



Patient satisfaction after orthodontic treatment: a systematic review

Satisfação dos pacientes pós-tratamento ortodôntico: revisão sistemática

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ABSTRACT

Objective: To conduct a systematic review of the literature about the factors that drive patients toward satisfaction after orthodontic treatment. **Material and Methods:** The review was registered in PROSPERO (CRD42013004528). Four databases as well as the reference lists and citations of the included publications were searched according to PRISMA guidelines, yielding 6.387 titles and abstracts. Two reviewers performed data collection independently and a third reviewer was included, if there was no consensus. **Results:** Nine surveys (2.742 participants) remained after data extraction and interpretation. A total of 14 findings were abstracted from the reports and were grouped together into 4 topics that were judged to be similar: treatment, aesthetics, function and social well-being. The main findings for adherence based on their calculated frequency effect sizes were: self-perception of esthetics of teeth (44%); harmony of the teeth with other structures of the face (44%); alignment of anterior teeth (33%); greater comfort, absence of pain and improved chewing/ eating (33%); social well-being (33%); treatment was worth it (33%). **Conclusion:** Despite the few studies and limitations related to the report and data quality, the evidence showed the main factor leading to patient satisfaction was improved aesthetics. Chewing, absence of pain, social well-being and the way treatment was conducted were highlighted as reasons for patient satisfaction after orthodontic treatment.

KEYWORDS

Corrective orthodontics; Patient satisfaction; Systematic review.

RESUMO

Objetivo: Realizar uma revisão sistemática da literatura sobre os fatores que levam à satisfação ou não do paciente pós-tratamento ortodôntico. **Material e Métodos:** Esta revisão sistemática foi registrada no PROSPERO (CRD42013004528). Quatro bancos de dados, bem como as listas de referências e citações das publicações incluídas foram pesquisados de acordo com as diretrizes do PRISMA, produzindo 6.387 títulos e resumos. Dois revisores realizaram a coleta de dados independentemente e um terceiro revisor foi incluído, se não houvesse consenso. **Resultados:** Nove artigos (2.742 participantes) permaneceram após a extração e interpretação dos dados. Um total de 14 resultados foram extraídos dos relatórios e foram agrupados em 4 temas que foram julgados semelhantes: tratamento, estética, função e bem-estar social. Os principais resultados baseados na frequência do tamanho de efeito foram: autopercepção da estética dos dentes (44%); harmonia dos dentes com outras estruturas da face (44%); alinhamento dos dentes anteriores (33%); maior conforto, ausência de dor e melhora na mastigação/ alimentação (33%); bem-estar social (33%); tratamento valeu a pena (33%). **Conclusão:** Apesar dos poucos trabalhos encontrados e do valor questionável da qualidade de alguns, a evidência aponta que o principal fator que leva à satisfação dos pacientes está relacionado à melhora estética dos próprios dentes. A mastigação, a ausência de dor, o bem-estar social e a maneira como o tratamento foi conduzido foram destacados como razões para a satisfação do paciente pós-tratamento ortodôntico.

PALAVRAS-CHAVE

Ortodontia corretiva; Satisfação do paciente; Revisão sistemática.

INTRODUCTION

There is a high percentage of individuals with malocclusion who need orthodontic treatment [1-3] and the demand for professional help frequently occurs for esthetic reasons, irrespective of the patient's functional and structural conditions [4-6]. There has been a growing number of professionals in this area, [7,8] and concern about the satisfaction of individuals who will have this treatment performed, or are undergoing it, has become a reason for investigation [9-16].

According to one study, approximately 34% of patients are satisfied with the treatment, 62% are partially satisfied, and 4% are not satisfied with the treatment they received [11]. For a good treatment, orthodontists must evaluate the individual as a whole, listen to his/her point of view and concept of esthetics [10,17,18]. The risks arising from professional practice have increased over the last few years in some countries such as the United States [19,20] and it is important for all the care relative to a good professional/patient relationship to be taken, before, during and after conclusion of the treatment. The professional's work must be based on ethical principles, and dental schools must include the topic in the curricular proposals, because the professional/patient relationship is one of the factors of success in dental practice [10,20,21]. Furthermore, no professional should make promises about treatment, so as not to generate expectations in the patient, which may perhaps not be possible to attain.

Although there are studies that relate orthodontics with facial and oral esthetic aspects, [22-24] patient satisfaction has had relatively limited coverage in the literature. Systematic reviews may help to improve the quality of care offered by orthodontists. In this context, the objectives of this study were: (1) to conduct a systematic review of the literature, of qualitative and opinion surveys, (2) ask the question: What are the factors that lead to patient satisfaction as regards the result of orthodontic treatment?

and (3) conduct a metasummary of the results found.

MATERIAL AND METHODS

Protocol and registration

This systematic review was written in accordance with the items described in the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) and was registered in the International Register of Prospective Systematic Reviews (Prospero), under number CRD42013004528.

Eligibility criteria

The following inclusion criteria were considered: (1) articles that presented the experimental method of a qualitative or opinion survey study; (2) articles that reported the factors related to post orthodontic treatment satisfaction; (3) studies whose subjects were patients with a minimum age of 18 years, who had concluded orthodontic treatment, and (4) studies whose subjects presented with skeletal facial pattern I, II or III. The following exclusion criteria were considered: (1) studies whose research subjects were oral health technicians, doctors, nurses or dental students; (2) patients who had undergone orthognathic surgery.

Literature search

To search for studies, the following electronic databases were consulted: Pubmed, Lilacs, Web of Science and Scopus, without limitation on date, in the English and Portuguese languages. The reference lists of the retrieved studies were searched for additional publications, and the citations were also analyzed using Google Scholar. The authors of included studies were contacted by email for the identification of additional studies.

Search strategy

For the search strategy, the PICO format [25] and the following terms were used: "Patient", "Patients", "Client", "Clients", "After orthodontic

therapy”, “After orthodontic treatment”, “After Orthodontic Therapeutics” and “Post orthodontic treatment”, as well as their Mesh and Entry terms (Table 1). The terms related to the type of study of the articles that should be included were not used, because “Qualitative Research” was introduced as a *Mesh term* by Pubmed, only in the year 2003, and therefore we excluded studies prior to this date, from the study.

Table 1 - Search strategy in different electronic databases

Databases	Search Strategy (Mesh and entry terms)	Results
Pubmed	(Patients OR Patient OR Client OR Clients) AND (After Orthodontic Therapy OR After Orthodontic Treatment OR After Orthodontic Therapeutics OR Post Orthodontic Treatment)	3206
Lilacs	(patients OR patient OR client OR clients) AND (“after orthodontic therapy” OR “after orthodontic treatment” OR “after orthodontic therapeutics” OR “post orthodontic treatment”)	175
Web of Science	Topic=(Patients OR Patient OR Client OR Clients) AND Topic=(After Orthodontic Therapy OR After Orthodontic Treatment OR After Orthodontic Therapeutics OR Post orthodontic treatment)	1618
Scopus	(patients OR patient OR client OR clients) AND (after and orthodontic and therapy) OR (after and orthodontic and treatment) OR (after and orthodontic and therapeutics) OR (post orthodontic treatment)	1388

Study selection

Two reviewers (LYK and RSST) independently read all retrieved titles, abstracts, and full-text articles. If one assessor regarded a publication as having met the inclusion criteria, the full text was obtained. Abstracts considered as potentially eligible, as well as those that did not supply enough information, were reserved for the assessment of the full-text article. Any differences concerning eligibility after the full text was evaluated were resolved through consensus, and when differences still persisted,

a third reviewer (USGS) was consulted before a final decision was reached.

Quality assessment

In order to evaluate the quality of the opinion surveys, an adaptation was made of the checklist proposed by Bennett et al. [26], in the article “Reporting guidelines for survey research: an analysis of published guidance and reporting practices”. Even articles presenting low quality were included. Later an evaluation was made of the weight of this article.

The quality assessment of included surveys considered the inclusion of the following items: I) research question justification; II) explicit research question; III) clear objectives; IV) description of the methods used to analyze data; V) method used to administer the research instrument (questionnaire); VI) place and date of the study; VII) method described well enough to be replicated; VIII) reliability of evidence; IX) validity of evidence; X) method used to verify data entry; XI) use of codification; XII) sample size calculation; XIII) method for selecting the sample; XIV) description of the study population; xv) description of the research instrument; XVI) description of the research instrument development; xvii) instrument pre-test; XVIII) instrument reliability and validity; xix) scoring method; xx) informed consent obtained; XXI) ethics approval; and XXII) evidence of ethical treatment of research participants; and XXIII) sample representativeness.

The items above were verified and classified as definitely present (yes), partially or unclearly present (not clear), or definitely not present (no). Studies that presented a prevalence of “yes” answers (> 50%) in the quality assessment were deemed to have a low risk of bias, studies that did not clearly present many of the items assessed were classified to have a moderate risk of bias, while studies that presented a prevalence of “no” answers (> 50%) were considered to have a high risk of bias.

Data extraction

Two reviewers (LYK and RSST) independently conducted data extraction. Items of general information were collected from the studies, such as authors and year of publication. The following specific characteristics were collected: objective, study design, place where research was conducted, the intervention, number of participants in the sample, inclusion and exclusion criteria, characteristics of the participants, manner of data collection, data analysis, main outcomes/results and conclusions of authors.

The percentage of participants who contributed to each of the topics was calculated, and the mean was determined for similar responses in each study. After this, the total of similar responses of all the studies was calculated, which was reported as a percentage.

Data analysis

For data analysis, a qualitative meta-summary [27] was used, which is an approach directed toward quantitative aggregation of the synthesis of both qualitative and opinion surveys. This involves extraction, grouping and formatting of the results, and calculation of frequency and intensity effect sizes.

After extraction of the results of the studies included, and grouping of the relevant findings, topics were created - concise representations, those broader in scope - eliminating redundancies, however, preserving the complexity of their contents. Whenever possible, examples of citations of participants were extracted. For coding the topics, we used the Software ATLAS.ti 7 - Qualitative Data Analysis.

To evaluate the magnitude of the conclusions obtained, the frequency and intensity effect sizes were calculated of themes that had been included by over 25% of the

studies. For this purpose, the number of studies that presented a certain term (minus the results derived from a study with a common base and that would represent a duplication of the same conclusion) was divided by the total number of studies. In addition, by means of percentage, the representativeness of each topic within each study was pointed out.

RESULTS

The search in the electronic databases PubMed, Web of Science, Scopus and Lilacs resulted in 6.387 references. After removal of the duplicates and evaluation of the titles and abstracts, 67 articles were considered potentially eligible. After analysis of the references and citations of complete texts in Google Scholar, another three articles were selected, totaling 70 articles. 61 articles were excluded for the following reasons: 23 articles did not present the experimental method of a qualitative or opinion survey; 29 articles presented patients under the age of 18 years; in three articles the research subject was a dental student or health technician/ or other areas of health; four articles did not report patient satisfaction after orthodontic treatment, and the complete texts of two articles were not made available. No article reported on subjects who had been submitted to orthognathic surgery. On conclusion of the evaluation, nine opinion surveys [9,13,15,16,18,28-31] fulfilled the inclusion criteria and were included in the systematic review. No qualitative study was found. Figure 1, in a flow diagram, summarizes the process of selection of the articles.

In total, 2.742 individuals participated in the primary studies. The geographic distribution of the place where the studies were conducted was as follows: Germany (1 study), Brazil (3 studies), Holland (1 study), Spain (1 study), Sweden (1 study) and Finland (1 study). There was 1 study that involved Germany and Holland. The studies may be visualized in greater details in Table 2.

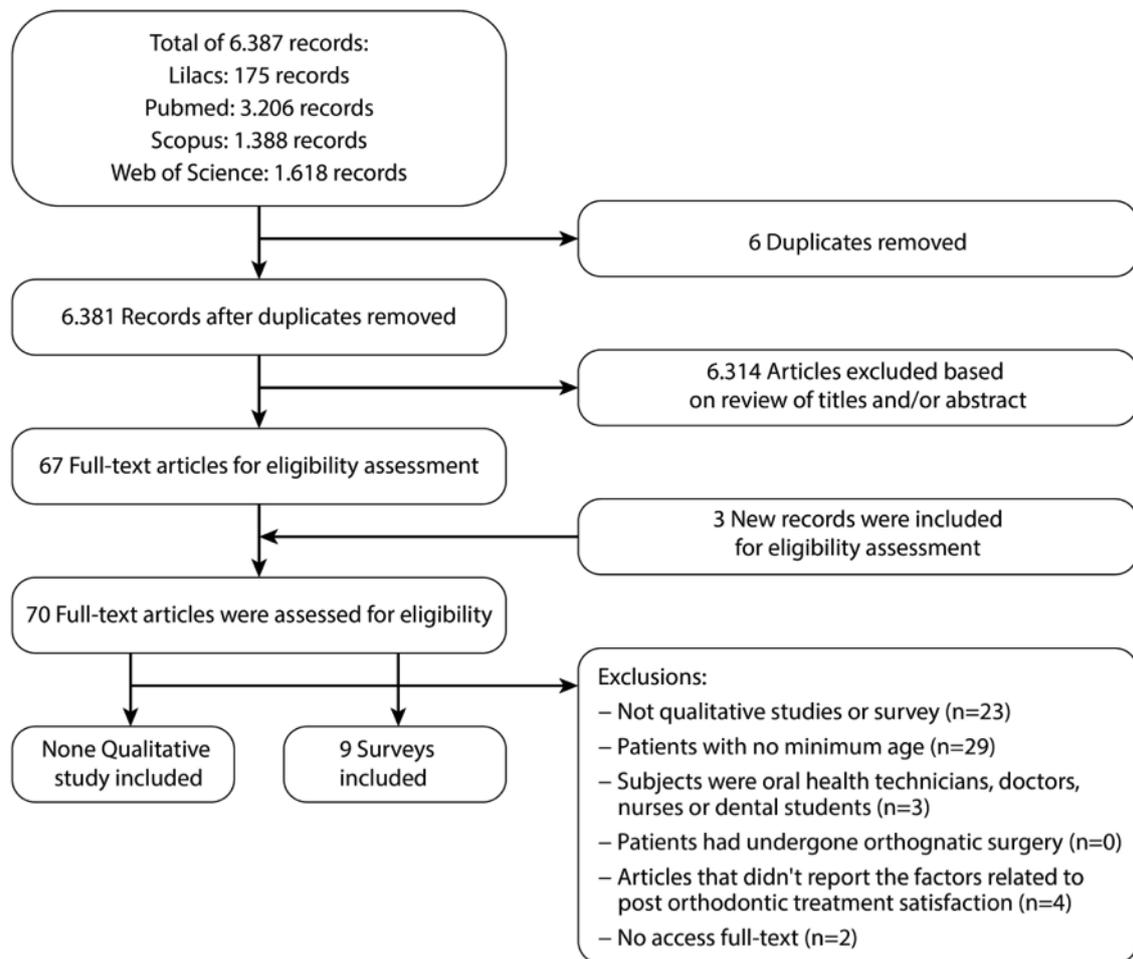


Figure 1 - Flow diagram showing Process of study selection.

Table 2 - Distribution of studies according to gender, age, place where research was conducted

Studies	Sample Size (total)	Men	Women	Age, mean or range	Country	Index used
Oliveira; Tavares; Freitas (2013) ^[30]	54	14	40	20-61	Brazil	Questionnaire
Palomares <i>et al.</i> (2012) ^[16]	200	137	63	Range: 18-30	Brazil	Profile of impact of oral health, IOTN, economic classification criteria and DMF-T
Maia <i>et al.</i> (2010) ^[15]	209	139	70	Medium: 16.2	Brazil	PAR and DIDL
Njio <i>et al.</i> (2008) ^[13]	1538	1030	508	N/I*	Holland	STOPS
Klages <i>et al.</i> (2005) ^[29]	298	172	126	Medium: 25.04	Germany and Holland	IOTC-AC
Berset <i>et al.</i> (2000) ^[31]	118	70	48	19	Sweden	Questionnaire and PAR
Riedmann <i>et al.</i> (1999) ^[28]	59	20	39	Medium: 30.5	Germany	PAR and IOTN
Varela <i>et al.</i> (1995) ^[9]	40	37	3	from 18 - 28: 26 persons from 28 - 43: 14 persons	Spain	Broad Questionnaires
Tuominen <i>et al.</i> (1994) ^[18]	226	137	89	Medium: 21.5	Finland	Interview

*N/I: Not informed

With the quality assessment the risk of bias of the studies included was verified. Studies in which there was prevalence of “yes” in the quality evaluation, were considered with low risk of bias. Studies in which many of the items evaluated were not clearly presented, were classified with moderate risk of bias. Studies in which there was prevalence of “no” were classified with high risk of bias. 4 articles were considered with low risk [13,15,16,30], 4 with medium risk [9,28,29,31] and one with high risk of bias [18]. After analysis and coding of the 9 articles, two categories of analysis were created: one related to the patient, and the other related to the professional conducts.

Patient Category

In this category, three topics emerged with a set of related sub-topics:

- Esthetics: factors related to alignment of anterior teeth, self-perception of the esthetics of teeth and harmony of teeth in relation to other structures of the face.

- Function: absence of pain, oral comfort and improvement in chewing/eating.

- Social well-being: promotion of self-awareness with regard to oral and general health, improvement in body image as a whole, improvement in shyness and satisfaction with general oral health.

As regards esthetics, after conclusion of orthodontic treatment, 44% of the articles developed esthetic self-perception of their teeth, 33% with regard to factors related to tooth alignment and 44% began to compare the harmony of the teeth in relation to other structures of the face. With regard to function, 33% of the articles reported greater comfort, absence of pain and improvement in chewing/

eating. A higher level of social well-being was pointed out by 33% of the articles, and approximately 22% reported orthodontic treatment promoted self-awareness as regards oral and general health, in addition to improving shyness and promoting satisfaction of general oral health.

Professional Category

The topic analyzed in this category was:

- Treatment: course of treatment, time necessary for treatment to be adequate, whether treatment was worth it, and whether the patient received attention and care from the orthodontist.

The course of treatment was as expected for 22% of the articles. Adequate time spent on treatment, not very extended or very short, was pointed out as a factor contributing to the satisfaction of 22% of the articles. Over 33% of those involved reported orthodontic treatment was worth it. In addition, 11% reported satisfaction after treatment, when they received attention and care from the orthodontist and his/her team.

Table 3 presents the frequency of effect size of each topic found for each category of analysis.

The intensity of effect size was calculated to evaluate the impact of studies and their conclusions on the results of synthesis. The article that presented the highest frequency of intensity; that is, presented the largest number of topics, was the study of Riedmann [28], with over 46%, followed by Maia [15] with 33%, Varela [9] also with 29%, Oliveira; Tavares; Freitas [30] 26%, Njio [13] and Tuominen [18] with 18%, Klages [29] and Berset [31] with 13.3% and Palomares [16] with 6.6%.

Table 3 - Frequency of effect size, in percentage, of sub-topics found

Topics	Sub-Topics	Frequency of effect size(%)	Authors
Treatment	Course of treatment	22	Riedmann (1998)[28]; Njio (2008)[13]
	Time of treatment	22	Oliveira (2013)[30]; Riedmann (1998)[28]
	Treatment was worth it	33	Riedmann (1998)[28]; Berset (2000)[31]; Njio (2008)[13]
	Attention and care of orthodontist	11	Njio (2008)[13]
Esthetics	Alignment of anterior teeth	33	Riedmann (1998)[28]; Klages (2004)[29]; Maia (2010)[15]
	Self-perception of esthetics of teeth	44	Riedmann (1998)[28]; Maia (2010)[15]; Berset (2000)[31]; Tuominen (1994)[18]
	Harmony of teeth in relation to other structures of the face	44	Oliveira (2013)[30]; Riedmann (1998)[28]; Varela (1995)[9]
Function	Absence of pain	11	Maia (2010)[15]
	Oral Comfort	11	Maia (2010)[15]
	Improvement in chewing/eating	33	Maia (2010)[15]; Oliveira (2013)[30]; Tuominen (1994)[18]
Social well-being	Social well-being	33	Riedmann (1998)[28]; Maia (2010)[15]; Varela (1995)[9]
	Promotion of self-awareness	22	Palomares (2012)[16]; Varela (1995)[9]
	Improvement in body image as a whole	11	Varela (1995)[9]
	Improvement of shyness	11	Varela (1995)[9]
	Satisfaction with general oral health	11	Tuominen (1994)[18]

DISCUSSION

In qualitative surveys, interviews with open questions are used, within an itinerary that allows a great deal of flexibility, and in which there is a vast possibility of responses. This allows a certain topic to be analyzed in depth. Whereas opinion surveys, because of using closed and more structured questions, allow a less diverse spectrum of responses. Therefore, the first aspect drawing attention in this review is that the production of qualitative surveys seeking to find out the opinion of patients about orthodontic treatment received is limited. On the other hand, despite the final number of opinion surveys having been relatively small, it must be pointed out that the number could have been larger if studies with subjects under the age of 18 years, who had been through some orthodontic experience, had been included. These articles were not included in the study, because this is the age from which the subject has the autonomy to judge the result of his/her treatment. As from this age range, the number of indications for treatment with the use of mobile appliances is lower.

The qualitative survey has been an important complement to quantitative data. Facial beauty is defined to a far larger extent by the set of characteristics rather than harmony among the skeletal parts only, and it does not seem to interest patients that the angles and proportions of their face are within a “pattern of normality”, if this pattern does not suit their ethnic and individual characteristics.

Among the topics identified, the factor presenting the highest frequency was esthetics on conclusion of orthodontic treatment. This reflects the increasing esthetic demand among a large portion of individuals who seek orthodontists nowadays [22,32,33]. The majority of adults who seek orthodontic treatment for themselves and their children do so for esthetic reasons [32].

A higher level of social well-being was pointed out by 33% of the articles, and approximately 22% reported orthodontic treatment promoted self-awareness as regards oral and general health, in addition to improving their own body image and shyness. From the professional point of view, this is a

reflection of good attendance of the patient, so that he/she accepts being submitted to the entire treatment once again, because he/she believes the treatment will bring satisfactory results, and improve his/her general health and social life. According to this thinking, one study showed that over 92% of patients reported that if they were to take the decision once again, they would submit to orthodontic treatment again [4]. Birkeland [32], in his study, showed orthodontists play a significant role in the decision about treatment, whether it is by means of the information transmitted, or related to cost-benefit and counseling of the patient. All this reflects a good professional code of ethics.

The article that presented the highest frequency of intensity; that is, presented the largest number of topics, was the study of Riedmann [28]. There was significant difference in the frequencies found, however, not every article that presented a high frequency of effect size, presented low risk of bias. This is due to the diversity of topics found and their potential clinical relevance.

All the results of the research showed the importance of knowing about the factors that lead to the satisfaction of patients after orthodontic treatment. This is related to the professional's conduct, which has great influence on the decision to adhere to treatment, and consequently reflects the contribution made by the professional to planning, during treatment and follow-up of the patients, who related great esthetic and/or functional changes due to the use of the corrective orthodontic appliance [10,11,13,20,21].

The publication of systematic review studies, as well as others that synthesize research results is an important step towards evidence-based practice. The final aim of this process is to improve the quality of care offered by health professionals.

CONCLUSION

In spite of the few studies and questionable value of quality of some, the evidence points out the main factor that leads to the satisfaction of patients is the improvement in esthetics. By this study, we could also conclude that masticatory function, absence of pain, social well-being and the way treatment was conducted were pointed out as reasons for post orthodontic treatment satisfaction.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this manuscript.

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