Reasons influencing the preferences of prospective patients and orthodontists for different orthodontic appliances

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Authors' contributions

GAMV: Conception and design of the study; acquisition, analysis and interpretation of data; drafting the article; and, final approval of the version to be submitted.
LSCB: Acquisition of data; revising the article for important intellectual content; and, final approval of the version to be submitted.
MMP: Conception and design of the study; revising the article for important intellectual content; and, final approval of the version to be submitted.
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All authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Availability of data and materials

The data will be made available upon request to the authors.

Ethics approval and consent to participate

The Research Ethics Committee of the Clementino Fraga Filho University Hospital – Federal University of Rio de Janeiro (HUCFF-UFRJ) approved the protocol of this cross-sectional study (n. 3.182.753). All subjects signed a written informed consent.

Consent for Publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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ABSTRACT

Objective: To evaluate the reasons influencing prospective patients (PP) and orthodontists to prefer a type of orthodontic appliance over another. **Methods**: 49 PP and 51 orthodontists were asked about their preferences for the following appliances: Clear aligners (CA), Lingual metallic brackets (LMB), Polycrystalline and Monocrystalline ceramic brackets, and Buccal metallic brackets (BMB). Subjects rated the importance of 17 potential reasons that would explain their choices. Those reasons that would most contribute to these decisions were identified. In addition, it was evaluated whether the provision of appliances-related information modified the participants' preferences. Non-parametric tests (Fisher's exact, χ^2 and Mann-Whitney tests) and multivariate analyses (regression and discriminant analysis) were used to assess the data (α=0.05). **Results**: CA and BMB were the most chosen appliances by PP and orthodontists, respectively. LMB was the most rejected option for all participants (p<0.001). Rates on the importance of *pain/discomfort*, *smile aesthetics*, *finishing details*, and *feeding/speech impairment*, showed the highest differences between PP and orthodontists (p<0.0005). Discriminant analyses showed that individuals who considered *treatment time* and *smile aesthetics* as more important, were more likely to prefer CA; those who prioritized *finishing details* and *cost*, were more likely to choose BMB (p<0.05). Receiving appliances-related information changed the preferences of PP (p<0.001). **Conclusion**: Reasons related to comfort and quality of life during the use were considered as more important by PP, those related to the results and clinical performance of the appliances were considered as more relevant for orthodontists.

Key words: Patient Preference; Orthodontic Appliances; Orthodontists.

INTRODUCTION

Trends in the use of orthodontic appliances change over time. Currently, options that generate greater satisfaction related to aesthetics and comfort during use are probably main requirements of patients seeking treatment.[1,2] Most of these alternatives still present limited efficacy for the correction of certain cases compared to conventional buccal metallic brackets (BMB).[3-5] Considering that there is still no an "ideal appliance", the existing differences between the available options regarding to clinical effectiveness,[3,4] related comfort,[2,6] and probability of adverse effects occurrence,[7-9] must be assessed by both patients and orthodontists before their choice.

Patient preference is a difficult issue to assess, since this may be influenced not only by factors directly related to therapy, but also by subjective factors inherent to the individual, such as previous experiences, attitudes or beliefs about treatment.[10,11] Some studies have demonstrated that patients show greater acceptability for the appliances they deem more aesthetic.[1,12] Nevertheless, it is very likely that other reasons are influencing their choices. In addition to that, much of the recommendations offered by orthodontists could be biased by their preferences and prior training using specific devices, without providing patients with complete information about the advantages and disadvantages of all options available.

Some studies were conducted to find out patients' motivations to perform orthodontic treatment.[13,14] However, little is known about the whole reasons influencing their choices regarding to the available appliances, and how orthodontist could **use this information to choose** suitable treatments for each patient. Therefore, the objectives of this study were (a) to evaluate the preferences of prospective patients (PP) and orthodontists for different orthodontic appliances, (b) to compare their judgments about the importance of potential reasons influencing these preferences, and (c) to identify predictive variables contributing to the choice or rejection of specific orthodontic appliances.

MATERIALS AND METHODS

The Research Ethics Committee of the Clementino Fraga Filho University Hospital – Federal University of Rio de Janeiro (HUCFF-UFRJ) approved the protocol of this cross-sectional study (n. 3.182.753). Methodological design was based on a previously published paper by Leles et al.[15] A sample size calculation was performed to compare proportions of two independent groups (two-tailed Fisher's exact test) in G*Power 3.1, based on the estimate that 30% of PP and 80% of orthodontists selected BMB as their preferred option and, 70% and 20% respectively, selected this

appliance as their rejected option (pilot study, 10 subjects per group). Considering as parameters a power of 90%, significance level of 5%, and allocation ratio of 1:1, a total of 46 participants (23 per group) were required as a minimum for each comparison.

Forty-nine consecutive individuals (PP, mean age = 37.4 ± 17.8; 14 males, 35 females) seeking orthodontic treatment at the Graduate Clinic in Orthodontics of the Federal University of Rio de Janeiro, between March and June 2019, were selected for the present study. Subjects that received previous orthodontic treatment were excluded. Additionally, 51 orthodontists (mean age = 36.4 ± 11.3; 16 males, 35 females) affiliated to the Brazilian Association of Orthodontists - Rio de Janeiro, were also selected. All subjects signed a written informed consent.

A three-part questionnaire was developed. In the first part, data such as gender, age, economic classification (Class A to E),[16] and smile/occlusion auto-perception (assessed by a zero to ten visual analogue scale - VAS) were collected. Subsequently, participants received standardized edited photographs (Figure 1) presenting five orthodontic appliances: 1 – Clear aligners (CA), 2 – Lingual metallic brackets (LMB), 3 – Polycrystalline ceramic brackets (PCB), 4 – Monocrystalline ceramic brackets (MCB), and 5 –BMB. These images were obtained from the same person simulating the use of the different appliances for standardization purposes. PP and orthodontists were asked about their knowledge or technical training on each of the evaluated appliances, respectively. Knowledge of the PP about the appliances could be by prior dental consultation with an orthodontist, media or advertising.

In the second part, the subjects were requested to rank these appliances in order of preference, on the premise that all of them solve their malocclusion (or the patient's malocclusion, for orthodontists). Immediately after their responses, a printed chart (Table 1) with information about the advantages and disadvantages of the appliances was presented to the participants, **without the possibility that the researcher could issue judgments against or in favour of any of the appliances studied. The researcher could only answer participants' doubts in relation to the lack of understanding of the contents**. Information for each of the appliances, related to the following six items was shown: 1 – aesthetics; 2 – treatment results; 3 – clinical performance; 4 – satisfaction, comfort and quality of life; 5 – side effects; and 6 – cost of treatment (**See the supplementary material with the list of references considered for the contents of Table 1**). Then, the subjects were asked again to rank the appliances, now with equivalent information received (preferences finally used for analyses). The appliances ranked as number one and five were presumed as the chosen and refused treatments, respectively.

In the third part of the questionnaire, participants were requested to rate the importance of 17 potential reasons influencing their preferences (Figure 2). Questions were presented as previously described:[17] How much do you consider _____ to be an important reason for deciding about an orthodontic appliance? The subjects emitted their responses using an ordinal five-point Likert scale for answering (1 = no importance, 2 = less important, 3 = moderate importance, 4 = very important, 5 = extremely important).

Statistical analysis

All analyses were performed using two-tailed tests (α=0.05) in SPSS version 21.0 (SPSS Inc, Chicago, IL, USA). Fisher's exact or χ^2 tests were used for the following purposes: (a) to assess differences in previous knowledge of PP on the different appliances, and in technical training received of orthodontists, (b) to assess the influence of the provision of appliances-related information on the choice of individuals, and (c) to compare the chosen/refused treatment frequencies between PP and orthodontists, and between the different orthodontics appliances. Regression analyses were performed to identify associations of factors (gender and economic classification) and covariates (age, smile and occlusion auto-perception), with the frequencies of choice of each appliance. Additionally, PP were grouped into a "high economic classification" group (Economic Classes A and B) and a "low economic classification" group (Classes C, D and E). χ^2 test was applied to evaluate the association between having "high" or "low" economic classification and the type of appliance chosen.

Scores of PP and orthodontists were compared using Mann-Whitney test (ordinal variables). Discriminant analyses were applied to create linear functions to identify how these reasons (predictive/independent variables) contribute to the choice or rejection of the appliances evaluated (dependent variables). Within-group correlations of each predictor variable with the canonical function (structure matrix) were calculated to identify the most discriminant variables. Eigenvalue, canonical correlation and Wilks' lambda were calculated to assess the predictive ability of the models. These were also validated by calculating the overall agreement after cross-tabulation of original and predicted groups classifications.

RESULTS

Previous knowledge and technical training on each of the assessed appliances was significantly different for PP and orthodontists, respectively (p<0.001; Table 2). In general, individuals are less familiar with LMB, and more familiar with BMB. **On the other hand, receiving information related to the advantages and disadvantages of orthodontic appliances significantly changed the opinion about the chosen/refused appliance in PP (p<0.001), but not in orthodontists (p>0.05) (Table 3).** The chosen/refused frequencies for the LMB (p=0.044) and BMB (p=0.028) were significantly different after PP were informed (Table 3).

Comparisons of the frequencies of the final chosen/refused appliances for PP and orthodontists are presented in Table 4. Significant differences were found between PP and orthodontists for the frequencies of individuals choosing or refusing LMB (p=0.016) and BMB (p<0.001). Differences on the chosen/refused distributions between the different orthodontic appliances were significant (p<0.001). While choosing CA was more prevalent for PP, choosing BMB was more prevalent for orthodontists. LMB showed the highest prevalence of rejection for all participants. Regression analyses evidenced no associations between factors or covariates assessed, and the frequencies of choice of each appliance. On the other hand, an association was observed between the economic classification and the preferred appliance **(p=0.039; Table 5)**; the most chosen option by the subjects of the "high economic classification" group was CA; while for the subjects of the "low economic classification" group it was BMB. **LMB was not part of this analysis due to the low frequency of this appliance as the chosen option. PCB and MCB were included into one single category (ceramic brackets) to enable these analyses.**

Scores issued by PP and orthodontists for each reason assessed are presented in Figure 2. Reasons judged as most important (scores 4 and 5; with frequency ≥35) for PP were *results*, *side effects*, *results stability*, *finishing details*, *difficulty in oral hygiene*, *smile aesthetics* and *pain/discomfort*; while for orthodontists they were *results*, *results stability*, *clinical performance*, *finishing details*, and *side effects*. The reasons presenting more difference in the scores rated between the groups were: *pain/discomfort*, *smile aesthetics* (p<0.0001), *finishing details*, *feeding* and *speech impairment* (p<0.0005). Although significant, less difference was presented for *results stability*, *cost* (p<0.005), *difficulty in oral hygiene*, *appointments frequency*, and *possibility of urgency appointments* (p<0.05).

Because of the low frequencies of chosen or refused options for LMB, PCB and MCB, these appliances were not included in the discriminant analysis. Information related to the relative efficacy of each discriminant function is presented in **Table 6**. Functions evidencing p<0.05 showed predictive ability to identify participants' preferences based on the rated importance for the reasons

studied. Reasons with a higher impact for choosing or refusing CA and BMB are presented in Table 7. Individuals who consider *treatment time* and *smile aesthetics* as reasons of greater importance are more likely to prefer CA; while for those who prioritize the *results* and *cost* of the treatment, the probability of refusing this appliance is greater. On the other hand, while subjects who prioritize reasons such as *finishing details* and *cost* of the treatment, are more likely to choose BMB; those who consider *smile aesthetics* and general discomfort (*feeding and speech impairment,* and *pain/discomfort*) as being of greater importance, are more likely to reject this appliance. The overall agreements for validation of the models ranged from 85.9 - 100 %.

DISCUSSION

Current orthodontic practice presumes clinician-patient interaction in the determination of problem-oriented diagnosis and treatment planning. In that context, it is important to know the preferences of the patients to be able to make recommendations that adequately guide decision-making. To the best of our knowledge, this is the first study comparing the preferences of PP and orthodontists for different types of orthodontic appliances, and evaluating the reasons that each judge as important for their choice.

Previous studies were carried out to assess the preference of patients for different orthodontic devices based on their attractiveness, demonstrating, with relative consistency, that CA or LMB are the most widely accepted alternatives.[1,12,18] In the present study, similarly, when PP were asked about their preference, only by observing images of the devices (before being informed), CA and LMB were the first and second preferred options, respectively; while BMB was the most rejected option. Interestingly, LMB was also the second most rejected option, which could be due to the little knowledge and uncertainty of the patients regarding these appliances (more than half of PP reported not having any prior knowledge about LMB). These results confirm that, apparently, the aesthetics offered by the devices is perhaps the most influential reason for the patients' decision, when they do not receive any other appliance-related information. This assumption was supported by the result that for PP, *smile aesthetics* was rated as one of the most important reasons when choosing for some type of appliance. Those individuals who considered this aspect as of great importance were more likely to prefer CA or to reject BMB. Indeed, it has been shown that the use of buccal brackets could negatively change the self-perception that the person has about her beauty (during use), which may affect her self-esteem, and consequently her social relationships.[19]

Although this information is controversial, it makes sense to think that the first thing most people will look for is an appliance with which their beauty is not affected.

After receiving information about the advantages and disadvantages of the evaluated appliances, even though CA remained as the most chosen option, the distribution of PP preferences changed. BMB was the second most chosen option, showing that many patients value other aspects of the devices in addition to their aesthetics. BMB has generally been shown to achieve the best treatment results. Although the evidence is still insufficient, of low quality and heterogeneous, it is stated that CA is a viable alternative mainly for mild to moderate malocclusions in non-growing patients that do not require extractions, but they still do not achieve the same effectiveness of BMB for some types of orthodontic movements.[3,20] Furthermore, even though CA have been shown to be effective, they may not achieve as detailed and stable results as BMB.[21] In the present study, reasons rated as important by PP are consistent with their preferences. Among the reasons that participants judged to be most important are *results*, *results stability* and *finishing details*. Individuals who rated *finishing details* as of great importance were more likely to prefer BMB; those who considered *results* as of great importance were more likely to reject CA. On the other hand, a considerable percentage of PP chose PCB or MCB as the preferred option, suggesting that individuals could decrease their aesthetic requirements, to a certain extent, in the attempt to obtain results more similar to those obtained with BMB. Similarly, considering that CA is the alternative that offers less pain and greater satisfaction during use,[2,22] these changes in preferences would demonstrate that they could also sacrifice this requirement for having better results. Apparently, the smile aesthetics, comfort and results offered by the appliances would be extremely important factors in making a decision.

In relation to the LMB, it has been reported that, although with some biomechanical limitations, these can achieve very similar results to those obtained with BMB.[4,23] However, these appliances have been associated with increased oral discomfort, impaired speech performance, and increased difficulty eating.[4,24,25] Besides that, it has been reported that patients using these devices present greater problems in maintaining proper oral hygiene.[7] These disadvantages could be the reason why, for PP, LMB was the most rejected option after being informed. Subjects reported *side effects*, *difficulty in oral hygiene* and *pain/discomfort* as one of the most important reasons they take into account in determining their preference. Although to a lesser extent, BMB can also cause some pain or discomfort in the cheek and lip,[24] and eating difficulties.[6] This would explain why these appliances were also rated as the second most rejected option. Subjects who prioritized general

discomfort (*feeding and speech impairment*, and *pain/discomfort*) as being of greater importance were more likely to reject BMB.

It is also important to consider that preferences, and the reasons that motivate them, are likely to change depending on the sample that is accessed. There is some evidence that suggests that the economic status could influence patients' preferences. One study showed that subjects who used CA had a significantly higher income than those treated with fixed appliances.[26] Likewise, it has been reported that patients are willing to pay more money for appliances they deem more aesthetic.[1] Our results agree with this evidence; being of higher economic class was associated with choosing CA, while being of lower economic class was associated with choosing BMB **or any of the ceramic bracket alternatives**. Further studies should be carried out with larger samples, in a stratified way according to the economic classification, to evaluate if there are differences in preferences according to this factor. **On the other hand, although the present study did not show influence of gender, age, and self-perception of the smile / occlusion on the preferences of the participants, it is suggested that future studies also consider these variables, since they could also impact the decision making.**

Divergences exist in treatments preferences between patients and professionals from different areas of health.[27] In orthodontics, there are no previous studies evaluating this issue. Considering that orthodontists have a contrasting view to that of patients on the need for treatment,[28] it is pertinent to think that their appliance preferences are also different. Our results demonstrated that there were significant differences between the preferences of PP and orthodontists. Although LMB was the most rejected option for both groups, the percentage was considerably higher for orthodontists (more than 80% of these rejected this option). We consider that this result was due to the fact that a similar percentage of specialists reported not having received prior technical training for the use of this device. This limitation of the specialty of Orthodontics has already been previously reported;[29] most orthodontists do not use LMB even they offer clear biomechanical and aesthetic advantages because the majority of specialists are not educated and trained to use these appliances. On the other hand, the most chosen option by orthodontists was BMB. The preferences for this type of appliance were significantly different from that of the PP. Among the reasons that this group deemed most important are *results*, *results stability*, and *finishing details*. This would suggest that orthodontists prioritize results at the time of their selection. However, this preference may also have been influenced by the prior knowledge this group had about BMB. All orthodontists were technically trained in the use of this device. It is obvious to think that, the greater familiarity and confidence in the use of BMB, made this option the

most chosen and, perhaps, most recommended by them. *Clinical performance* was another reason that orthodontists rated as most important. This could explain why PCB and MCB had very low frequencies as chosen options. Indeed, it has been reported that these devices have certain biomechanical limitations during use.[5] It is important to note that CA was the second most chosen option by orthodontists, which could be explained by two reasons deemed important for this group, *clinical performance* and *side effects*. Despite the fact that treatment results of CA are not as good as those of BMB,[3,20,21] these devices allow performing orthodontic mechanics with few complications. Proof of this is that using this appliance, the number of emergency visits and emergency chair time are significantly less when compared to the use of edgewise brackets.[30] On the other hand, regarding *side effects*, it has been suggested that the use of CA reduces periodontal damage,[9] as well as the incidence and severity of root resorption that is caused by traditional orthodontic therapies.[8]

Based on the pattern of responses of PP, it is highly likely that initial preferences were based on the visual impact and attractiveness of each appliance, and the participants' prior knowledge of these. On the other hand, **our findings demonstrated that,** evidently, the participants change their opinions once they were informed on the particularities of the devices. **It is important to note that, classifications (judgments) presented in Table 1 (i.e., very good, good, medium, bad), although supported by relevant evidences (supplementary material), these were established by the authors. When the available evidence on a certain topic was controversial (inconsistent results between the studies), insufficient or absent, the authors determined the classification for the appliance, based on their clinical experience (e.g., in the case of the cost of treatments). This form of classification could have introduced a certain risk of bias associated with the authors' preferences, mainly for cases in which the information was insufficient. Fortunately, for most of the studied aspects, the literature showed a consistent pattern of results. It should also be mentioned that some factors as the severity of the case and the clinical ability of the orthodontist using the different orthodontic appliances could modify the judgments presented in Table 1. In the present study, in order to control these factors, the preferences of the participants were evaluated under the premise that all appliances would be able to resolve their malocclusion (or the patient's malocclusion, for orthodontists). Considering, that in real clinical practice, there is the possibility of variation in relation to these factors (among others, such as the type, design, brand, or prescription for each appliance), the reported preferences should be evaluated according to the context studied.** Future studies should be carried out, with new information provided to the participants, since there is a constant evolution of orthodontic appliances. The changes in the PP preferences after being

informed, demonstrate the importance that patient-orthodontist communication has for decision-making.[11] Although the evidence is scarce regarding how patients make sense of orthodontic problems and treatments, knowing the reasons the patient is considering for choosing a treatment would already be a starting point. It will be the task of the orthodontist to identify these reasons and know how to properly guide the patient in their selection, which will also depend on the diagnosis and severity of the case.

Most of the reasons evaluated were rated as having some degree of importance for both study groups; however, some presented significant differences. In general, reasons related to the comfort and quality of life during the use were considered as more important for PP than for orthodontists; reasons related to the results and clinical performance of the appliances were considered as more important for orthodontists than for PP. These results have great applicability for clinical practice, since they will allow to implement marketing processes according to the demands and preferences of patients, to improve the information strategies provided on the different alternatives of appliances and, to plan targeted treatments according to the need/demand of each patient. As a specialist, the orthodontist must understand that a certain type of appliance will be an alternative for some cases and not for others.

CONCLUSION

PP and orthodontists preferences are different. Reasons related to the comfort and quality of life during the use were considered as more important for PP than for orthodontists to decide for a certain type of appliance; reasons related to the results and clinical performance of the appliances were considered as more important for orthodontists than for PP.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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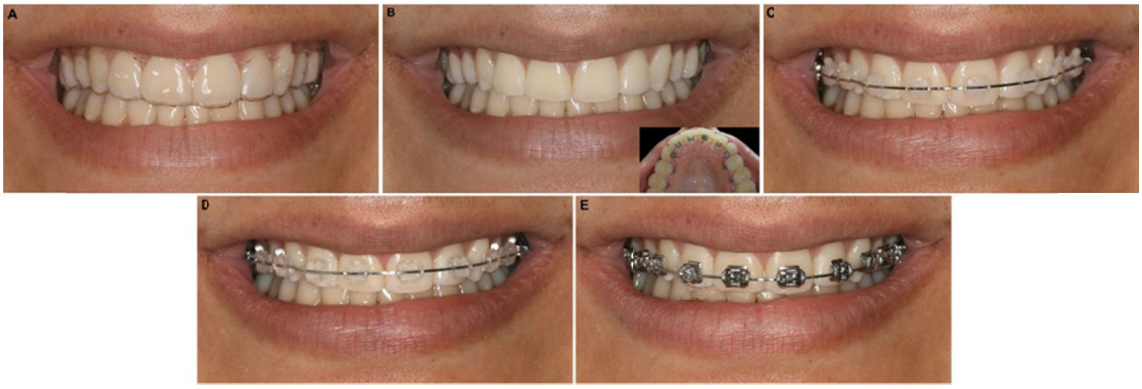

Figure 1. Images of the orthodontic appliances presented to the participants. **A, Clear aligners; B, Lingual metallic brackets; C, Polycrystalline ceramic brackets; D, Monocrystalline ceramic brackets; E, Buccal metallic brackets.**

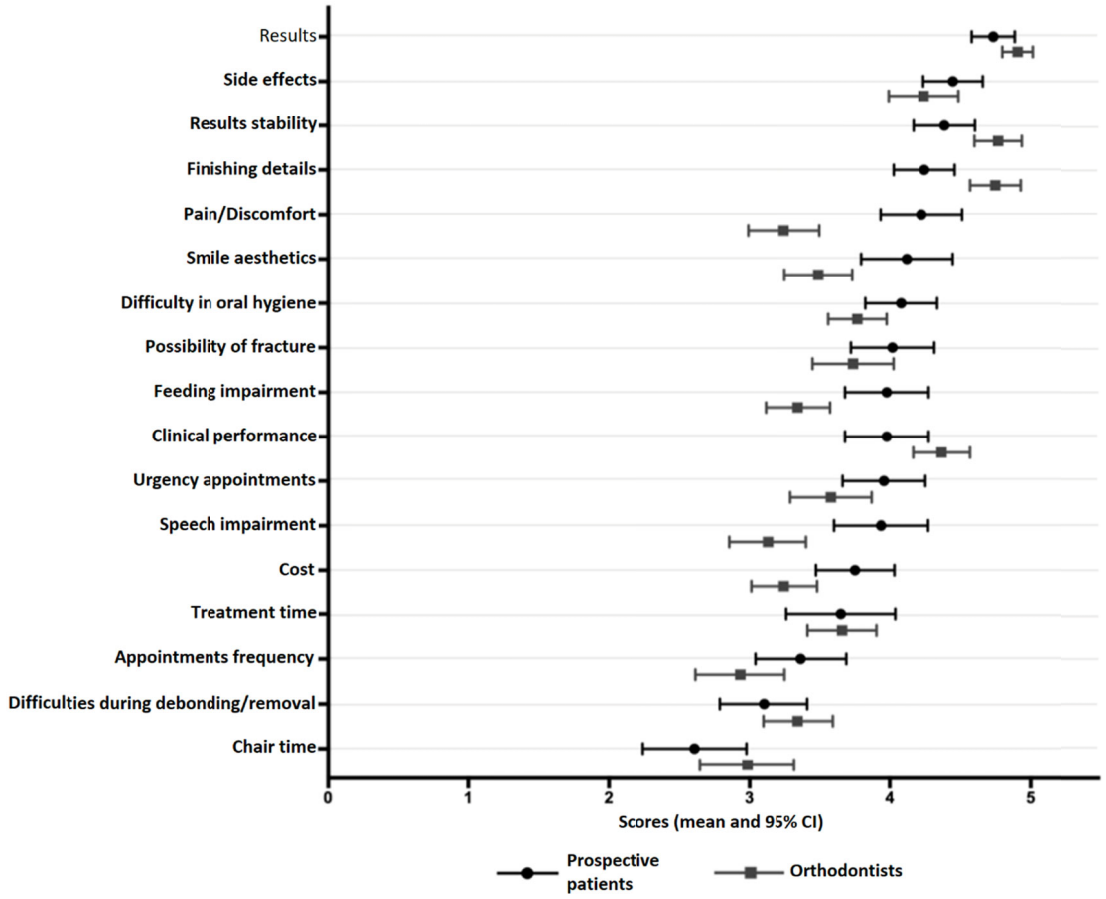

Figure 2. Scores issued by prospective patients and orthodontists on the importance of the reasons that influence their preferences. The reasons are presented in order of importance to the prospective patients. The means and 95% CIs are only representative values, since the medians (and interquartile ranges) were considered for statistical analysis **(Graphic generated in GraphPad Prism, GraphPad Software, San Diego, CA, USA).**

Table 1. Chart with appliances-related information

	CA	LMB	PCB	MCB	BMB
AESTHETICS Smile aesthetics	VERY GOOD	VERY GOOD	GOOD	GOOD	BAD
TREATMENT RESULTS Results, finishing details, results stability.	MEDIUM	GOOD	VERY GOOD	VERY GOOD	VERY GOOD
CLINICAL PERFORMANCE Ability of the appliance to get results without difficulties and/or complications, and in less time.	MEDIUM	GOOD	MEDIUM	MEDIUM	VERY GOOD
SATISFACTION, COMFORT, QUALITY OF LIFE Absence of pain/discomfort, no deterioration of oral functions, less difficulty for oral hygiene, lower appointments frequency, lower chair time, little chance of urgency appointments.	VERY GOOD	BAD	MEDIUM	MEDIUM	MEDIUM
SIDE EFFECTS Lower probability of root resorption, dental caries, gingivitis/periodontal disease, tooth wear.	VERY GOOD	GOOD	GOOD	GOOD	GOOD
COST	BAD	MEDIUM	GOOD	MEDIUM	VERY GOOD

CA – clear aligners, LMB – lingual metallic brackets, PCB – polycrystalline ceramic brackets, MCB – monocrystalline ceramic brackets, BMB – buccal metallic brackets.
See the supplementary material with the list of references considered for the contents.

Table 2. Previous knowledge/technical training on each of the assessed appliances

		CA	LMB	PCB	MCB	BMB	*p* value*
Prospective patients (n=49)	Knowledge n (%)	27 (55.1)	21 (42.9)	38 (77.6)	35 (71.4)	45 (91.8)	<0.001
	No knowledge n (%)	22 (44.9)	28 (57.1)	11 (22.4)	14 (28.6)	4 (8.2)	
Orthodontists (n=51)	Technical training n (%)	45 (88.2)	7 (13.7)	50 (98.0)	50 (98.0)	51 (100.0)	<0.001
	No technical training n (%)	6 (11.8)	44 (86.3)	1 (2.0)	1 (2.0)	0 (0.0)	

CA – clear aligners, LMB – lingual metallic brackets, PCB – polycrystalline ceramic brackets, MCB – monocrystalline ceramic brackets, BMB – buccal metallic brackets.
* Chi-square test.
p<0.05 indicates statistically significant association.

Table 3. Chosen/refused appliances for prospective patients (n=49) **and orthodontists (n=51)**, before and after receiving information on advantages and disadvantages of the assessed appliances

	Pre information		Post information		*p* value*
	Chosen	Refused	Chosen	Refused	
Prospective patients					
Clear aligners	26 (83.9)	5 (16.1)	15 (65.2)	8 (34.8)	0.197
Lingual metallic brackets	9 (47.4)	10 (52.6)	4 (16.0)	21 (84.0)	0.044
Polycrystalline ceramic brackets	4 (66.7)	2 (33.3)	10 (90.9)	1 (9.1)	0.515
Monocrystalline ceramic brackets	5 (55.6)	4 (44.4)	7 (100.0)	0 (0.0)	0.089
Buccal metallic brackets	5 (15.2)	28 (84.9)	13 (40.6)	19 (59.4)	0.028
Orthodontists					
Clear aligners	**17 (85.0)**	**3 (15.0)**	**19 (82.6)**	**4 (17.4)**	**>0.999**
Lingual metallic brackets	**0 (0.0)**	**44 (100.0)**	**0 (0.0)**	**43 (100.0)**	**>0.999**
Polycrystalline ceramic brackets	**2 (100.0)**	**0 (0.0)**	**2 (100.0)**	**0 (0.0)**	**>0.999**
Monocrystalline ceramic brackets	**3 (100.0)**	**0 (0.0)**	**2 (100.0)**	**0 (0.0)**	**>0.999**
Buccal metallic brackets	**29 (87.9)**	**4 (12.1)**	**28 (87.5)**	**4 (12.5)**	**>0.999**

Percentages are presents for the rows.
* Fisher's exact test
p<0.05 indicates statistically significant association.

Table 4. Chosen/refused appliances for prospective patients and orthodontists

	Prospective patients (n=49)		Orthodontists (n=51)		*p* value*
	Chosen	Refused	Chosen	Refused	
Clear aligners	15 (30.6)	8 (16.3)	19 (37.3)	4 (7.8)	0.314
Lingual metallic brackets	4 (8.2)	21 (42.9)	0 (0.0)	43 (84.3)	0.016
Polycrystalline ceramic brackets	10 (20.4)	1 (2.0)	2 (3.9)	0 (0.0)	>0.999
Monocrystalline ceramic brackets	7 (14.3)	0 (0.0)	2 (3.9)	0 (0.0)	>0.999
Buccal metallic brackets	13 (26.5)	19 (38.8)	28 (54.9)	4 (7.8)	<0.001
p value†	<0.001		<0.001		

Percentages are presented for the columns
* Fisher's exact test
† Chi-square test
p<0.05 indicates statistically significant association.

Table 5. Appliances chosen by prospective patients according to their economic classification

	CA	PCB + MCB	BMB	*p* value*		
				CA *vs.* (PCB + MCB)	CA *vs.* BMB	CA *vs.* (PCB + MCB) *vs.* BMB
High economic classification n (%)	11 (73.3)	6 (35.3)	4 (30.8)	0.031	0.024	0.039
Low economic classification n (%)	4 (26.7)	11 (64.7)	9 (69.2)			

CA – clear aligners, PCB – polycrystalline ceramic brackets, MCB – monocrystalline ceramic brackets, BMB – buccal metallic brackets.
High economic classification includes Classes A and B. Low economic classification includes Classes C, D and E.
Percentages are presented for the columns.
*Chi-square test.
$p<0.05$ indicates statistically significant association.

Table 6. Parameters providing information about relative efficacy of the discriminant functions

	Eigenvalue	Canonical correlation	Wilks' Lambda	*p* value
Clear aligners				
Prospective patients	12.022	0.961	0.077	0.015*
Orthodontists	2.863	0.861	0.259	0.462
Total	1.264	0.747	0.442	0.034*
Buccal metallic brackets				
Prospective patients	1.429	0.767	0.412	0.324
Orthodontists	2.064	0.821	0.326	0.117
Total	0.997	0.707	0.501	0.003*

Total includes prospective patients and orthodontists
* Functions showing the best predictive ability.

Table 7. Predictive variables and structure matrix of the discriminant functions for choosing or refusing CA and BMB

	Prospective patients	Structure matrix	Total	Structure matrix
Clear Aligners	***Choosing***		***Choosing***	
	Treatment time	0.180	Smile aesthetics	0.467
	Smile aesthetics	0.167	Treatment time	0.371
			Difficulty in oral hygiene	0.327
			Urgency appointments	0.242
			Appointments frequency	0.215
			Side effects	0.204
	Refusing		***Refusing***	
	Possibility of fracture	0.500	Cost	0.630
	Results	0.210	Results	0.580
Buccal metallic brackets	***Choosing***		***Choosing***	
	Finishing details	0.388	Finishing details	0.367
	Cost	0.333	Chair time	0.246
			Cost	0.202
			Results	0.192
	Refusing		***Refusing***	
	Feeding impairment	0.347	Smile aesthetics	0.464
	Smile aesthetics	0.214	Feeding impairment	0.400
	Treatment time	0.155	Pain/Discomfort	0.324
			Speech impairment	0.23
			Side effects	0.175
			Possibility of fracture	0.160

Total includes prospective patients and orthodontists.
Structure matrix is presented as absolute values, ordered by the size of correlation within functions. Only coefficients >0.15 are showed.

SUPPLEMENTARY MATERIAL

List of references used to prepare the informative printed chart (Table 1)

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