)
Second	12 (33)
Third or higher	13 (36)
Programme type	
Oral Surgery and Stomatology	5 (14)
Orthodontics and Dentofacial Orthopedics	9 (25)
Periodontology	5 (14)
Preventive, Restorative and Paediatric Dentistry	7 (19)
Prosthodontics	6 (17)
Fixed Prosthodontics	4 (11)
* Calculated among respondents with non-missing information	

and Stomatology, 9 (25%) in Orthodontics and Dentofacial Orthopedics, 5 (13%) in Periodontics, 7 (19%) in Preventive, Restorative and Paediatric Dentistry, and 6 (17%) in Prosthodontics and 4 (11%) in Fixed Prosthodontics. Residents in the first, second, and third or higher study years were equally represented.

The mean overall GDES30 was 2.1 (SD = 0.4), a score that corresponds to a “somewhat stressful” level. Distributions of individual item responses, as well as item mean scores are presented in Tab. II. Item means ranged from 1.5 to 2.7, while “lack of leisure time”, “meeting the research requirement of the programme” and “completing graduation requirements” emerged as the top three stressors. “Financial issues” was classified as “very stressful” by 17% of respondents and was the fourth ranked stressor. A gradient of increasing perceived stress was noted between residents of the first (1.9), second (2.0), and third or higher (2.3) study year. Moreover, participants 30 years

or younger and females had slightly higher GDES30 scores compared to older residents and males.

With regard to burnout, 36% of respondents were “cases” in the PA dimension (Tab. III). This proportion was lower for EE (17%) and DP (8%). Similarly to perceived stress, residents in higher study levels demonstrated worse burnout subscale scores and higher proportion of “cases”. With regard to age and gender, younger residents and females consistently had the least favorable burnout scores and higher proportion of “cases”. Although these differences were not formally tested, the proportion of burnout “cases” was at least twice as high in virtually all of these contrasts.

Discussion

This study found relatively low levels of perceived stress and burnout among a group of thirty-six Swiss dental residents.

Tab. II Distribution of responses to the thirty stressors of the Graduate Dental Environment Stress (GDES30) questionnaire, with item mean scores and standard deviation (SD), and ranking of the items among the 36 dental residents at the University of Bern

Stress Items	n*	Percent** of responses				Item score mean (SD)	Rank***
		1	2	3	4		
1. Amount of assigned readings	32	9	59	25	6	2.3 (0.7)	9
2. Difficulty of assigned readings	33	15	48	36	0	2.2 (0.7)	11
3. Competition for higher performance	33	21	52	24	3	2.1 (0.8)	17
4. Patients being late or breaking their appointments	36	28	44	14	14	2.1 (1.0)	14
5. Examinations/assessments	32	25	25	38	12	2.4 (1.0)	7
6. Collaboration with full-time faculty	27	41	37	22	0	1.8 (0.8)	26
7. Learning laboratory techniques	26	58	38	4	0	1.5 (0.6)	30
8. Learning clinical/surgical techniques	36	50	22	22	6	1.8 (1.0)	26
9. Lack of adequate staff in the clinics	36	36	19	33	11	2.2 (1.1)	12
10. Lack of confidence to be a successful resident	36	17	53	25	6	2.2 (0.8)	13
11. Lack of confidence to become a successful specialist	35	20	43	26	11	2.3 (0.9)	8
12. Meeting research requirement of the programme	33	9	45	30	15	2.5 (0.9)	2
13. Policies and regulations of the programme	33	18	52	30	0	2.1 (0.7)	15
14. Obtaining adequate clinical experience	36	28	42	28	3	2.1 (0.8)	21
15. Completing graduation requirements	34	12	38	38	12	2.5 (0.9)	3
16. Lack of input in administrative issues of the programme	34	24	50	21	6	2.1 (0.8)	18–19
17. Insecurity regarding professional future	34	32	38	24	6	2.0 (0.9)	22
18. Financial issues	35	26	26	31	17	2.4 (1.1)	4–6
19. Lack of time for leisure activities	36	6	39	39	17	2.7 (0.8)	1
20. Inconsistency of feedback between different instructors	35	26	23	37	14	2.4 (1.0)	4–6
21. Availability of faculty to work-up cases	29	31	48	14	7	2.0 (0.9)	24
22. Lack of compliance/communication with patients	36	42	39	17	3	1.8 (0.8)	29
23. Leave of absence and holiday days allowed	35	34	34	26	6	2.0 (0.9)	23
24. Fear of failure when treating complex cases	35	14	46	26	14	2.4 (0.9)	4–6
25. Neglect for personal life	34	26	44	24	6	2.1 (0.9)	18–19
26. Awareness of own competences and limitations	35	29	46	17	9	2.1 (0.9)	20
27. Collaboration with part-time (clinical) faculty	23	43	30	22	4	1.8 (0.9)	25
28. Doing case presentations to patients	32	16	56	16	12	2.2 (0.9)	10
29. Doing presentations in seminar activities	31	26	45	23	6	2.1 (0.9)	16
30. Collaboration with other specialties/services	33	39	45	9	6	1.8 (0.8)	27

* Number of non-missing responses

** Percent calculated among non-missing responses, where 1: not stressful at all, 2: somewhat stressful, 3: quite stressful, 4: very stressful

*** Items ranked from highest to lowest mean score

Tab.III Distribution of perceived stress (GDES30 mean score and standard deviation [SD]) and burnout (MBI subscale mean scores and SD, and percent of "high" or "low scorers", or "cases") among the entire sample, and stratified by age, gender and year of study among the 36 dental residents at the University of Bern

		Perceived stress			Burnout			
		GDES30 mean	Emotional exhaustion mean (SD)	% high*	Depersonalization mean (SD)	% high**	Personal accomplishment mean (SD)	% reduced***
Overall		2.1 (0.4)	14.3 (9.5)	17	3.7 (4.2)	8	34.4 (7.6)	36
Age								
	≤ 30 years	2.2 (0.4)	16.7 (10.2)	22	4.6 (4.7)	14	33.2 (7.9)	45
	> 30 years	2.0 (0.4)	10.5 (7.2)	7	2.2 (2.9)	0	36.0 (7.1)	23
Gender								
	Female	2.2 (0.5)	16.2 (11.0)	22	3.6 (4.4)	11	32.9 (7.6)	44
	Male	2.1 (0.4)	12.5 (7.6)	11	3.9 (4.2)	6	35.6 (7.8)	29
Year of study								
	First	1.9 (0.4)	11.2 (7.7)	9	3.0 (3.6)	0	36.3 (10.4)	27
	Second	2.2 (0.4)	13.4 (10.0)	17	3.4 (4.4)	8	32.3 (6.9)	50
	Third or higher	2.3 (0.4)	17.6 (9.9)	23	4.5 (4.7)	15	34.8 (5.3)	31

* Proportions of burnout "cases" were calculated using the thresholds used in the Maslach Burnout Inventory – high emotional exhaustion score: >26

** High depersonalization score: >12

*** Reduced personal accomplishment score: <32

Although not directly comparable, this finding is consistent with results reported by Pöhlmann and colleagues (PÖHLMANN ET AL. 2005), who found that undergraduate dental students from Bern had the lowest EE and PA among a multi-school study among Swiss and German students. Moreover, the overall stress score of 2.1 among the surveyed residents was lower than estimates reported in a previous study among Greek residents (DIVARIS ET AL. 2012) that employed the same stress survey instrument.

The fact that "lack of leisure time" and "completing graduation requirements" were the highest ranked stressors is not surprising given the nature of residency training, and is consistent with previous findings among dental students and residents (SOFOLA & JEBODA 2006, POLYCHRONOPOULOU & DIVARIS 2009, ALZAHM ET AL. 2011). In fact, "lack of leisure time" was also the top stressor among dental undergraduates from the same institution in the Pöhlmann study (PÖHLMANN ET AL. 2005). The equally high ranking of "completing the research requirement of the programme" is also indicative of the additional perceived pressures that residents have to cope with beyond their clinical training.

Despite being limited by a small sample size, our data revealed some variation in stress and burnout by study year. Specifically, higher study year was associated with increased perceived stress, worse burnout subscale scores and higher prevalence of burnout "cases". Although perceived stress can be linked to transitions through different stages of dental training (POLYCHRONOPOULOU & DIVARIS 2010), these differences between year of study should be considered in the context of the specific institution. Small between-programme type variations were also noted in the study by Humphris and colleagues (HUMPHRIS ET AL. 1997). In any case, it must be acknowledged that the typically small size of all studies in the field limits their between-subgroups inferential potential.

Considering a potential heterogeneity with regard to gender and age, this study found little variation in perceived stress. Interestingly, similar differences of 0.1–0.2 points in mean GDES30 were found among Greek residents, with females and younger subjects having the highest scores (DIVARIS ET AL. 2012).

Although these differences are too small to be of practical importance, they are consistent with the body of literature indicating gender differences in appraising and experiencing the dental educational environment (MUIRHEAD & LOCKER 2008, POLYCHRONOPOULOU & DIVARIS 2010, ALZAHM ET AL. 2011). The reasons underlying this gender difference in perceiving or reporting higher levels of stress are not entirely clear, as socio-cultural differences may confound this phenomenon (SANDERS & LUSHINGTON 1999, POLYCHRONOPOULOU & DIVARIS 2005, SCHÉLE ET AL. 2011). In spite of this, a "locus of control" perspective has been suggested as an important mechanism (MUHONEN & TORKELOSON 2004). This is consistent with the finding of older residents reporting less stress and being less prone for burnout development, as coping mechanisms, sense of control and resourcefulness are likely to increase over time. Other reports, however, suggest that some aspects of burnout are closely related to personality characteristics (HUMPHRIS ET AL. 1997). Keinan and Melamed (KEINAN & MELAMED 1987) have demonstrated, for example, that individuals who display increased tendency for emotional reactivity and those who lack resourcefulness are more likely to suffer from burnout.

It must be emphasized that stress and burnout are essentially individual-level manifestations resulting from an array of multi-level factors. Considering the case of residents in an academic setting, these stress and burnout-associated factors can be broadly classified as proximal and distal. Proximal factors include personal characteristics such as age, gender, personality traits, individual experiences, and others (MCMANUS ET AL. 2004). Distal factors may include "environmental" influences such as the specific stressors in the work environment, peer support, financial issues, family and social circumstances, as well as the cultural context. Because these factors operate as an ensemble in complex, often unobservable ways (LINK & PHELAN 1995), disentangling their individual contributions is challenging. For this reason, direct comparisons between studies from different countries, with varying educational philosophies and cultural background, should be made with caution. We anticipate that, to some degree, individual, programme, and country-level factors are associated with stress and burnout develop-

ment among dental residents. Conduct of a large, multi-national survey would allow a more comprehensive consideration of all proximal and distal factors.

Overall, low levels of perceived stress and burnout were found among this group of Swiss dental residents, but some variations were noted with regard to gender, age, and year of study. More studies, possibly involving qualitative methodology or "climate" surveys, may provide confirmatory results, more insights and recommendations with regard to specific stressors in residency training and in the specific dental institution. Addressing such issues that often arise in educational settings can help improve the psychological and professional well-being of trainees, and contribute to a superior academic environment.

Résumé

Le stress et l'épuisement professionnel sont des phénomènes bien connus dans les études et la formation continue en médecine et médecine dentaire. Dans le domaine médical, le stress chez les internes a été associé avec de graves conséquences, telles que la diminution de la performance et l'augmentation d'erreurs médicales. A ce jour, peu d'études sont connues évaluant le stress chez les étudiants et internes en médecine dentaire. Cette enquête avait pour but d'étudier les facteurs de stress perçus et les facteurs influençant l'épuisement professionnel chez les internes en médecine dentaire de l'Université de Berne. 36 internes des 6 cliniques dentaires ont été invités à remplir le questionnaire Graduate Dental Environment Stress (GDES30) ainsi que le Maslach Burnout Inventory (MBI). 11 participants étaient des internes en première année, 2 en deuxième et 13 en troisième ou plus. Pour quantifier le stress perçu, les facteurs de stress individuels et le score GDES total ont été pris en considération. Le nombre de cas de burnout et le MBI subscale scores divisés par secteur d'épuisement émotionnel (EE), dépersonnalisation (DP) et diminution de la performance personnelle ont été pris en considération pour la quantification du burnout. Des analyses descriptives et bivariées ont été effectuées. La participation d'internes masculins et féminins était équilibrée. L'âge moyen était de 30 ans. Le score GDES en moyenne était 2.1 (DS = 0.4). Le stress perçu subjectivement correspondait à un degré de «un peu stressant». Les facteurs de stress les plus cités étaient «manque de loisir», «atteinte des exigences du programme de formation continue» et «obtention du diplôme». Basant sur l'échelle PA, 36% correspondaient à des cas de burnout montrant 17% pour l'EE et 8% pour le DP. Le niveau de stress ainsi que celui du burnout augmentait proportionnellement avec les années de formation, alors que surtout les internes de jeune âge et de gent féminine montraient des valeurs de stress et de burnout les plus élevées. Des résultats similaires concernant les facteurs de stress les plus cités ont été documentés dans des études précédentes. Par contre, le taux de stress et de burnout était moins élevé dans cette enquête. Malgré le petit nombre de cas limitant le potentiel inférentiel, diverses corrélations entre âge, sexe, année de formation et stress perçu, ainsi que burnout ont été identifiées. De futures enquêtes impliquant des analyses qualitatives ou des interrogations environnementales pourraient confirmer les données existantes, et donner plus d'informations ainsi que des recommandations concernant les facteurs de stress dans la formation continue dans les cliniques dentaires spécifiques.

Des études et connaissances ultérieures pourraient favoriser le bien-être des internes et mener à un environnement académique plus agréable.

Zusammenfassung

Stress und Burnout sind in der Aus- und Weiterbildung der Medizin und Zahnmedizin gut dokumentiert. Im medizinischen Bereich wurden Stress und Burnout bei den Weiterbildungsassistenten mit schwerwiegenden Folgen wie Leistungsabfall und erhöhtem Risiko für Kunstfehler in Verbindung gebracht. Es gibt bis heute nur wenige Studien über Stress und Burnout bei den Studenten und Weiterbildungsassistenten der Zahnmedizin. Das Ziel dieser Studie war, subjektive Stressfaktoren sowie Faktoren, die das Burnout beeinflussen, bei den Weiterbildungsassistenten der Zahnmedizin der Universität Bern zu erfassen.

36 Weiterbildungsassistenten aus 6 zahnmedizinischen Kliniken wurden angefragt, den Graduate-Dental-Environment-Stress (GDES30) und den Maslach Burnout Inventory (MBI) Fragebogen auszufüllen. 11 der Befragten befanden sich im ersten Weiterbildungsjahr, 2 im zweiten und 13 im dritten oder in einem höheren. Um den wahrgenommenen Stress zu quantifizieren, wurden individuelle Stressfaktoren und gesamte GDES Scores berücksichtigt. Die Quantifizierung des Burnouts erfolgte über die Berechnung der Anzahl Burnout-Fälle und MBI Subscale Scores unter den Sparten emotionale Erschöpfung (EE), Depersonalisation (DP) und verminderte persönliche Leistung (PA). Deskriptive und bivariate Analysen der Daten wurden durchgeführt. Es konnte eine gleichmässige Verteilung zwischen männlichen und weiblichen Teilnehmern festgestellt werden. Das Durchschnittsalter betrug 30 Jahre. Der durchschnittliche GDES Score war 2.1 (SD = 0.4). Die subjektive Stresswahrnehmung entsprach somit der Stufe «ein wenig gestresst». Die meistgenannten Stressfaktoren waren «mangelnde Freizeit», «Erreichen der Anforderungen des Weiterbildungsprogrammes» und «Erfüllen des Weiterbildungsabschlusses». 36 Prozent der Teilnehmer waren gemäss PA-Skala Burnout-Fälle mit einem Anteil von 17% für EE und 8% für DP. Sowohl Stress- als auch Burnout-Level nahmen proportional mit dem Weiterbildungsjahr zu, während hauptsächlich jüngere und weibliche Weiterbildungsassistenten die höchsten Stress- und Burnout-Scores zeigten. Ähnliche Resultate bezüglich der meistgenannten Stressfaktoren konnten bereits in früheren Studien gefunden werden. Hingegen waren die Stress- und Burnout-Scores in dieser Studie tiefer. Insgesamt war der Level von subjektivem Stress und Burnout bei dieser Gruppe von Schweizer Weiterbildungsassistenten der Zahnmedizin tief. Obwohl das inferenzielle Potenzial dieser Studie wegen der kleinen Fallzahl limitierend war, konnten bei den erfassten Daten verschiedene Korrelationen zwischen Alter, Geschlecht, Weiterbildungsjahr und subjektivem Stress sowie Burnout gefunden werden. Weitere Studien mit Einbezug von qualitativen Analysen oder «Umwelt»-Befragung könnten bestätigende Ergebnisse und mehr Einblick sowie Empfehlungen bezüglich Stressfaktoren im Weiterbildungsprogramm in spezifischen zahnmedizinischen Kliniken liefern. Weitere Untersuchungen und daraus resultierende Erkenntnisse könnten das Wohlbefinden der Weiterbildungsassistenten fördern und zu einem verbesserten akademischen Umfeld führen.

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