

Review

Patient anxiety towards dental treatment: A scoping review



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ABSTRACT

Objectives: Anxiety related to dental treatment is a common problem, so it is essential to identify its potential protective and enhancing factors and consequences. Anxiety is an emotion with negative impacts that may hinder the ability to make decisions and perform daily tasks. The objective is to map the scientific literature on anxiety about dental treatment in adults.

Methods: This study used a scoping review registered in the Open Science Framework. The article writing was structured according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews.

Results: 465 articles were identified, of which 19 were included for analysis. In these, anxiety-enhancing factors, such as the use of turbinate on teeth and previous negative experiences, anxiety-protecting factors, such as regular visits to the dentist and the dentist being calm, showing empathy, and providing emotional support, and actual and/or potential consequences of anxiety, such as postponing or rescheduling appointments and poor oral health, were identified.

Conclusions: The results of this study may contribute to assisting dentists in their clinical practice by anticipating anxiety situations, which may allow them to adopt preventive strategies by introducing previous assessment methodologies. (Rev Port Estomatol Med Dent Cir Maxilofac. 2022;63(4):189-197)

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Ansiedade dos utentes face ao tratamento dentário: Uma scoping review

R E S U M O

Palavras-chave:

Ansiedade
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Objetivos: A ansiedade face ao tratamento dentário trata-se de uma problemática frequente, pelo que importa identificar os potenciais fatores protetores e potenciadores da mesma, bem como as suas potenciais consequências. A ansiedade é uma emoção que tem impactos negativos que podem impedir a capacidade de tomar decisões e de dar resposta a algumas tarefas diárias. O objetivo passa por mapear a literatura científica relativamente à ansiedade face ao tratamento dentário nos adultos.

Métodos: Para a realização deste estudo recorreu-se a uma scoping review, a qual foi registada na Open Science Framework. A redação do artigo foi estruturada de acordo com o Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews.

Resultados: Foram identificados 465 artigos, 19 dos quais incluídos para análise. Nestes, foram identificados fatores potenciadores de ansiedade, tais como a utilização de turbina nos dentes e experiências negativas anteriores, fatores protetores da ansiedade, tais como as visitas regulares ao médico dentista e o médico dentista estar calmo, mostrar empatia e dar apoio emocional, e consequências reais e/ou potenciais da ansiedade, tais como adiar ou desmarcar as consultas e uma má saúde oral.

Conclusões: Os resultados deste estudo podem ser um contributo para auxiliar o médico dentista na sua prática clínica, através da antecipação de situações de ansiedade, o que poderá permitir que este adote estratégias preventivas com a introdução de metodologias de avaliação prévias. (Rev Port Estomatol Med Dent Cir Maxilofac. 2022;63(4):189-197)

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Introduction

Anxiety is an emotion with negative impacts beyond adverse feelings and changes in daily behaviors. In particular, anxiety hinders the ability to make decisions and respond to some daily tasks.¹ It can be experienced at work, when entering the labor market, before exams, among other moments and circumstances. It is an emotional condition that precedes a threatening stimulus, which may not even be identified.^{2,3} Some symptoms of anxiety are feeling tired, having difficulty concentrating, becoming easily irritated, having muscle tension, having difficulty controlling feelings of worry, and having sleeping problems.⁴

Undergoing dental treatments is commonly assumed to be potentially anxiety-producing, as exposed in the scientific literature. A study by Lin⁵ indicated that anxiety associated with dental appointments is related to patients' negative experiences in previous dental appointments. Accordingly, patients with previous positive experiences had lower anxiety levels than those with previous negative experiences. Two circumstances determine patient anxiety when exposed to dental treatments: the moment before anesthesia, which often causes a state of phobia, and the dental treatment itself.⁶ A recent study by Caltabiano⁷ revealed that women had more anxiety than men, with some factors, such as the injection of local anesthesia and tooth drilling, increasing anxiety levels. In terms of age, younger patients had higher anxiety about dental treatment than older patients. That study

also evaluated whether several factors caused patients to feel more or less anxiety during dental treatment. The factors that caused increased anxiety levels were the appointment time and patients knowing they would have future appointments. The factors that caused decreased anxiety levels were a calm, clinical environment and the patient's active participation in the treatment (e.g., holding the vacuum cleaner).

When providing care for patients' oral pathologies, dentists should also focus on their psychological and psychological needs. The time the dentist spends with the patient allows for building a relationship of trust that may help complete the treatment and make the patient feel less anxious.⁸ If the dentist realizes the patient is anxious at the first appointment, they can help manage it from the first moment. Some strategies might include talking calmly with the patient to identify situations that cause fear or anxiety, asking open-ended questions that can help guide the conversation in the right direction, advising deep breathing, and normalizing feelings of anxiety. Since the dental office environment can play an important role in anxiety, a positive, calm environment is suggested, with information always available to make the patient feel comfortable.²

Given this scenario and the need to synthesize the existing evidence on dental treatment-related anxiety, this study aimed to map the scientific literature regarding anxiety about dental treatment in adults, using a scoping review. To answer this objective, we defined the following research questions: a)

what factors are drivers of dental-treatment anxiety in adults?; b) what factors are protective factors of dental-treatment anxiety in adults?; c) what are the actual and/or potential consequences of dental-treatment anxiety in adults?

We considered it relevant to map the most extensive possible information on this topic, aggregate it, and make it easier for dentists to consult to provide high-quality practice. Scoping reviews are an excellent approach for this type of objective.⁹

Methods

A detailed protocol of the present scoping review was registered in the Open Science Framework (OSF) with the code (10.17605/OSF.IO/5PDYW). The article writing was structured according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR).

This scoping review included articles published in online databases. We chose to include Portuguese, English, and Spanish studies because these are the languages mastered by the researchers, allowing a good quality of evidence selection and respective data extraction. Moreover, there was no restriction on the publication date since a scoping review aims to review all existing literature on a given topic.¹⁰ All articles with full text available were included regardless of geographic location, without specific ethnicity or gender criteria. However, we only included studies concerning adults (persons aged 18 years or older) because anxiety manifests itself differently in children and adolescents.¹¹

This review focused on studies addressing anxiety in patients attending the dental office. We sought to include studies examining dental-treatment anxiety, its consequences, and the factors that protect against and/or enhance it. For the review, anxiety was considered an emotion with negative impacts, including adverse feelings and changes in daily behaviors.¹ Other emotions, such as fear or phobias of the dentist or dental treatment, were excluded due to not falling within the definition of anxiety.

We included studies focusing on anxiety in adults attending dental offices in private clinics, hospitals, and private and/or public clinics. Because the central concept of the review is “dental-treatment anxiety carried out by professional dentists,” we excluded studies in which dental students carried out dental treatments.

Research terms were identified using Medical Subject Headings (MeSH) and defined based on the research questions. On 14 February 2022, the databases CINAHL Complete (via EBSCO host), MEDLINE With full text (via EBSCO host), and Web of Science Core Collection (via Web of Science) were used to search for the following terms: (“dental anxiety” OR “dental anxieties”) AND (“factor*” OR “cause*” OR “reason*” OR “consequence*” OR “effect*” OR “outcome*” OR “repercussion*”). The search process is detailed in Table 1.

Articles were exported to Endnote Web[®] software (Clarivate Analytics). A total of 465 articles were identified, and duplicates were removed. The first analysis was done by independently reading the titles and abstracts to select the articles

that answered the research questions. Then, two independent researchers (BC and FS) with the same objective read the full text of the selected articles. During this analysis, whenever there was disagreement about the inclusion or exclusion of a particular article, it was sent to a third independent researcher (CG) to resolve the disagreement.

The methodological quality of the articles was not assessed because the objective of a scoping review is to map all the existing literature on the topic.¹² Table 2 contains the information of the articles, with the title, author, year of publication, type of study, objectives, and individual results, and was developed based on the model recommended by the Joanna Briggs Institute for extracting details, characteristics, and results from the articles.¹²

Table 1. Research Strategy

CINAHL Complete, searched in February 2022; 104 results

Research	Descriptors
S1	TI dental anxiety
S2	dental anxieties
S3	S1 OR S2
S4	AB factor*
S5	cause*
S6	reason*
S7	consequenc*
S8	effect*
S9	outcome*
S10	repercussion*
S11	S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10
S12	S3 AND S11
S13	Filters: English; Portuguese; Spanish, full text available

MEDLINE Complete, searched in February 2022; 234 results

Research	Descriptors
S1	TI dental anxiety
S2	dental anxieties
S3	S1 OR S2
S4	AB factor*
S5	cause*
S6	reason*
S7	consequenc*
S8	effect*
S9	outcome*
S10	repercussion*
S11	S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10
S12	S3 AND S11
S13	Filters: English; Portuguese; Spanish, full text available

Web of Science Core Collection, searched in February 2022; 127 results

Research	Descriptors
S1	TI dental anxiety
S2	dental anxieties
S3	S1 OR S2
S4	AB factor*
S5	cause*
S6	reason*
S7	consequenc*
S8	effect*
S9	outcome*
S10	repercussion*
S11	S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10
S12	S3 AND S11
S13	Filters: English; Portuguese; Spanish, full text available

Table 2. Data Extraction

Authors	Year	Title	Type of study	Objectives	Anxiety-enhancing factors	Protective factors for anxiety	Actual and/or potential consequences of anxiety
Schuurs, A. et al. ¹³	1983	Dental anxiety, the parental family and regularity of dental attendance	Descriptive, correlational, cross-sectional study.	Examine the relationship between regularity of attendance and dental anxiety, parental dental behavior, respondents' dental education, and gender.	-	- The combination of being a woman with a higher education level and making regular dentist visits.	-
Stabholz, A. e Peretz, B. ¹⁴	1999	Dental anxiety among patients prior to different dental treatments	Descriptive, correlational, cross-sectional study.	Assess levels of dental anxiety among patients prior to various dental treatments.	- The wait for turbinate treatment in those aged 35-49 years.	-	-
Bedi, R. e McGrath, C. ¹⁵	2000	Factors associated with dental anxiety among older people in Britain	Descriptive, correlational, cross-sectional study.	Report the prevalence of dental anxiety and explore whether high anxiety levels are associated with sociodemographic factors, self-reported oral health status, and use of dental services in an elderly population in the UK.	- High waiting time in the waiting room; - High waiting time in the dentist's chair at the time of preparation of materials; - Poor oral health; - Last visit more than one year ago; - Last visit was an emergency/pain visit.	- Good oral health; - Last visit less than one year ago; - Last visit was a scaling or routine visit.	- Three times less likely to make an appointment with the dentist; - Twice as likely to only go to the dentist for pain.
Enkling, N., Marwinski, G. e Jöhren, P. ¹⁶	2006	Dental anxiety in a representative sample of residents of a large German city	Demographic, descriptive study.	Examine the reasons for anxiety and avoidance of dental treatment and the sample's expectations regarding receiving the best dental treatment.	- The more time after the last appointment passes.	- Last appointment less than one year ago.	- Not going to the dentist.
Acharya, S. ¹⁷	2007	Factors affecting dental anxiety and beliefs in an Indian population	Descriptive, correlational, cross-sectional study.	Validate and test the psychometric properties of the MDAS and the Modified Dental Belief Scale (MDBS) and describe the possible factors that may affect dental anxiety and beliefs in the Indian population.	- Use of the turbine on the teeth; - Injection of local anesthesia; - Previous negative experiences.	-	-
Lago-Méndez, L. et al. ¹⁸	2009	Postoperative recovery after removal of a lower third molar: role of trait and dental anxiety	Prospective, descriptive study.	Evaluate the influence of trait anxiety and dental anxiety on postoperative recovery after lower third molar surgery and determine the effect of anxiety on the duration of surgery.	-	-	- More pain in the postoperative period of a third molar extraction; - Longer surgery time for a third molar extraction.
Sanikop, S., Agrawal, P. e Patil, S. ¹⁹	2011	Relationship between dental anxiety and pain perception during scaling	Cohort, correlational, descriptive study.	Evaluate patients' perception of pain during scaling and its relationship to dental anxiety.	-	- The dentist promises to prevent pain; - The dentist is calm, shows empathy, and provides emotional support.	-
Carrillo-Díaz, M. et al. ²⁰	2012	Assessing the relative efficacy of cognitive and non-cognitive factors as predictors of dental anxiety	Cross-sectional, correlational, descriptive study.	Compare the predictive power of a set of cognitive and non-cognitive factors in accounting for dental anxiety levels.	- Negative experiences at the dentist; - Knowing people who are afraid of the dentist.	-	-

Table 2. Data Extraction (cont.)							
Authors	Year	Title	Type of study	Objectives	Anxiety-enhancing factors	Protective factors for anxiety	Actual and/or potential consequences of anxiety
Egbor, P. e Akpata, O. ²¹	2014	An evaluation of the sociodemographic determinants of dental anxiety in patients scheduled for intra-alveolar extraction	Descriptive, correlational, cross-sectional study.	Statistically analyze the sociodemographic determinants of dental anxiety in patients scheduled for intra-alveolar exodontia.	<ul style="list-style-type: none"> - More frequent visits to the dentist. 	-	-
Appukkuttan, D. et al. ²²	2015	Dental Anxiety Among Adults: An Epidemiological Study in South India	Descriptive, correlational, cross-sectional study.	Assess dental anxiety, factors influencing dental anxiety, and anxiety regarding dental extraction procedures among patients seen at a dental hospital in India.	<ul style="list-style-type: none"> - Previous negative experiences; - Receiving an injection of local anesthesia; - Use of the turbine on the teeth; - Dental extractions. 	-	- Postpone the consultation.
Deogade, S. C. e Suresan, V. ²³	2016	Psychometric assessment of anxiety with the Modified Dental Anxiety Scale among central Indian adults seeking oral health care to a dental school	Descriptive, correlational, cross-sectional study.	Investigate the level of dental anxiety, factors affecting it, and anxiety about tooth extraction among adults seeking dental care at a dental college in Central India.	<ul style="list-style-type: none"> - Having visited the dentist 1-2 years before; - Bad previous experience; - Use of the turbine on the teeth; - Shaving and polishing; - Injection of local anesthesia; - Dental extraction. 	<ul style="list-style-type: none"> - Never having visited the dentist before. 	<ul style="list-style-type: none"> - Poorer oral health; - Postponing tooth extraction.
Guentsch, A. et al. ²⁴	2016	Oral health and dental anxiety in a German practice-based sample	Descriptive, correlational, cross-sectional study.	Assess whether dental anxiety affects dental and periodontal health.	<ul style="list-style-type: none"> - Use of the turbine on the teeth; - Injection of local anesthesia. 	-	<ul style="list-style-type: none"> - No flossing; - Fewer visits to the dentist; - More gum disease; - More decayed teeth.
Dou, L. et al. ²⁵	2018	The prevalence of dental anxiety and its association with pain and other variables among adult patients with irreversible pulpitis	Descriptive, correlational, cross-sectional study.	Evaluate the prevalence of dental anxiety and its relationship to pain, among other variables, in Chinese adult patients with irreversible pulpitis seeking dental care.	<ul style="list-style-type: none"> - Adverse experiences during dental treatment; - Adverse experiences and pain at recent appointments. 	-	-
Strøm, K., Skaare, A. e Willumsen, T. ²⁶	2019	Dental anxiety in 18-year-old Norwegians in 1996 and 2016	Cohort, correlational, descriptive study.	Estimate the prevalence of dental anxiety and explore the factors that may increase the risk of reporting dental anxiety among 18-year-old Norwegians in 2016 and report changes in dental anxiety since 1996.	<ul style="list-style-type: none"> - Performance of treatment at the last appointment; - Treatment pain. 	-	<ul style="list-style-type: none"> - Missing or skipping appointments; - Poor oral health.
Musalam, K. et al. ²⁷	2021	Magnitude and Determinants of Dental Anxiety among Adult Patients Attending Public Dental Clinics in Dar-Es-Salaam, Tanzania	Cross-sectional, descriptive study.	Assess the magnitude and determinants of dental anxiety among adult patients seen in public dental clinics in Dar-es-Salaam, Tanzania.	<ul style="list-style-type: none"> - Dental extractions; - Unfriendly dentist; - The sound of the turbine; - Not knowing the treatment plan. 	-	-

Table 2. Data Extraction (cont.)

Authors	Year	Title	Type of study	Objectives	Anxiety-enhancing factors	Protective factors for anxiety	Actual and/or potential consequences of anxiety
Scandurra, C. et al. ²⁸	2021	The role of cognitive and non-cognitive factors in dental anxiety: A mediation model	Descriptive, correlational, cross-sectional study.	Evaluate the mediating role of cognitive factors (such as professionalism, communication, and lack of control) in the relationship between traumatic dental events and dental anxiety.	- Previous negative experiences.	-	-
Sreeja, S. et al. ²⁹	2021	An Assessment of Dental Anxiety in Patients Before and After Scaling and Polishing Procedures	Descriptive, correlational, cross-sectional study.	Examine emotional assessments of dental apprehension levels in patients.	- The injection of local anesthesia into the gingival mucosa; - Evaluation of the gingival mucosa with a probe.	-	-
Suleiman, A. R. et al. ³⁰	2021	The Effect of Dental Anxiety on Surgical Time of Mandibular Third Molar Disimpaction	Prospective, descriptive study.	Determine the effect of dental anxiety on surgical time of mandibular third molar (M3) disimpactions at a Nigerian hospital.	-	-	- Longer dental surgery duration.
Yu, J. et al. ³¹	2021	The Prevalence of Dental Anxiety Associated with Pain among Chinese Adult Patients in Guangzhou	Descriptive, correlational, cross-sectional study.	Assess the prevalence of dental anxiety and its associated factors in Chinese adult patients.	- Use of turbine; - Injections of local anesthesia; - Negative first consultation experience; - Longer appointment times; - Postponement of appointments; - Pain at the most recent visit.	-	-

Results

A total of 465 articles were identified. The full text of two articles could not be accessed, eight involved a non-adult population, and 14 did not answer the research questions. Finally, 19 articles were included for analysis¹³⁻³¹ after full-text reading and guided analysis of the review questions. The steps of the study selection for inclusion in the scoping review are described in the PRISMA-ScR flow diagram (Figure 1).

The results regarding anxiety-enhancing factors, protective factors, and actual and/or potential consequences of anxiety are reported in Table 1. Most studies were descriptive, correlational, and cross-sectional. There was a great diversity in the publication years of the studies, scattered between 1983 and 2021, with the most significant number of studies published in the year 2021, i.e., very recently. In the '80s and '90s, research in this area was incipient, increased essentially from 2015, and equaled the number of publications of the five previous years in 2020/21. Regarding the countries of publication, one of the articles was published in America, three in Africa, seven in Europe, and eight in Asia. The country with the most publications was India. The total number of participants in the analyzed studies was 6959, ranging from a minimum of 78 to a maximum of 1360.

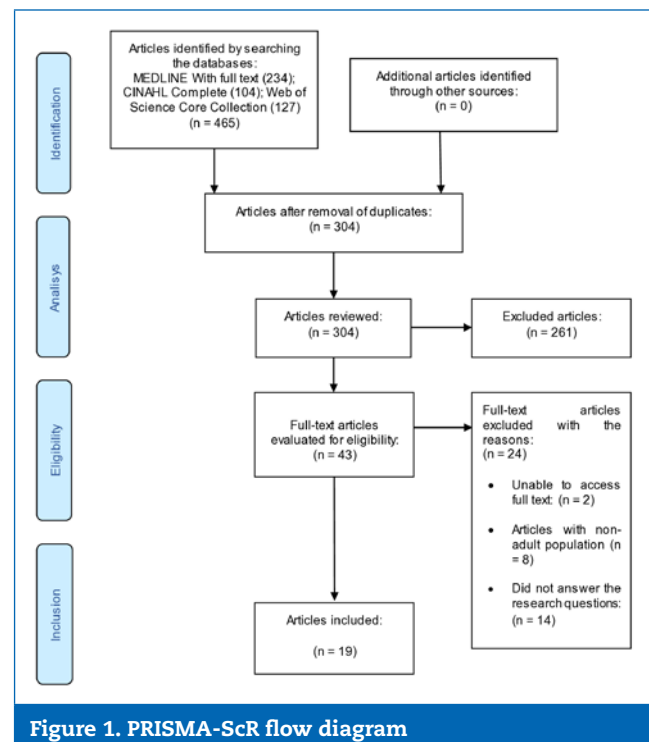


Figure 1. PRISMA-ScR flow diagram

The main anxiety-enhancing factors were using a turbine on teeth, previous negative experiences, injection with local anesthesia, and pain during treatment. The main anxiety-protective factors were regular visits to the dentist, the last visit being a scaling or routine appointment, and the dentist being calm, empathetic, and emotionally supportive. The main actual and/or potential consequences of anxiety were postponing, missing, or skipping appointments and poor oral health.

Discussion

The use of a turbine on the teeth was one of the factors most often mentioned as anxiety-provoking in dental visits. Namely, Siegel³² reported that patients tended not to visit the dentist for five or more years because using a turbine on their teeth caused them anxiety. The same was indicated by Saincher,³³ who found that blood oxygen saturation levels increased when the turbine was used on the teeth, indicating a higher level of anxiety.

The literature also identified local anesthesia injection as an anxiety factor, having been associated with the patients' fear of needles and injections.³⁴ When asked how they would feel if the turbine were used on their teeth and they were given local anesthesia, patients tended to feel more anxious.³⁵ Moreover, many patients associated pain with local anesthesia injections.³² Pain during treatment was another anxiety factor identified in this review. Alroomy³⁶ found a positive correlation between pain and anxiety, and another study related different anxiety levels to different pain levels in dental treatments, with people with more anxiety feeling more pain.³⁷ Finally, Suhani³⁴ reported that anxiety tended to be high in patients with previous negative experiences.

Regarding factors that protect against anxiety, two studies reported regular dentist visits as among the most frequently mentioned factors.^{34,38} In both studies, anxiety and regular visits to the dentist were inversely related: the more visits to the dentist, the lower the level of anxiety. Another critical factor was whether the last visit was a scaling or a routine visit, and patient anxiety levels did not differ significantly between scaling/polishing and routine visits.⁷ Likewise, Alwan's study,³⁹ which indicated that blood glucose levels increase when anxiety increases, reported no significant changes in glucose levels after scaling. The last factor was the dental doctor being calm, showing empathy, and providing emotional support. Most participants wanted the opportunity to build a trusting relationship with the dentist and receive support and advice.⁴⁰ Jevean and Ramseier⁴¹ emphasized that one of the techniques used with anxiety was to be calm and use language more adapted to the patient's profile.

The main actual and/or potential consequences of anxiety were postponing, missing, or rescheduling appointments. Suhani³⁴ and Jevean and Ramseier⁴¹ indicated that most participants agreed that anxiety increased the number of absences and postponement of appointments. Another frequent consequence was poor oral health, with Mueller⁴² pointing out that anxiety is related to oral hygiene and attitudes toward oral health. Khan⁴³ also indicated a significant association between oral health and anxiety.

The limitations of this study were searching only databases, leaving out the analysis of books and theses (gray litera-

ture), with potentially additional information. Moreover, the search was conducted only in English, Portuguese, and Spanish, which may have limited the results, so it is essential to look at them carefully. It was not possible to access articles that did not have the full text available for free. Although the selection of articles for this study was made rigorously and followed the PRISMA-ScR guidelines, some relevant publications may have been left out, a limitation inherent to any review work. In a future study, we propose broadening the range of languages and research sites to obtain even more extensive scientific evidence.

Conclusions

Factors that increase oral health anxiety are using turbines on teeth, previous negative experiences, injection with local anesthesia, and pain during treatment. Anxiety-protecting factors are frequent visits to the dentist, the last visit being a scaling or routine appointment, and the dentist being calm, empathetic, and emotionally supportive. The actual and/or potential consequences of anxiety are postponing, missing, or canceling appointments and poor oral health.

The present study mapped a substantial part of the scientific literature regarding dental-treatment anxiety in adults. With its results, we hope to contribute to a more excellent and better knowledge of the impact of dental-treatment anxiety, helping reduce patients' avoidance of dental visits due to this cause and enhance the well-being of people who need regular oral care. This study may help dentists anticipate anxiety situations in their dental practice, allowing them to adopt preventive strategies based on previous anxiety assessment methodologies. It may also contribute to teaching by enriching the knowledge on this topic and including it in the syllabus of integrated master's degrees in Dentistry.

Conflict of interest

The authors have no conflicts of interest to declare.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that no patient data appear in this article.

Right to privacy and informed consent. The authors declare that no patient data appear in this article.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

Beatriz Ferraz Couto: Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Validation; Writing – original draft; Writing – review & editing.

Germano Rodrigues Couto: Conceptualization, Validation, Visualization, Writing – review & editing. **Francisco Sampaio:** Conceptualization, Formal analysis, Investigation, Methodology, Supervision, Validation, Visualization, Writing – review & editing.

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REFERENCES

- Park J, Moghaddam B. Impact of anxiety on prefrontal cortex encoding of cognitive flexibility. *Neuroscience*. 2017;345:193-202.
- Appukuttan D. Strategies to manage patients with dental anxiety and dental phobia: literature review. *Clin Cosmet Investig Dent*. 2016;8:35-50.
- Murad M, Ingle N, Assery M. Evaluating factors associated with fear and anxiety to dental treatment: a systematic review. *J Family Med Prim Care*. 2020;9:4530-5.
- National Institute of Mental Health. Anxiety disorders. Available from: <https://www.nimh.nih.gov/health/topics/anxiety-disorders>. Accessed 27 Nov, 2021.
- Lin CS, Lee CY, Wu SY, Chen LL, Lee KT, Wang MC et al. Translation and validation of modified dental anxiety scale based on adult Taiwan population. *BMC Oral Health*. 2021;17:21:647.
- López-Valverde N, Fernández JM, López-Valverde A, Juan LFV, Ramírez JM, Fraile JF, et al. Use of virtual reality for the management of anxiety and pain in dental treatments: systematic review and meta-analysis. *J Clin Med*. 2020;9:1025.
- Caltabiano ML, Croker F, Page L, Sklavos A, Spiteri J, Hanrahan L, et al. Dental anxiety in patients attending a student dental clinic. *BMC Oral Health*. 2018;18:48.
- Bryne E, Hean S, Evensen K, Bull V. More than just a dental practitioner: a realist evaluation of a dental anxiety service in Norway. *Eur J Oral Sci*. 2021;129:e12820.
- Peters MDJ. In no uncertain terms: the importance of a defined objective in scoping reviews. *JBI Database System Rev Implement Rep*. 2016;14:1-4.
- Armstrong R, Hall BJ, Doyle J, Waters E. Cochrane update 'scoping the scope' of a Cochrane review. *J Public Health (Oxf)*. 2011;33:147-50.
- D'Avanzato C, Joormann J, Siemer M, Gotlob IH. Emotion regulation in depression and anxiety: examining diagnostic specificity and stability of strategy use. *Cogn Ther Res*. 2013;37:968-80.
- Peters MDJ, Godfrey C, McInerney P, Soares CB, Khalil H, Parker D. Chapter 11: Scoping Reviews. In: Aromataris E, Munn Z (Editors). *Joanna Briggs Institute Reviewer's Manual*. The Joanna Briggs Institute, 2017. Available from: <https://synthesismanual.jbi.global/>
- Schuurs A, Duivenvoorden HJ, Thoden van Velzen SK, Verhage F. Dental anxiety, the parental family and regularity of dental attendance. *Community Dent Oral Epidemiol*. 1984;12:89-95.
- Stabholz A, Peretz B. Dental anxiety among patients prior to different dental treatments. *Int Dent J*. 1999;49:90-4.
- Bedi R, McGrath C. Factors associated with dental anxiety among older people in Britain. *Gerodontology*. 2000;17:97-103.
- Enkling N, Marwinski G, Jöhren P. Dental anxiety in a representative sample of residents of a large German city. *Clin Oral Invest*. 2006;10:84-91.
- Acharya S. Factors affecting dental anxiety and beliefs in an Indian population. *J Oral Rehabil*. 2007;35:259-67.
- Lago-Méndez L, Diniz-Freitas M, Senra-Rivera C, Seoane-Pesqueira G, Gándara-Rey JM, García-García A. Postoperative recovery after removal of a lower third molar: role of trait and dental anxiety. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2009;108:855-60.
- Sanikop S, Agrawal P, Patil S. Relationship between dental anxiety and pain perception during scaling. *J Oral Sci*. 2011;53:341-8.
- Carrillo-Diaz M, Crego A, Armfield JM, Romero-Maroto M. Assessing the relative efficacy of cognitive and non-cognitive factors as predictors of dental anxiety. *Eur J Oral Sci*. 2012;120:82-8.
- Egbor P, Akpata O. An evaluation of the sociodemographic determinants of dental anxiety in patients scheduled for intra-alveolar extraction. *Libyan J Med*. 2014;9:25433.
- Appukuttan D, Subramanian S, Tadealli A, Damodaran LK. Dental anxiety Among adults: an epidemiological study in South India. *N Am J Med Sci*. 2015;7:13-8.
- Deogade S, Suresan V. Psychometric assessment of anxiety with the Modified Dental Anxiety Scale among central Indian adults seeking oral health care to a dental school. *Ind Psychiatry J*. 2016;25:202-9.
- Guentsch A, Stier C, Raschke GF, Peisker A, Fahmy MD, Kuepper H, et al. Oral health and dental anxiety in a German practice-based sample. *Clin Oral Investig*. 2017;21:1675-80.
- Dou L, Vanschaayk MM, Zhang Y, Fu X, Ji P, Yang D. The prevalence of dental anxiety and its association with pain and other variables among adult patients with irreversible pulpitis. *BMC Oral Health*. 2018;18:101.
- Strøm K, Skaare AB, Willumsen T. Dental anxiety in 18-year-old Norwegians in 1996 and 2016. *Acta Odontol Scand*. 2019;78:13-9.
- Musalam K, Sohal KS, Owibingire SS, Kileo B. Magnitude and determinants of dental anxiety among adult patients attending public dental clinics in Dar-Es-Salaam, Tanzania. *Int J Dent*. 2021;2021:9965204.
- Scandurra C, Gasparro R, Dolce P, Bochicchio V, Muzii B, Sammartino G, et al. The role of cognitive and non-cognitive factors in dental anxiety: a mediation model. *Eur J Oral Sci*. 2021;129:e12793.
- Sreeja SS, Bhandary R, Bhat AR, Shenoy N. An assessment of dental anxiety in patients before and after scaling and polishing procedures. *J Health Allied Sci*. 2021;12:243-6.
- Suleiman A, Efunkoya AA, Omeje KU, Amole IO. The effect of dental anxiety on surgical time of mandibular third molar disimpaction. *Niger J Clin Pract*. 2021;24:1430-7.
- Yu J, Jiang R, Nie EM, Zhang CY, Li X. The prevalence of dental anxiety associated with pain among Chinese adult patients in Guangzhou. *Pain Res Manag*. 2021;2021:7992580.
- Siegel K, Schrimshaw EW, Kunzel C, Wolfson NH, Moon-Howard J, Moats HL, et al. Types of dental fear as barriers to dental care among African American adults with oral health symptoms in Harlem. *J Health Care Poor Underserved*. 2012;23:1294-309.
- Saincher RR, Pentapati KC, Gadicherla S. Effect of Audio-Visual Treatment Information on Hemodynamic Parameters during the transalveolar extraction of mandibular third molars: a randomized clinical trial. *J Int Soc Prev Community Dent*. 2019;9:21-6.
- Suhani RD, Suhani MF, Badea ME. Dental anxiety and fear among a young population with hearing impairment. *Clujul Med*. 2016;89:143-9.
- Gunjal S, Pateel DGS, Parkar S. Dental anxiety among medical and paramedical undergraduate students of Malaysia. *Int J Dent*. 2017;2017:4762576.
- Alroomy R, Kim D, Hochberg R, Chubak J, Rosenberg P, Malek M. Factors influencing pain and anxiety before endodontic

- treatment: a cross-sectional study amongst American individuals. *Eur Endod J*. 2020;5:199-204.
37. Ahmadi M, Kiakojori A, Moudi S. Association of anxiety with pain perception following periodontal flap surgery. *J Int Soc Prev Community Dent*. 2018;8:28-33.
 38. Saatchi M, Abtahi M, Mohammadi G, Mirdamadi M, Binandeh ES. The prevalence of dental anxiety and fear in patients referred to Isfahan Dental School, Iran. *Dent Res J (Isfahan)*. 2015;12:248-53.
 39. Alwan AM, Mousa HA, Talib HJ, Jassim TK. Impact of air and manual scaling on dental anxiety and blood glucose level among diabetic patients. *J Int Soc Prev Community Dent*. 2021;11:510-5.
 40. Wang M, et al. A qualitative study of patients' views of techniques to reduce dental anxiety. *J Dent*. 2017;66:45-51.
 41. Jevean P, Ramseier CA. Management of dental anxiety – a cross-sectional survey in private dental practices in the Swiss Romandy. *Swiss Dent J*. 2020;130:308-20.
 42. Mueller M, Schorle S, Vach K, Hartmann A, Zeeck A, Schlueter N. Relationship between dental experiences, oral hygiene education and self-reported oral hygiene behaviour. *PLoS ONE*. 2022;17:e0264306.
 43. Khan SDAA, Alqannass NM, Alwadei MM, Alnajrani MD, Alshahrani ZM, AlAlhareth AY, et al. Assessment of the Relationship between Dental Anxiety and Oral Health-Related Quality of Life. *J Pharm Bioallied Sci*. 2021;13(Suppl 1):S359-62.