

ORIGINAL ARTICLE

Sociodemographic, clinical and psychological predictors of subjective avoidance in endodontic therapy

ABSTRACT

Aim: Despite improvements in dentistry, patient's avoidance rates to dental treatments remain high. This study aimed to assess sociodemographic, clinical and psychological predictors of subjective avoidance in endodontic therapy.

Methodology: One hundred patients diagnosed with any type of pulp or periapical pathology that required non-surgical endodontic therapy were treated in two different clinical settings. Data were collected at two time points: a) at baseline in the waiting room before starting endodontic therapy; b) from the beginning endodontic therapy until the treated tooth regained complete functionality (a range of one to three months).

Results: There was a significant positive association between subjective avoidance and behavioral avoidance ($t=2.248$, $p=.027$). Women obtained significantly ($t=-2.039$, $p=.044$) higher scores in subjective avoidance (mean=5.73, SD=3.26) than men (mean=4.43, SD=3.04). Patients who have been taking medication presented significantly ($t=-2.071$, $p=.043$) higher avoidance (mean=6.25; SD=2.70) than patients who reported not needing medication (mean=4.91, SD=3.31). Bivariate analyses suggest that subjective avoidance maintained strong positive correlations with trait anxiety ($p=.039$), state anxiety ($p=.031$), dental anxiety ($p<.001$), dental phobia ($p=.003$) and phobic stimuli in dental context ($p<.001$).

Conclusions: Within the limitations of the present study, it can be concluded that the only predictor variable for avoidance is dental anxiety ($p<.001$).

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Introduction

The average number of times dentists are consulted is far lower than medical doctors (Healthcare activities statistics, <https://ec.europa.eu/eurostat>).

The importance of understanding attendance patterns, along with the barriers to dental attendance of adults, is important for the maintenance of adequate oral health among the population. Attendance rates for dental care show wide variability among EU Member States; in 2018, the Netherlands registered 2.8 consultations of a dentist on average per year, whilst at the opposite end were countries such as Romania, Cyprus and Denmark where each person consulted a dentist on average 0.5 times per year or less (Statistics-Eurostat-European Union, <https://ec.europa.eu/eurostat>). Particularly in Spain, the European Health Survey (EHSS) (European Survey of Health in Spain, <https://www.ine.es>) published in 2021 stated that 49.1% of the Spanish population had not attended an annual check-up at a dentist, 2% of the adult populations over 15 years of age had never visited a dentist and only 9% attended when they were having trouble or dental pain. In spite of this data, the Spanish Dental Council promotes healthcare with free annual check-ups and recommends that dental appointments should take place every year, and more often in the case of adults with specific dental problems (Consejo General de Dentistas de España. Información para el ciudadano y el profesional de la Odontología, <https://www.consejodentistas.es>). Oral health has become increasingly important as a public health monitoring measure. Patients who visit the dentist for regular dental examinations show better oral health-related attitudes and behaviours, whilst also receiving better dental treatment compared to adults who attend only when experiencing pain or having trouble (1-5). In recent years, there has been an increasing interest in patient-centered care and the individual-

ization of treatment. However, the level of dental avoidance hasn't decreased. Thus, in order to provide the best level of care, it is necessary to identify the variables that may influence in this situation. Armfield and Heaton (4), in their study among dentally fearful adults, concluded that there were no statistically significant differences between avoiders and non-avoiders regarding age, gender, insurance status or education (6). Nevertheless, other studies have found that based on gender, women are more likely than men to have consulted a dentist, meanwhile, regarding age, older people are less likely to visit a dentist (7). Thus, previous studies have been unsuccessful in creating a sociodemographic profile of patients who avoid.

In recent years, studies have focused on which variables are barriers to dental attendance. Based on these variables, Gragoll et al. (8) developed a typology of patients who avoid visiting dentist. The European Statistics of Income and Living Condition (Health variables of EU-SILC, <https://ec.europa.eu/eurostat>) Survey observed that some of the main barriers for dental attendance were cost of treatment, lack of time, travel distance to a dental provider, not knowing any good doctors or fear of doctors. Dental fear is one of the psychological variables that has aroused the most interest in previous studies (2, 4, 6, 9-11). Dental fear is a concern to both patients and dentists, as it is associated with avoidance of general dental appointments, ranging from 5.5% to 15.5% (5, 12, 13). Oosterink, De Jongh, Hoogstraten (14) reported that out of the various dental procedures, patients were most fearful of endodontic treatment. This may be because 9% of the adult population only visited dentists when they already had pain, therefore making the necessary treatments more complex. In addition, previous studies have shown that dental pain is another of the most important barriers to patients accessing dental care (2, 15-17). Although, the relationship between dental fear and dental pain is widely known, little research has



focused on the study of these two variables and their interaction with dental avoidance. In particular, it would be interesting to study both variables among patients who require more complex treatments, such as root canal treatment, due to the fact that this type of treatment is usually necessary among people who haven't maintained their regular dental check-ups. To the best of our knowledge, there are no previous studies that have included sociodemographic, clinical and psychological predictors of avoidance in a single study.

Regarding psychological variables, dental fear has been the most studied in previous studies. However, other variables that have proven to be relevant in other areas of dentistry such as self-efficacy (18-20), patient's general anxiety (21) and affectivity (22) have hardly been studied in the previous literature in relation to avoidance. In this context, and given the lack of research in this regard, the aim of this study has been to identify variables, including sociodemographic, clinical and psychological ones, that were relevant in patients' subjective avoidance when they are exposed to root canal therapy. In addition, the association between patient's subjective avoidance and behavioral avoidance, as an objective measure, was assessed.

Methodology

Design and study sample

This longitudinal observational study was conducted in two different clinical settings. Of the 100 participants, 59 were treated at the university dental clinic, at the Health Sciences Faculty of Rey Juan Carlos University (Madrid, Spain) and 41 were treated in a private dental practice (Ferrus and Bratos Dental Practice, Madrid, Spain). Consecutive patients diagnosed with a pulp or periapical pathology that required non-surgical endodontic therapy were invited to participate in the present study, before commencing treatment. A researcher belonging to the team, who did not participate in treating the patients, was responsible for inviting

them to participate. All the volunteers who were asked to participate in the study accepted to take part. Once consent had been given, in the waiting room before starting endodontic therapy, they all signed informed consent forms. The inclusion criteria were to be ≥ 18 yr of age and to require a non-surgical endodontic treatment plan. The exclusion criteria were having a diagnosis of a severe mental disorder and/or not signing both informed consent forms (one for the study and another specific form for the treatment). This study was undertaken with the approval of the Committee for Ethics in Research of the University Rey Juan Carlos (Reg. no. 26/2014). The study was open from February 2014 to March 2019.

Procedure

Root canal treatments were performed following the recommendations of the European Society of Endodontology (Quality guidelines for endodontic treatment: consensus report of the European Society of Endodontology: <https://www.e-s-e.eu>). Following local anesthesia, teeth were isolated using a rubber dam and an access cavity preparation was made with a diamond bur high speed size 014 (Komet®, Lemgo, Germany). Shaping was carried out with a combination of with hand (k-files, Denstply Maillefer®, Baillagues, Switzerland) and rotary files (Protaper Universal files, Denstply Maillefer®, Baillagues, Switzerland). The chemomechanical protocol was carried out using 5.25% sodium hypochlorite between each file used. A final rinse of 18% EDTA (Ultradent®, St Louis, MO, USA) during 1 minute was used. Finally, canals were dried using paper points and obturated, using AH Plus (Denstply Sirona®, Baillagues, Switzerland) and gutta-percha using a continuous wave down pack technique of obturation (System B, SybronEndo®, Glendora, CA, USA). All treatments were carried out by a single experienced endodontist (MSc Endodontics).

Data were collected at two times points: a) at baseline in the waiting room before starting endodontic therapy (baseline

measurements); b) from beginning of endodontic therapy until the treated tooth regained complete functionality (follow-up measurements).

a) Baseline measurements

>Sociodemographic variables: age and gender were obtained from patients' clinical history.

>Clinical variables

1) *American Society of Anesthesiologist's Physical Status Classification System (ASA-PS)*.

The ASA-PS was developed to offer clinicians a simple categorization of the overall health status of patients. It is a grading system adopted worldwide in health-care-related environments. The ASA-PS originated in 1941 although afterwards it has undergone several modifications (23-25). (American Society of Anesthesiologists: Guidelines, Statements, Clinical Resources, <https://www.asahq.org/standards-and-guidelines>).

The score consists of six classes (I to VI). In the present study, we only used class I (normal healthy patient), class II (patient with mild systemic disease) and class III (patient with severe systemic disease). Despite being routinely used, the rating denotes low inter-rater reliability with a strong reliance on work experience (26).

2) *Medication*: it was recorded if patients had been taking medication before the beginning of endodontic therapy in relation to their current dental problem. In addition, among the patients who did, we registered the type of medication (antibiotics and/or anti-inflammatory drugs).

3) *Tooth type and endodontic variables*: it was recorded if the treated tooth was a molar, premolar, incisor or canine. Pulpal status was diagnosed with clinical symptoms (palpation, percussion and thermal sensibility using a cold sensibility test). According to these symptoms, the sample was classified as irreversible pulpitis, necrosis, apical periodontitis and need for retreatment. Also, a preoperative periapical radiography of the tooth to be treated was taken in order to register if the tooth showed a radiolucent apical lesion.

>Psychological variables

1) *Subjective avoidance*: an ad hoc item was used to measure this variable: "To what extent would you avoid this situation?" The measure uses a 10-point Likert scale from "0=no avoidance" to "10=maximum avoidance". The higher the score obtained the higher the level of the patient's subjective avoidance.

2) *The Index of Dental Anxiety and Fear (IDAF-4C⁺)*: the IDAF-4C⁺ was developed by Armfield (27). It is composed of three modules: the Anxiety and Fear module (IDAF-4C), the Phobia module (IDAF-P) and the Stimulus module (IDAF-S). The anxiety and fear module, also called the four components module (IDAF-4C), is the core module. It contains eight measurements enveloping central features of dental anxiety and fear. Each component includes two items. The response formats included a 5-point Likert scale. Mean full scale scores were categorized to indicate no or little dental fear (1-1.5), low dental fear (1.51-2.5), moderate dental fear (2.51-3.5), and high dental fear (>3.5). The IDAF-4C has high internal consistency (Cronbach's alpha=0.91) and good test-retest reliability (r=0.82) (28-29). In the present study, the internal consistency of this module was also high (Cronbach's alpha=0.87). The phobia module (IDAF-P) is composed of five items. The first three items are used for the diagnosis of specific phobia towards dentists, as described by the American Psychiatric Association (DSM-5-TR, <https://psychiatry.org>). The two other items aim to provide a differential diagnosis from panic disorder and social phobia. The response options are yes/no. The IDAF-P showed good internal consistency in the present study (Cronbach's alpha=0.64). The stimulus module (IDAF-S) comprises ten items referring to a range of anxious stimuli that could be present in the dental setting. The response format is a 5-point Likert scale. All items are analysed individually, the calculation of an overall score is not required. This module showed high internal consistency in the present study (Cronbach's alpha=0.89).

3) *Self-Efficacy*: the Spanish version of the 'General Self-efficacy Scale' was used to assess self-efficacy (30). This scale is com-



posed of 10-items such as 'If I am in trouble, I can usually think of a solution' or 'I can usually handle whatever comes my way'. The scale is a brief and widely used instrument to explain and predict human characteristics in different domains, including health behaviours. The scale is scored on a 4-point Likert-type, with a range of total scores from 10 to 40. The higher the score obtained on the scale, the higher the level of patient's self-efficacy. The General Self-efficacy scale has showed a high level of internal consistency (Cronbach's $\alpha=0.83$) (31). In the present study, the Cronbach's α value was also 0.83.

4) *Positive Affect and Negative Affect*: the Spanish version of the Positive and Negative Affect Scale (PANAS) was used (32). The scale was developed by Watson, Clark, Tellegen (33). This scale comprises two 10-item subscales which measure positive affect and negative affect. The items consist of single-term descriptors of affective states and are presented to the participants in random order. Examples of descriptors for positive items are 'interested', 'alert', and 'strong' while descriptors for negative items are 'guilty', 'irritable', and 'hostile'. Each item in the subscales is scored on a 5-point Likert scale. It is a standardized measure of changes in a person's mood. The Cronbach's α has indicated excellent internal consistency for both factors (0.90 and 0.91, respectively) (34-35). In the present study, the Cronbach's α value was 0.85 for positive affect and 0.89 for negative affect.

5) *State Trait Anxiety Inventory (STAI)*: in order to assess anxiety we employed the Spanish version of the State Trait Anxiety Inventory (STAI) questionnaire (36-37). This validated instrument for the measurement of anxiety consists of two scales: Trait-STAI, to measure basal anxiety, and State-STAI, to measure anxiety at a given moment; on both scales the higher the score the higher the level of anxiety (range from 0 to 60 points). The questionnaire has a good internal consistency in the Spanish adaptation, between 0.90 and 0.93 in anxiety/state and between 0.84 and 0.87 in anxiety/trait (38). In this study, the value

of Cronbach's α was high for both factors (0.88 for Trait-STAI and 0.87 for State-Anxiety).

b) Follow-up measurements

>Clinical variables

1) *Number of canals of treated teeth*

2) *The Endodontic Case Difficulty Assessment Form according to the American Association of Endodontics, AAE* (<https://www.aae.org>): this assessment form identifies three categories of considerations which may affect treatment complexity. The first category to take into account is the patient's considerations in relation to treatment, recording anesthesia problems, patient's ability to open mouth or presence of patient's gag reflex, among others. The second category is in relation to the diagnosis and treatment considerations. It records, for example, the difficulty in taking x-rays or position of the tooth in the arch. The last category includes three items: trauma history, endodontic treatment history, and periodontal-endodontic condition. Based on all these considerations, treatment is classified into minimal difficulty, moderate difficulty and high difficulty.

>*Delayed appointments*: this behavioural indicator was registered when a restoration appointment was completed and the treated tooth had regained full functionality. The clinician registered if the patient had delayed any dental appointment necessary for the tooth to be fully restored to functionality. Delayed appointments became a dichotomous variable coding 0 (patient hasn't delayed any appointments) or 1 (patient has delayed at least one appointment).

Statistical analysis

Data were entered into a database prepared with Statistical Program for Social Sciences (SPSS™, IBM Inc., Armonk NY Version 22.0). Analyses were conducted using SPSS. Nominal data were summarised as counts and frequencies while quantitative data were summarised as means and standard deviations. Cronbach's α was calculated as a reliability coefficient. Comparisons between groups were conducted

with Student's t-tests or one-way ANOVA (Sheffé post-hoc comparisons). Bivariate correlations were evaluated using Pearson correlation analyses. Predictors of subjective avoidance were evaluated with multiple linear regression (enter method). P was set at 0.05 (two-tailed). Effect sizes for significant findings were also reported.

Results

Demographic and clinical characteristics of patients. Of the 100 patients in the sample 60 percent were female ($n=60$) and 40 percent were male ($n=40$), ranged in age from 18 to 72 (mean, 42.91 years \pm SD=11.92). The main clinical characteristics measured in the sample are shown in Table 1.

Table 1
Clinical characteristics of patients

| Variables related to health status | | | | | |
|---|--------------------|---------------------|----------------------|--------------------------------|--|
| American Society of Anesthesiologists (ASA) classification | n | n | n | | |
| | Class I | Class II | Class III | | |
| | 84 | 9 | 6 | | |
| Dental variables | | | | | |
| Previous medication | Yes (n) | No (n) | | | |
| | 28 | 72 | | | |
| Type of previous medication | None | Antibiotic | Anti-inflammatory | Antibiotic & Anti-inflammatory | |
| | 72 | 9 | 13 | 6 | |
| Endodontics variables | | | | | |
| American Association of Endodontists (AAE) Endodontic Case Difficulty Assessment Form | Minimal Difficulty | Moderate Difficulty | High Difficulty | | |
| | 33 | 53 | 14 | | |
| Tooth type | Molars | Premolars | Canines | Incisors | |
| | 46 | 29 | 7 | 17 | |
| Number of canals | 1 Canal (n) | 2 Canals (n) | 3 Canals (n) | 4 Canals (n) | |
| | 40 | 15 | 31 | 14 | |
| Pulpal diagnosis | Irreversible pulp | Pulp necrosis | Apical Periodontitis | Retreatment | |
| | 28 | 36 | 5 | 31 | |
| Radiolucent apical image | Yes (n) | No (n) | | | |
| | 50 | 50 | | | |

Data expressed in n (equivalent to percentages given that the total sample is 100).



Table 2
Relationship between subjective avoidance and behavioural indicators of avoidance

| | Behavioral avoidance | | t | p | Eta ² p |
|----------------------|----------------------|-------------|-------|------|--------------------|
| | Yes (n=7) | No (n=93) | | | |
| | Mean (SD) | Mean (SD) | | | |
| Subjective avoidance | 7.85 (1.67) | 5.09 (3.20) | 2.248 | .027 | .53 |

Subjective avoidance. Relationship with behavioural indicators of avoidance

The mean value of subjective avoidance was 5.20 (SD=3.22), ranging from 0 to 10 and mode was 5 (25%). With regards to the behavioural indicators of avoidance (delayed treatment), seven per cent of the sample delayed their treatment without giving an explanation. The range of delayed appointments was 1 to 5. The results of the analysis of the relationship between the subjective perception of avoidance and behavioural avoidance are shown in Table 2. There was a significant association between subjective avoidance and behavioural avoidance as subjective avoidance scores were significantly higher in patients who cancelled appointments compared to those who didn't.

Sociodemographic predictors

The bivariate analyses, when age and gender were considered as sociodemographic variables, showed significant relationships in the case of gender ($t=-2.039$, $p=.044$). In particular, women obtained higher scores in subjective avoidance (mean=5.73, SD=3.26) than men (mean=4.43, SD=3.04). The value of eta partial squared was .72. No significant relationships were observed between age and subjective avoidance ($r=-.143$, $p=.15$).

Clinical predictors

The following variables were considered as clinical predictors: medication prior to the appointment in relation to the dental problem, type of medication, ASA-PS

Classification System, treated tooth, number of canals in the affected tooth, pulp status, presence of a radiolucent apical lesion on the diagnostic X-ray and the degree of difficulty of the treatment according to American Association of Endodontists (AAE). The previous analyses at the bivariate level only showed statistically significant differences in relation to medication prior to the appointment as part of the dental problem ($t=-2.071$, $p=.043$). Specifically, patients who attended treatment having taken previous medication due to their dental problem ($n=28$) presented significantly higher avoidance (mean= 6.25; SD= 2.70) than those patients who reported not needing medication ($n=71$) (mean =4.91, SD=3.31). The value of eta partial squared was .72.

Psychological predictors

As psychological predictors we included state anxiety, trait anxiety, positive affect, negative affect, dental anxiety, dental phobia, phobic stimuli and self-efficacy. Table 3 shows the Pearson correlations between subjective avoidance and psychological variables. The bivariate analyses demonstrated that subjective avoidance maintains a strong positive correlation with trait anxiety ($p=.039$), state anxiety ($p=.031$), dental anxiety ($p<.001$), dental phobia ($p=.003$) and phobic stimuli in a dental context ($p<.001$).

Regression analysis

Table 4 shows the results of the regression analysis, including the statistically significant sociodemographic, clinical and psychological variables in the bivariate analyses. The table shows the variables included and excluded in the model. The final model explained 18% of the variance ($F=20.960$; $p<.001$). The only predictive variable of the model (DV: subjective avoidance) was dental anxiety ($p<.001$).

Discussion

The present study was conducted on patients who needed root canal therapy, and who were followed-up until complete

Table 3
Bivariate correlations between variables

| | Mean (SD) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-------------------------|--------------|------|-------|--------|--------|--------|--------|--------|--------|
| 1. Subjective avoidance | 5.20 (3.22) | .21* | .21* | -.13 | .13 | .41** | .29** | .38** | .05 |
| 2. Trait anxiety | 16.57 (8.77) | | .78** | -.53** | .71** | .38** | .40** | .36** | -.27** |
| 3. State anxiety | 17.70 (8.22) | | | -.51** | .63** | .39** | .47** | .39** | -.21* |
| 4. Positive affect | 35.72 (5.09) | | | | -.37** | -.26** | -.26** | -.31** | .29** |
| 5. Negative affect | 17.78 (6.16) | | | | | .29** | .29** | .35** | -.07 |
| 6. Dental anxiety | 1.70 (.78) | | | | | | .72** | .72** | -.13 |
| 7. Dental phobia | .44 (.87) | | | | | | | .53** | -.13 |
| 8. Phobic stimuli | 2.14 (.82) | | | | | | | | -.06 |
| 9. Self-efficacy | 32 (6.86) | | | | | | | | |

* $p < .05$, ** $p < .01$

functionality of the treated tooth. Usually, patients require this type of treatment when preventive treatments have not been carried out due to years of inadequate or missing dental routines (4,6,39-41). One of the main reasons for the lack of preventive treatments is dental fear. Specifically, one of the main dimensions of dental fear, namely 'fear of invasive treatment or pain',

has been found to be significantly associated to root canal therapy (42). In this same line, endodontic therapy has been shown to be one of the dental treatments with the highest rates of avoidance (15,42) therefore being of special interest to study further the predictors of avoidance of this type of treatment in particular. The findings of the present study showed a significant association between subjective and behavioural avoidance in patients who needed root canal therapy.

The novelty of the present study has been that subjective avoidance was measured as an independent variable of other related (but not equivalent) variables, such as dental fear. To the best of our knowledge, previous studies have registered patient's avoidance regarding dental treatments using other indicators, frequently dental fear. Lin, et al. (10) measured intentional (subjective) avoidance associated with dental fear comparing patients who had and had not experienced root canal therapy. Similarly, Neramo, Willumsen, Johnsen (42) registered avoidance directly associated with dental fear, by asking patients if they had missed a dental appointment due to fear. In addition to subjective avoidance, behavioural avoidance was also recorded in the present study. To the best of our

Table 4
Variables included and excluded from the regression analysis

| Included variables | Beta | t | p |
|---------------------|-------|-------|-------|
| Dental anxiety | .422 | 4.578 | <.001 |
| Excluded variables | | | |
| Sex | .099 | 1.055 | .294 |
| Previous medication | .131 | 1.416 | .160 |
| Trait anxiety | .077 | .777 | .439 |
| State Anxiety | .077 | .766 | .445 |
| Dental phobia | -.047 | -.355 | .723 |
| Phobic stimuli | .228 | 1.716 | .089 |

VD: Subjective avoidance



knowledge, there are no studies that have examined the associations between subjective avoidance and behavioural avoidance. Regarding the latter, the percentages obtained in our study are in accordance with general data regarding dentist avoidance, that have shown that 9% of the general population only seeks dental assistance when they were having trouble or are in dental pain (Instituto Nacional de Estadística, <https://www.ine.es>).

Regarding study design and data collection, the present study was of an observational longitudinal nature, carried out in a sample of adult population while in treatment. The majority of previous studies have been cross-sectional where patients filled a questionnaire at the beginning of their visit to the dental clinic (9, 43-44) although other studies have observed patients over years in order to assess the evolution of psychological factors (42, 45). In our opinion, it has been of interest to register subjects at a time when they needed endodontic therapy and to have continued their follow-up until full function of the tooth was recovered, especially to measure avoidance.

According to our results, certain sociodemographic variables could predict subjective dental avoidance. With regards to gender, the results of previous research have not always been consistent, as some authors have found that men are more prone to avoidance whereas others have not found any differences between genders (7,46-48). In our study, women showed more avoidance, this could be explained by the use of a specific ad-hoc item to evaluate subjective avoidance. Our results suggest that age is not a predictor for subjective avoidance, which is in accordance with previous literature (6,48). Even though dental care attendance rates indicated a slight variability among EU Member States suggesting that elderly people tended to visit dentists less often than younger people (Healthcare activities statistics, <https://ec.europa.eu/eurostat>). In our study only 7% of the participants were older than 65, which could explain the absence of significant avoidance-age relationships. Regarding the clinical variables considered, none

of them have shown a significant relationship with dental subjective avoidance. This is the first study, to the best of our knowledge, that encompasses specific endodontic variables in relation to treatment avoidance. Previous studies have analyzed its role on the evolution of pain in endodontic therapy (49-52) or regarding seeking dental assistance due to pain (10, 16, 47, 53-54).

One of the findings of interest in our study has been that subjective avoidance was significantly higher in patients who had taken previous medication compared to patients who hadn't taken it. To our knowledge, no previous studies in the endodontic field have reported whether patients had been taken medication prior to endodontic therapy due to their dental problem. Patients' need for medication to relieve their symptoms could be interpreted as an objective measure of the need for dental treatment in patients, although pain thresholds vary greatly from one patient to another. The results found in the current study could be interpreted if we hypothesize that the patients who took medication delayed visiting the dentist even more as the medication mitigated their symptoms. Our results are in agreement with Falcon, et al. (55) who found that patients who receive palliative care are highly associated with incomplete nonsurgical endodontic treatment. A possible explanation of this is that patients with high rates of dental avoidance, relieved their symptoms with medication. When the medication stopped working for them, they sought a dentist for an emergency appointment. Dentists are able to relieve acute pain but need longer appointments to complete root canal treatment and often a second appointment to restore the complete functionality of the tooth. Again, this could increase avoidance rates as patients will have relieved their symptoms and therefore won't return for further appointments. On the other hand, our results suggest that this is in line with the general models proposed to explain treatment adherence. In them, the perception of the symptoms on behalf of the patient is considered a main predictor of adherence to treatment

(56-57). The gap between knowledge creation and implementation remains wide with few studies documenting the iterative process of comprehensive implementation in clinical settings. The objective of this study was to improve adherent physical therapy care according to CPG's for low back pain and describe the knowledge to action (K2A). Our study has highlighted that patients who have taken medication prior to appointments reduced their acute symptoms and decreased adherence to treatment, which in turn produced greater rates of patient treatment avoidance. As a consequence, patients experienced poorer oral health quality-of-life and poorer perceived oral health (58-60), in turn contributing to an increase in the cost of general health service (6).

Regarding psychological predictors, the results of the present study suggest that self-efficacy and negative affect don't show any correlations regarding subjective avoidance. In relation to negative affect in dentistry, no previous studies were found associating it to avoidance. However, neuroticism as a construct has been closely linked to negative affect (61), defined as a trait disposition to experience negative affect, including anger, anxiety, self-consciousness, irritability, emotional instability, and depression (62). In dentistry, neuroticism has been studied associated to individual's oral health (63) and in relation to dental fear, especially in women (64-66). Anxiety is a clear predictor of avoiding dental treatment, as plenty of studies have shown this relationship (7, 44, 67-70). Root canal therapy is one of the dental treatments that most anxiety generates in patients (71). In our study, general anxiety variables and dental anxiety variables were assessed. Both of them had a strong correlation with subjective dental avoidance. In particular, when both were compared in relation to avoidance, dental anxiety proved to be more predictive. At this point, we ought to highlight the role of dental fear and its vicious circle (72, 73). It is already known that dental fear has a prevalence of between 5 and 20% in the adult population and is a significant clinical complication in dental practice (65).

Dental fear has been widely studied as a key predictor of dental avoidance (5, 6, 11, 21, 74-76).

This study presents some limitations that must be taken into account. These findings cannot be generalized due to the sample size being small and collected only in Spain, which is one of the countries of the European Union with higher rates of dental avoidance among adults (Healthcare activities statistics, <https://ec.europa.eu/eurostat>). It should be mentioned that there could be a possible bias in the present study due to 74% of the patients having undergone previous endodontic treatment. Finally, at a methodological level, it is necessary to point out the low but acceptable Cronbach's alpha of the phobia module of IDAF-4C⁺, although this limitation can be found in other articles (77-78).

Conclusions

According to our results, dental anxiety plays the most important role in predicting root canal therapy avoidance. Therefore, we believe that the use of the dental anxiety scale would be enough to screen patients for high rates of avoidance.

Clinical Relevance

Managing anxiety, customizing treatment plans to promote a safe and calm environment at dental appointments, and discussing patient concerns prior to treatment is one way to reduce dental anxiety, also contributing to reduce avoidance of root canal therapy.

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Conflict of interest

None.



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