A systematic review of dentists' psychological wellbeing during the COVID-19 pandemic

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Key points

This systematic review confirms the impact of the early phases of the COVID-19 pandemic on the psychological health of dentists.

Benefits include the identification of the pre-eminent risk and protective factors for long-term psychological wellbeing.

The distinction between operational and organisational elements may provide an important future framework for understanding the impact of job stressors in additional high-stress healthcare professions.

Abstract

Background The COVID-19 pandemic presented significant challenges to healthcare workers worldwide, including the effect on the psychological wellbeing of dentists.

Aims To evaluate the impact of the early phases of the pandemic on the psychological health, long-term wellbeing and clinical service provision of dentists, as well as the identification of the key risk and protective factors for adverse mental health outcomes (MHOs) in this group.

Methods A systematic review of cross-sectional studies (n = 53) from public and private dentistry sectors was employed to delineate the risk and protective factors for adverse MHOs.

Results Self-reports from these studies (1 December 2019 to 31 December 2021), involving 45,671 dentists worldwide were analysed. Study findings were classified according to their psychological impact (as risk or protective factors), categorised as 'operational' or 'organisational' and subdivided into 'psychosocial', 'occupational', 'sociodemographic' and 'environmental' elements. A GRADE (Grading of Recommendations, Assessment, Development, and Evaluations) certainty of evidence score was calculated for all the identified factors.

Conclusions This review confirmed the negative impact of the pandemic on the MHOs of dentists worldwide. Pivotal risk factors included fear of infection, transmission to families, lack of personal protective equipment and possible direct contact with infected patients. Enhanced infection control protocols, individual resilience and organisational support were identified as important protective factors.

Introduction

There is heightened interest in the impact of the COVID-19 pandemic on the wellness of frontline healthcare workers (HCWs), including dentists. The pandemic has resulted in deployment of significant resources, including an array of HCWs, to mitigate spread of disease and to reduce associated morbidity and mortality.[1] The World Health Organisation (WHO) declared the outbreak a public health emergency of international concern in January 2020[2] and a pandemic in March 2020.[3] The scale of the pandemic is unprecedented, impacting society, the global economy and provision of healthcare services.[4] HCWs have been confronted by multiple challenges, including the scale and duration of additional pandemic-driven healthcare demand,[5] resultant overwhelming workload[6] and ongoing concerns over availability of personal protective equipment (PPE).[7] Perceived lack of adequate preparations and organisational support[8] have amplified the mental burden on HCWs.[9] Resultant elevated levels of stress, anxiety and symptoms of depression could have long-term psychological implications on all HCWs.[10] However, most research on the impact of stress, psychological distress and burnout on mental health outcomes (MHOs) in HCWs has been historically focused on physicians[11] and nurses.[12]

There is burgeoning interest in the impact of the pandemic on psychological wellbeing of dentists.[13] Multiple studies have reported on the global prevalence of work-related stress,[14] psychological distress (PD)[4] and burnout in dentists.[15] Identifiable dentist-specific stressors include scheduling pressures,[16] management of anxious patients,[17] patient demands,[18] fear of litigation and over-regulation,[14] and business process stresses.[19] These stressors have been posited to impact dentists' professionalism,[20] productivity,[21] clinical decision-making[22] and service delivery.[23]

The COVID-19 crisis presents a considerable challenge to all healthcare systems and workers,[24] including a profound impact on dental professionals and global dental practice.[25,26] Therefore, supporting the psychological wellbeing of dentists is a priority. This review seeks to evaluate research on the effects of the early phase of the COVID-19 pandemic on the psychological health of dentists.

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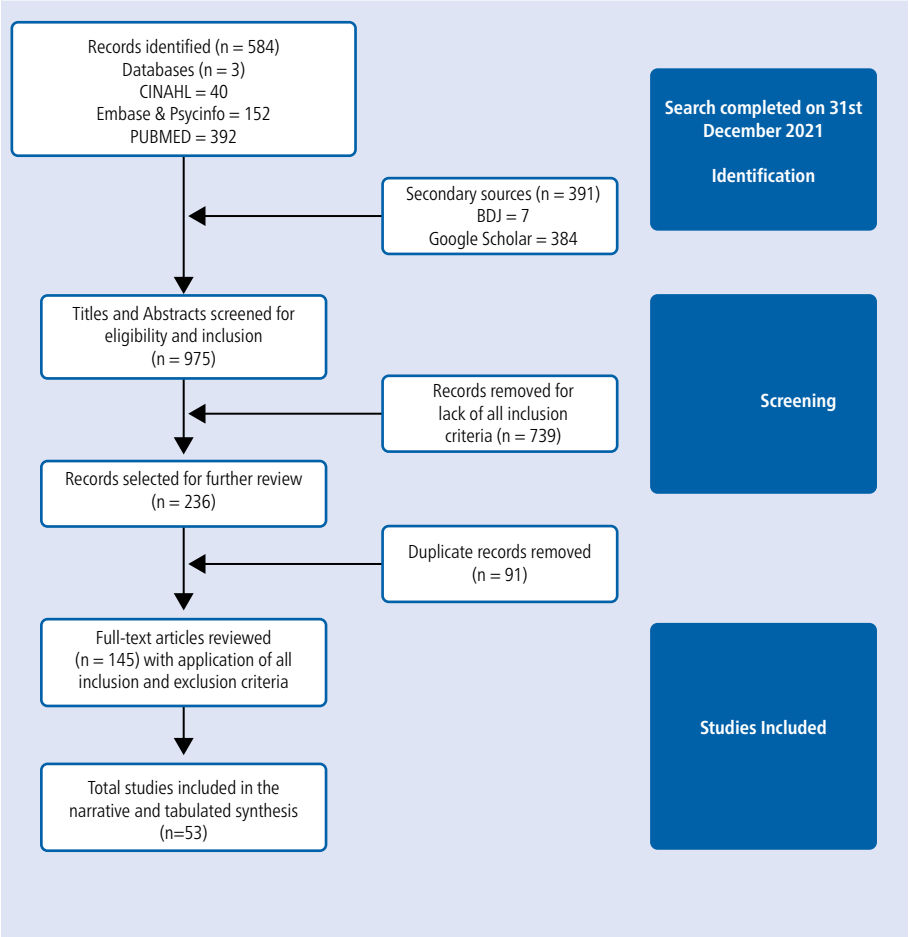
Fig. 1 PRISMA 2020 flow diagram for the present review



This includes the identification of pivotal risk and protective factors for adverse MHOs in dentists, their specific impacts and the implications for both long-term psychological wellbeing and clinical service delivery.

Methods

Design and reporting of this study were informed by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement 2020,[27] recommendations of WHO[28] and COVID-19 collaboration guidelines.[29] Databases searched were CINAHL, Embase, PsycINFO and Medline. The *British Dental Journal* was hand-searched in order to identify additional references not captured in the search strategy, while the reference lists of included articles provided additional sources.

The search strategy was: (COVID-19 or Coronavirus or 2019-ncov or sars-cov-2 or cov) AND (dentist or dentistry or dental practice) AND (work-related stress or anxiety or depression or fear or psychological distress or burnout) AND (English language only and 01/12/2019 to 31/12/2021). Published observational and experimental studies reporting on psychological impact of the COVID-19 pandemic on dentists were reviewed. Inclusion criteria for selection were:

1. Dentists working close to coronavirus (exposed to increased risk)
2. Dentists on mandated leave of absence from regular dental practice during the COVID-19 pandemic
3. Psychological impact on the MHOs of dentists during the COVID-19 pandemic
4. 1 OR 2 AND 3.

Exclusion criteria were non-English language articles, studies involving dental students and collection of data before the outbreak of COVID-19. The review focused on graduate dentists specifically and not dental students, as these two groups differ in important characteristics, such as job roles, overall level of experience and volume of pandemic work experience. The nature of dentists' work, clinical experience and job role are unique in the dental workforce. All 975 titles and abstracts resulting from the database searches were screened for eligibility (by BL) and 145 were subject to full-text review. A total of 53 studies passed all inclusion and exclusion criteria (see Figure 1).

Contributors BL, JH and AK all made substantial contributions to the conception and design of the work. BL is a dentist, while JH and AK are occupational health psychologists with an interest in workplace health and wellbeing. Data were extracted from the 53 articles and summarised in a tabulated format (online Supplementary Information – sheet 1). This included: demographic and background information from each study (country, study design, participant numbers, sex, practice setting); measurement tools employed; reported MHOs; and compliance with clinical protocols. Also included in the table were principal findings, associated psychological impacts, study limitations and reported risk and protective factors for MHOs.

A narrative and tabulated data synthesis approach was employed.[30,31] Outcomes of the selected studies were categorised according to the reported impact on psychological wellbeing of dentists, using criteria proposed by De Kock *et al.*,[32] namely: a) general psychological impacts; b) risk factors associated with adverse MHOs; and c) protective factors against adverse MHOs. Multiple frameworks have been proposed that delineate work stressors, including the identification of operational and organisational stressors.[33] In this review, risk and protective factors have been designated primarily as 'operational' or 'organisational' in nature (or both), and further sub-categorised into 'psychosocial', 'occupational', 'sociodemographic', or 'environmental' elements[32] (Table 1).

Quality assessment of each study resulted in a GRADE (Grading of Recommendations, Assessment, Development, and Evaluations) certainty of evidence profile for each reported risk and protective factor associated with MHOs in dentists[34] (online Supplementary Information – sheet 2). Sheet 3 in the online Supplementary Information presents the JBI Critical Appraisal Checklist for Cross-Sectional Studies that was used to assess individual study quality.[35] The risk of bias was analysed using the Evidence Project appraisals tool[36] (online Supplementary Information – sheet 4). Sheet 4 in the online Supplementary Information also reports on prior ethical approval status for each study.

Results

This review of 53 studies incorporates self-reports from 45,671 dentists (in over 70 countries) during the period December 2019 to December 2021. A majority of studies (n = 39) collected data between March and July 2020, corresponding to the initial phases of the COVID-19 pandemic. Analysis using the Joanna Briggs Institute critical appraisal checklist resulted in the studies being rated as 'excellent' (n = 7), 'good' (n = 9), 'fair' (n = 28) and 'poor' (n = 9). Prior ethical approval was reported in 77% of studies (n = 41). The Evidence Project risk of bias instrument confirmed 62% of studies (n = 33) as low risk for potential bias and 38% (n = 20) as high risk for bias. Multiple practice settings (private and public sector) and professional roles (majority general dentists) were included. The GRADE certainty of evidence score was applied to key identified risk factors (n = 17) and protective factors (n = 8). Baseline scores were designated as low (for all non-randomised controlled trial studies), as recommended by the Cochrane Consumers and Communication Group Advisory for Authors, and then either upgraded or downgraded according to their prescribed criteria.[34]

Results indicated that key risk factors provided a high certainty of the evidence, or very good indication of likely effect in three cases, a moderate certainty of evidence or good

Table 1 Key risk and protective factors

Factor	Category	Sub-category	Description	(n = 53)	%
	Mental health outcome	Psychosocial	Anxiety	40	75
			Fear	44	83
			Depression	12	23
			Psychological distress	13	25
			Burnout	5	9
			Work-related stress	22	42
Risk	Operational	Occupational	Fear of infection	46	87
			Fear of transmission	41	77
			Close contact (patients)	32	60
			Fear of aerosols	30	57
		Sociodemographic	Age	23	43
			Sex	22	42
			Predisposing medical history	9	17
		Environmental	Period of review	12	23
			Lack of vaccines	4	8
			Long-term future of dentistry	16	30
			Loss of earnings	16	30
			Inequalities of care	4	8
			Misinformation	5	9
Risk	Organisational	Environmental	Lack of preparedness	18	34
			Lack of organisational support	26	49
Risk	Operational/organisational	Occupational	Infection control protocols	34	64
			PPE	40	75
Protective	Operational	Occupational	Work experience	10	19
			Improvements in standards	13	25
			Improved surgery equipment	25	47
		Environmental	Individual resilience development	36	68
Protective	Organisational	Occupational	Financial support	21	40
		Environmental	Organisational support	43	81
Protective	Operational/organisational	Occupational	PPE	37	70
			Enhanced infection control protocols	33	62

indication of likely effect in seven cases, and a low certainty or only some indication of effect in seven cases. Protective factors scored high (n = 3), moderate (n = 3) and low certainty of evidence (n = 2). Only two risk factors, namely age and sex, presented with significant conflicting opinions.

All included studies confirmed the substantial psychological impact of the COVID-19 pandemic on dentists. Validated measures employed to analyse anxiety, depression or burnout included the Generalised Anxiety Disorder Assessment (GAD-7),[37] Patient Health Questionnaire-4 (PHQ-4),[38] Depression Anxiety Stress Scale (DASS-21)[39] and Maslach Burnout Inventory (MBI).[40] GAD-7 was the most commonly used measure (seven studies).[41,42,43,44,45,46,47]

Categorisation of the specific MHOs for dentists (listed in Table 1) confirmed the reporting of symptoms of anxiety in 40 studies, including Chen *et al.*;[43] fear in 44 studies;[48,49] depression in 12 studies;[50] psychological distress in 13 studies;[51] burnout in 5 studies;[52] and work-related stress in 22 studies.[53] Ahmed *et al.*[54] confirmed symptoms of anxiety in 78% of their reporting dentists, highlighting the fear of infection and transmission to families.

Fear of infection (n = 46),[55] possible transmission to family members (n = 41),[54] close contact with patients (n = 32)[56] and the potential effects of aerosol generating procedures (n = 30)[57] were the most prominent 'operational' ('occupational') risk factors. Two Italian studies recorded lower levels of severe anxiety at 9%[44] and 6%.[42] A Cameroon study[58] confirmed reports of minimal or mild anxiety in 84% of participants, raising questions about the optimal approach to the definition of anxiety and highlighting possible reporting bias. A study on the prevalence of COVID-19 among 2,125 American dentists[59] trialled a regimen of enhanced infection control protocols together with the Centre for Disease Control and Prevention's recommended levels of PPE supplies. Results confirmed a low COVID-19 prevalence of 0.9% (95% CI of 0.5–1.5) with a 3.6% testing positivity rate. This provided strong evidence for the impact of the combination of enhanced infection control protocols and appropriate PPE in the prevention of COVID-19 infection in dental settings.

Compliance with infection control protocols (n = 34),[60] as well as access and availability of appropriate PPE supplies (n = 40),[61,62,63] served as both 'operational' and 'organisational' ('occupational') risk factors, and potential protective factors for adverse MHOs in dentists.[4]

Results from Ahmed *et al.*[54] reflect this duality, as despite 84% of their study group endorsing the use of recommended N95 masks, only 10% reported using them in practice. This emphasised worldwide organisational concerns with PPE production, delivery and costs.[61] Similarly, Tysiac-Mista *et al.*[64] reported that 71% of Polish dentists unilaterally suspended practice (despite no locally enforced lockdown) due to a lack of PPE, anxiety and fear. In contradistinction, a Brazilian study[65] reported that a local group of dentists continued to provide regular dental care throughout their lockdown phase, despite acknowledging that their biosafety measures were not protective.

'Operational' ('sociodemographic') risk factors included age (n = 23),[48,66,67,68,69] sex (n = 22),[45,66,70,71] and predisposing medical history (n = 9).[47,72] Gasparro *et al.*[66] postulated that younger, less experienced dentists were more likely to develop psychological symptoms of anxiety and depression. In contrast, Hleyhel *et al.*[67] asserted that younger dentists had superior knowledge of preventative measures (that could be considered to be protective if applied correctly). Chen *et al.*[43] cited raised stress levels in male practitioners. However, in other studies, female dentists were reported to have higher levels of anxiety[45] and fear.[66] An association was also recorded between pre-existing medical conditions, symptoms of anxiety[72] and prevalence of PD and depression.[47]

'Operational' ('environmental') risk factors were impacted by the review's narrow timeframe (n = 12)[73] and the simultaneous absence of an approved vaccine in the early phases of the pandemic (n = 4).[70] At this time, some dentists were also tasked with providing emergency dental care (often without adequate higher-level PPE).[74,75]

This scenario also highlighted the moral dilemma of many clinicians at having to defer patient dental care indefinitely.[51,76] Additional 'operational' ('environmental') risk factors included: concerns for the long-term future of dentistry (n = 16);[77] implications for the loss of earnings (n = 16);[76] effect of pandemic-related inequalities of care (n = 4);[78] and potential misinformation (n = 5) due to a perceived over-reliance on social media as a trusted source.[41]

Influential 'organisational' ('environmental') risk factors included perceived lack of pandemic preparedness (n = 18);[55] absence of organisational support (n = 26);[79] and an appeal to support less-developed countries.[56] Reported 'operational' ('occupational') protective factors against adverse MHOs in dentists included the mitigating value of work experience (n = 10)[68] and the knock-on effect of a successfully managed national COVID-19 campaign.[80] Other notable protective factors were time off work,[4] implementation of a vaccination campaign[81] and improvements in training standards (n = 13).[62] A variety of studies also advocated the promotion and use of purpose-built surgery equipment (n = 25),[82] innovative dental treatment modalities, such as teledentistry,[83] and track-and-trace mobile applications.[84] The lone 'operational' ('environmental') protective factor reported was the development of individual resilience (n = 36),[85] acknowledging the posited value of resilience (in conjunction with higher standards of knowledge and training) as a means of combating fear of contagion and associated anxiety.[86] Uziel *et al.*,[85] promoted the potential ability of dentists to manage their professional trauma as a self-growth opportunity. Additional reported factors included: an 'organisational' ('occupational') protective factor, namely, financial support (n = 21);[42] combined 'operational'/'organisational' ('occupational') protective factors, including adequate PPE supplies (n = 37);[71] enhanced infection control protocols (n = 33);[87] and the pivotal 'organisational' ('environmental') protective factor, namely organisational support (n = 43).[52,88]

The magnitude of the impact of organisational support is highlighted in a study by Collin *et al.*[4] on British dentists, that reported lower overall levels of PD during the national lockdown period than those recorded in 2017, using the same measure (57.8% vs 67.7%). This so-called public sector bubble effect was linked to the British Government's financial support package for NHS dentists during the pandemic lockdown period, highlighting the prospective value of providing appropriate and opportune organisational support.[4] A similar initiative in Italy reportedly had little overall impact.[66] It is noteworthy, however, that despite the reported decrease in levels of PD among UK dentists, the overall levels of PD in UK dentists remained high in comparison to other professions.[4]

Discussion

This review has confirmed the considerable psychological impact of the COVID-19 pandemic on the MHOs of dentists worldwide.[89] Direct contact with patients during this period has been shown to generate fear of infection and possible secondary transmission to families, staff and patients.[89] Dentists considered the pandemic dangerous[73] and felt unable to work safely during the early phases due to concerns over infection control protocols,[90] the contemporaneous non-availability of a vaccine[70] and a shortage of appropriate PPE.[90] Dentists also highlighted longer-term fears for the economic viability of dental practices.[76]

Substantial evidence supports the assertion that fear of infection and subsequent transmission were accurate predictors of anxiety,[91] depression,[66] work-related stress,[92] fear,[93] PD[61] and burnout.[52] A broad spectrum of key risk and protective factors impacting the MHOs of dentists have also been identified and validated. Risk factors with strong evidence for impact included inadequate PPE supplies,[91] compliance with infection control protocols[81] and possible exposure to aerosol generating procedures.[46] The protective factors with the strongest evidence included the development of individual resilience,[85] enhanced compliance with recognised infection control protocols,[89] guaranteed access to adequate PPE,[91] availability of financial assistance[44] and the pivotal role of effective organisational support.[66]

Given the prohibitions of routine dental care provision during the early stages of the pandemic and the cumulative impact of the risk factors reported by this review, it is not surprising that most dentists found this period particularly stressful and that their psychological wellbeing was challenged. The combined effect of dentist-specific stressors,[14] which reportedly worsened during the pandemic,[80] and the additional cumulative impact of the novel pandemic-specific stressors, was considerable.[4]

The identification of protective and risk factors, their classification into the 'operational' and 'organisational' typology, and their further sub-categorisation into 'psychosocial', 'occupational', 'sociodemographic' and 'environmental' elements[32] underpins this review.

Symonds[94] is reported to have first drawn this distinction between 'operational' and 'organisational' 'psychosocial' risk factors in their model on the emotional hazards of police work.[33] 'Organisational' 'psychosocial' factors were defined by Cox *et al.*[95] as 'aspects of work design and the organisation and management of work, and their social and organisational contexts, that have the potential for causing psychological, social, or physical harm'. Houdmont *et al.*[33] further suggested that in the UK policing context, this has resulted in the development of two parallel but disproportionate literatures. Ricciardelli and Carleton[96] confirm the impact of both 'operational' and 'organisational' stressors on the MHOs of Canadian correctional workers, while also proposing that identified specific stressors may be modifiable. It is noteworthy that the outcomes of this review do not appear to map directly onto the current literature, with its apparent focus on 'operational' factors,[33] but would rather seem to endorse a broader framework, with a mix of both 'operational' and 'organisational' elements.

This study underlines the potential value of appropriate organisational interventions, such as the recent UK public sector support package.[4] Any future initiatives should, however, broaden their remit and incorporate an integral longer-term strategy for supporting both the physical and mental wellbeing of all dental professionals. The Management Standards approach[97] offers a potential pathway to establishing a mutually agreeable and balanced relationship between the demands and responsibilities of both individual and organisational interventions,[98] especially when linked to a robust theoretical framework, such as the job-demands and resources model.[99]

Limitations of this study included: an inability to infer causality due to the cross-sectional nature of the studies;[100] the constraints of self-reporting; and the absence of a universal validated measure for reporting psychological impacts. Strengths of this study included: a worldwide distribution of data; rigorous analysis of study quality, risk of bias and certainty of the evidence; and substantial levels of concordance of reported clinical findings.

Conclusion

The COVID-19 pandemic has highlighted the presence of psychosocial working conditions that may have previously worked to the detriment of dentists.[4] This hiatus could, however, provide a unique opportunity for the constructive re-engagement and reform of the profession, to the long-term benefit of all dental professionals and their patients.[4] Future interventions must not only seek to bolster resilience but should modify working conditions to make them less problematic, including the contributions of organisational support from both regulatory bodies and central government alike. A holistic approach, centred on creating a healthy, safe and supportive working environment is recommended,[32] in parallel with ongoing monitoring of the sustained impacts of the COVID-19 pandemic.[4] Future research into both dentist-specific and pandemic-specific job stressors is advocated, including their complex interplay with identifiable risk and protective factors. The distinction between 'operational' and 'organisational' elements may provide an important future framework for understanding the impact of job stressors in additional high-stress healthcare professions.

Ethics declaration

The authors declare no conflicts of interest. Relevant ethical standards and current best practice have been adhered to at all times. We approached the King's College London Research Ethics Committee for advice as to whether ethical clearance was required for this study. We were advised that formal research ethical clearance was not required as the study solely made use of data that were available in the public domain.

The authors confirm that the data supporting the findings of this study are available within the article (and/or) its supplementary materials.

Author contributions

Brett Lefkowitz, Jonathan Houdmont and Alec Knight all made substantial contributions to the conception and design of the work. Brett Lefkowitz collected and analysed the data. Brett Lefkowitz and Alec Knight collaborated on the data analysis and interpretation. Brett Lefkowitz drafted the work, and all authors revised it critically for important intellectual content. All authors approved the final version and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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