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Article

A qualitative analysis of perceptions of orthodontists in Concepción about removable orthodontic appliances.

Francisca Matthews.[1]

Affiliations: [1]Facultad de Odontología, Universidad Andrés Bello, Chile.

Corresponding author: Francisca Matthews. Colón 427-1 Chiguayante, Chile. Phone: (56-9) 79624654. E-mail: fca.matthews@gmail.com

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Abstract: Objective: To determine the utilization, attitudes and perceptions about removable orthodontic appliances (ROA) among a sample of Chilean orthodontists. Materials and methods: Data collection was performed using semi-structured interviews with 10 orthodontists from diverse professional backgrounds. The analysis was performed using the "Grounded Theory" methodology, using Atlas.ti v.6.0.15. Results: We interviewed four men and six women (31 to 75 years old), with 7 to 53 years of experience as dentists, and 1 to 10 years of experience as orthodontists. All orthodontists have experience in private practice, five in public service, and one in a military institution. One-hundred and thirty-three codes were grouped into seven categories identified as follows: perception of orthodontists, control over treatment, ROA characteristics, ROA indications and contraindications, patients' attitude to ROA, selection of treatment, and ROA utilization. Conclusion: In the selection of ROA, different factors are involved, including the characteristics of the dentist, of the patient, and the social context. The key factor in the utilization of ROA is the perception of control over treatment.

Keywords: Removable orthodontic appliances; perceptions; attitude; qualitative analysis; grounded theory; control over treatment.

INTRODUCTION.

Technology has allowed a continual revolution of orthodontic appliances (OA), resulting in a large variety of devices, each with specific uses and indications. From this arsenal, the most appropriate OA should be carefully selected for each clinical situation.[1] The treatment choice must be supported by irrefutable evidence,[2] because an improper selection can worsen the malocclusion.[3] However, the decision-making process regarding dental treatments is complex.[4] It is important to understand the decision-making process and the selection of treatments because of the impact they have on patient care and satisfaction.[5] There are many factors related to the dentist that influence this process, such as: initial[6] and continuing education,[7] practical skills,[8] experience,[7,9] individual characteristics,[8] beliefs and personal values,[10] and sociodemographic characteristics (sex and age).[11]

MATERIALS AND METHODS.

Study design

This is a qualitative study, based on "Grounded Theory" methodology. The principles of grounded theory are: 1) Openness, 2) Immediate analysis, 3) Coding and comparing, 4) Memo-writing (diagrams), 5) Theoretical sampling, 6) Theoretical saturation, and 6) Production of a substantive theory.[17] All these components, included in the different phases of

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the study, finally allow the construction of a theory based on the gathered data and not from a prior theoretical framework, allowing a better understanding of the research situation.

Sampling and data collection

The target group was orthodontists of the city of Concepción (Chile). The inclusion criterion was to be practicing the specialty within the city, and there are not exclusion criteria. The data collection was conducted through semi-structured interviews (Table 1). All respondents were interviewed after the research aim had been explained and they had voluntarily signed the informed consent. The number of respondents was determined under the concept of *"theoretical saturation,"* corresponding to the point at which respondents no longer provide new data and the responses begin to be repetitive.

Data analysis

The mechanism of analysis was based on assigning codes to segments of information obtained in the interviews, a process called "open coding." Then, these codes were sorted into different categories according to their characteristics/properties and dimensions (a range over the property can vary), resulting in a series of representative categories. Finally, these categories were connected based on causality, interaction, intervention, and consequences, a process called "axial coding". The final product is a diagram showing the relationship between the categories, around a central category, which represents the center of the research situation.

RESULTS.

Ten active orthodontists were interviewed, four men and six women; the age range varied between 31 and 75 years old with a mean of 44.8 years. The professionals have from 7 to 53 years of experience as dentists with a mean of 21.4 years of professional practice. The years of experience as orthodontists ranged between 1 to 10 years with a mean of 3.8 years; from this aspect only eight orthodontists were considered because the two older professionals did not attend regular postgraduate studies and obtained the specialty through other mechanisms.

All respondents worked in their private practice, with five also working in the public system, and only one in a military institution.

The result of the "open coding" analysis was a list of 133 codes grouped into seven categories (9 to 37 codes per category). The "axial coding" connected these 7 categories in causality, interaction, intervention, and consequences groups. The properties and dimensions of each category along with some quotations are detailed below.

Category 1, Patient´s attitude

Three properties were identified: -Attitude of the patient and the parents: From "very good attitude" to "very bad attitude." This aspect was described 22 times as positive and 12 as negative for the patients, and 4 and 5 times respectively for the parents.

-Patient preference: From "removable preference" to "fixed preference." This revealed that patients generally prefer to use FOA, regardless of the health system to which they belong (private, public or military).

-Differences in patients according to the health system to which they belong: Evaluated according to the above two parameters and cataloged from "very similar" to "very different."

Some responses regarding a patient attitude were: *"...the patient in the public system will be more cooperative using an ROA, because they have no other chance..."* Male, 65 years old, private system; *"... In the public system I would say that children do not collaborate very well, and not all parents are very committed ..."* Female, 33 years old, private and public system.

Category 2, ROA characteristics

Five properties were identified:

-ROA classification: From "strictly removable" to "mixed use."

-Economic terms: From "very economical" to "very expensive." On six occasions the respondents mentioned the low cost of the ROA as a clear advantage, but one of the participants mentioned that ROA provides little economic gain.

-Patient comfort: From "comfortable" to "uncomfortable." Four respondents described the ROA as uncomfortable, marking this as a disadvantage, while one patient pointed out the advantage of the ROA as being less invasive than the FOA.

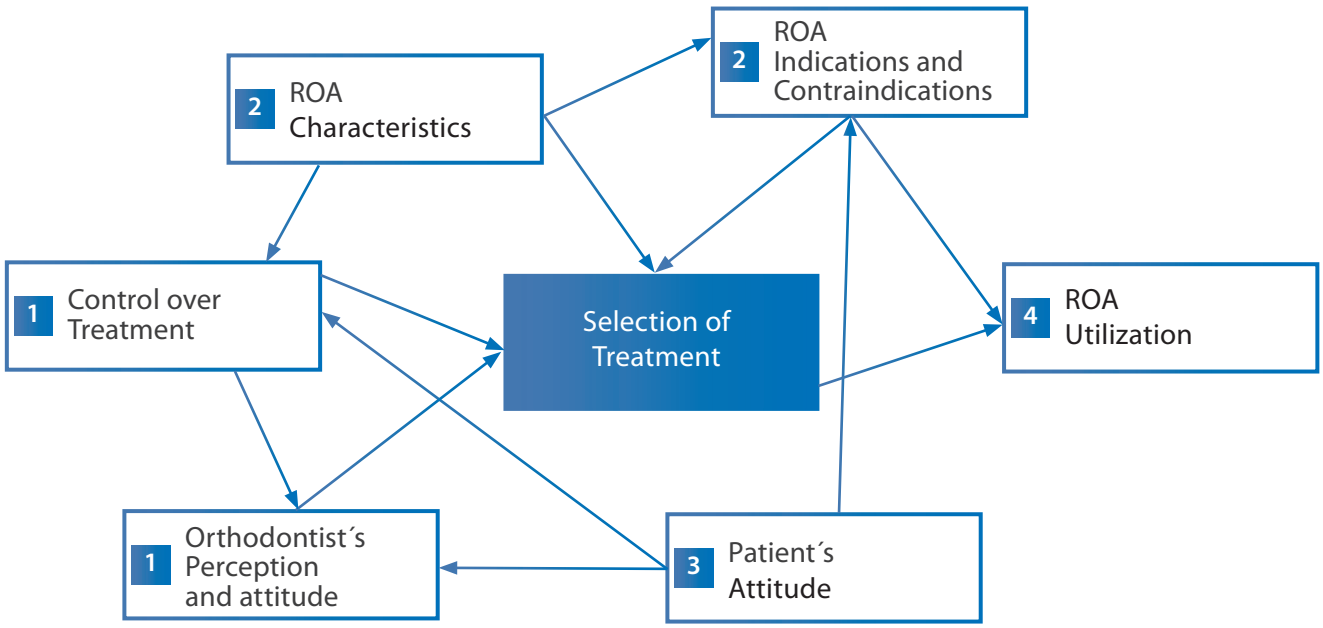
-Effectiveness: From "limited effectiveness" to "very effective." Positive references about the effectiveness of ROA were mentioned 11 times, five times it was considered poor and five times it was described as fair.

-Other: From "other benefits" to "other drawbacks." The advantages of ROA included that they are cheaper, they allow better hygiene, are comfortable for the patient, can be

Table 1. Interview's script.

Perception and attitude	**1.** How do you assess the effectiveness of removable appliances? **2.** What do you think are the advantages and disadvantages of removable appliances? **3.** What do you think is the attitude of patients toward these devices? **4.** How do you think patients respond to treatment with removable appliances?
Prescription	**1.** Do you use removable appliances in your patients? If so, in what proportion? **2.** Do you believe that there are differences in the amount of use and indication between the public and private system? If so, what do you think are the main causes? **3.** When comparing patients in the public and private systems, do they express a preference for some kind of treatment? Do they respond better to one of them? What do you think are the main differences?
Type of patient and clinical situation	**1.** In which clinical situations do you prefer the use of removable appliances? **2.** What contraindications do you consider for the use of removable appliances? **3.** What is the ideal time for the use of removable orthodontics?
Method of use	**1.** Do you consider them a stand-alone treatment or a previous/complementary treatment to the definitive treatment ? Why?
Attitude of orthodontists to removable appliances	**1.** What do you think is the attitude of other orthodontists towards removable appliances? **2.** How effective do you think removable appliances are? **3.** How do you consider the results obtained in your patients treated with removable appliances?

Figure 1. Axial codification.



ROA: Removable orthodontic appliance; **1:** Causal conditions; **2:** Contextual conditions; **3:** Intervention conditions; **4:** Consequences.

removed at will, are less invasive, and provide a therapeutic diversity; the disadvantages were: the short life of the device, they become odorous, uncomfortableness, their limited effectiveness, and they only provide simple movements and just tooth movements.

Category 3, Indications and contraindications of ROA

Seven properties were identified:

-Clinical situation: From "extremely simple situations" to "complex situations." ROA were mostly indicated in simple situations.

-Patient commitment: From "uncooperative patient" to "committed patient." ROA were indicated in patients with

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high commitment to treatment.

-Age: From "2 years" to "20 years."

-General development: From "early childhood" to "adulthood."

-Type of dentition: From "temporary" to "permanent."

-Type of treatment: From "only treatment to "complementary" (to FOA).

-Other: From "other indications" to "other contraindications." The indications for ROA were: Simple anomalies, class II, class III, simple crossbite, need for orthopedics, interceptive orthodontics, teeth inclination, simple rotation, no need to mobilize roots, periodontal patients with vestibular inclined teeth, mixed dentition, primary dentition, during the peak of growth, children and adolescents between 6 and 14 years old (some reduce the range to 8 to 12 years old), complementary use to FOA (as a first stage of treatment), and as orthodontic contention. The contraindications for ROA were: Severe abnormalities in adult patients, permanent dentition, uncooperative patients, careless patients, patients with impaired motor skills, patients with poor hygiene.

Category 4, Orthodontists´ perceptions and attitudes

Four properties were identified:

-Orthodontists' attitude to ROA: From "good attitude" to "very bad attitude." Nine respondents evaluated themselves as having a negative attitude towards ROA, while the tenth considered themself as having a regular attitude.

-Professionals preferences regarding braces: From "prefer fixed" to "prefer removable." Five of the participants openly expressed their preference for FOA, mainly due to control over treatment. One of those interviewed preferred ROA because of their simplicity.

-Professional/personal background: From "training" to "individual preferences." In this regard, age is a determining factor: *"...there are colleagues who are older and who were trained with this technique..."* Female, 36 years old, private system. Experience is another relevant factor: *"...I don't have the expertise to leave a patient with a perfect smile using ROA…"* Male, 43 years old, private and public system. The same applies to specialist training: *"...They have no experience with ROA because they are trained in universities that just train them in FOA..."* Female, 75 years old, private and public system. Only one of the respondents said she uses ROA as the first choice of treatment: *"...I always use them first, when it is easy, when it's something minor, my first choice is to use ROA..."* Female, 47 years old, private and public system.

-Perception of effectiveness and results obtained with ROA: From "very good" to "very bad." Effectiveness was evaluated as good if the patient and parents collaborate. Effectiveness was mentioned 20 times as good, 5 as bad, and 5 as fair. Explaining the importance of the treatment and its implications for patients and their parents was highlighted; also it was emphasized that the prognosis of each case will depend on the characteristics of each patient: *"...It really depends on the patient, their growth, their jaw relationships, how the teeth erupt..."* Male, 35 years old, private and public system.

Category 5, Selection of treatment

Seven properties were identified:

-Patient participation: From "the patient decides" to "the patient does not decide." It is noted that usually patients are not consulted about their preferences, either because the case does not provide alternatives, because the health system does not have other options, or because they believe that the patient does not have the knowledge or skills necessary to make the decision.

-Treatment options: From "only FOA" to "only ROA." It is noted that there are cases that can only be treated with a certain appliance and others where there is a choice between using ROA or FOA. In these circumstances the choice is mainly based on personal (dentist) preference.

-Fashion: From "influence" to "no influence." Fashion stands out here as being a factor that influences both the patient and the clinician: *"...if the kids at school have their four best friends using braces, they too will want to use braces..."* Male, 43 years old, private and public system.

-Money earned: from "influence" to "no influence." This is pointed out as a reason why use of ROA is low: *"...the ROA do not make much money..."* Female, 40 years old, military and private system.

The next three properties refer mainly to the type of health system, public or private.

-Difference in resource availability: From "no differences" to "great differences." It is noted that there are no major differences between the private and public health systems: *"...today I understand that public services are well supplied with materials. There are FOA available for use, not like before, when resources were scarce... But, nowadays, if you are an orthodontist in a public hospital and you work with FOA and request the materials needed, they are going to give them to*

you..." Male, 65 years old, private system.

-Opportunity of care: From "public system overload" to "greater opportunity for treatment in the private system." Respondents agree that there is an overload on the public system that does not allow long treatments or treatments with a higher requirement of clinical hours: *"...In the public system the demand is so big that you have to try to quickly solve the patient's need and then discharge them..."* Male, 35 years old, public and private system.

-Indications variability: From "only used in the public system" to "there are no big differences." Participants believe that the greater use of ROA in the public system is the consequence of seeing younger patients referred to pediatric dentists who are devoted to interceptive orthodontics, unlike the private system, where patients are older (adolescents) and generally prefer FOA.

Category 6, Control over treatment: Two properties were identified:

-Adherence to treatment: From "good compliance" to "very poor adherence." Participants cataloged the treatment adherence from low to very low, because based on the participants' experience, the patients and their parents do not comply with the instructions, which decreases the control over treatment: *"...it's something you cannot control as an orthodontist because it depends on a third part, that is to say, the patient..."* Female, 31 years old, private system.

-Control provided by ROA: From "precise control" to "no control of the movement." This refers to controlling the effects produced by ROA, regarded as poor compared to FOA: *"...braces are the only appliances that can control the three-dimensional position of the tooth..."* Male, 43 years old, private system.

Category 7, ROA utilization: Two properties were identified:

-Utilization by orthodontists: From "do not use" to "frequently use." One interviewee relates making a greater use of ROA: *"...I use them in all patients under 10 who come with a overbite or vis-à-vis and have a retruded maxilla..."* Female, 40 years old, military and private system. The rest of the participants said they use ROA scarcely, stating that: *"...FOA won the battle over ROA a long time ago.."* Male, 65 years old, private system.

-ROA utilization according to specialty: From "no specialty required" to "exclusive use by orthodontists." It is noted that pediatric dentists are the main users of ROA, especially in interceptive orthodontics programs in the public system: *"... you do not necessarily need to be an orthodontist to use it; pediatric dentists use a lot of ROA..."* Female, 31 years old, private system.

The axial coding determined that "selection of treatment" is the central category because it connects all categories that determine the use of ROA as the final consequence of the research situation (Figure 1). Orthodontists' opinions regarding the control over treatment and their perceptions and attitudes regarding OA are the main causal factors that determine the selection of treatment, but they are not the only ones.

DISCUSSION.

The analysis of the interviews has provided valuable information about the factors influencing the selection of treatment regarding the utilization of ROA in the contemporary orthodontics practice in the city of Concepción.

These results are supported by the theory of planned behavior, which states that the attitude, perceived behavioral control, and social norms are the main determinants of human behavior.[18] Because the participants perceive these conditions as negative in relation to ROA, the low utilization of ROA is an expected result.

Other influencing factors were: the age of orthodontists, individual preferences, training background, experience and perception of complexity, the availability of or access to treatment, and the attitude of patients and their parents. These factors have also been determined by previous studies in relation to different areas of dentistry and medicine. A previous study[9] found that there are significant differences in the clinical decision-making among the different age ranges and that young people generally have a tendency to choose options that represent less risk, while older people consider a wider range of alternatives. In this context it has been determined that those orthodontists who have no experience in dealing with ROA, or who have had negative experiences with ROA, use them less frequently.

The majority of respondents prefer to use FOA because this allows them to have greater control over treatment. Small[7] noted that dentists are looking to work in a "comfort zone" and stay within it, so the dentist who is uncomfortable with a procedure should refer the patient to

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be treated by specialists.

Another aspect involved in the selection of treatment is the type of health system (public or private); there is a significant difference between the two systems in ROA utilization, which is used more widely in the public system. This situation could be influenced by the age of patients, and because the pediatric dentists dedicated to interceptive orthodontics in the public system used ROA more. Some participants suggested that the difference in the availability of financial resources is the main cause of this disparity. But some respondents have indicated that public services deliver all the elements necessary to perform the various treatments, including FOA.

This study has a geographical limitation, since it only considered orthodontists from the city of Concepción (Chile). Moreover, the lack of experience on the part of the professionals in both health systems makes it difficult to make objective comparisons. Therefore, it is proposed that further studies focus on a national survey based on these results, to extend this study to other decisions in orthodontics practice, to evaluate how individual preferences are formed in dental schools, and to explore the attitudes and perceptions of patients and their parents regarding the different types of treatments.

CONCLUSION.

Different factors are involved in the selection of ROA, including the characteristics of the dentist, the patient and the social context. The key factor in the utilization of ROA is the perception of control over treatment.

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