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Evaluation of the aesthetic perception of Orthodontic Appliances

Pietro Salvador

Dissertação conducente ao Grau de Mestre em Medicina Dentária (Ciclo Integrado)

Gandra, 28 de junho de 2021

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Clique ou toque aqui para introduzir texto.

Trabalho realizado sob a Orientação de Mestre Selma Pascoal e Co-orientadora Professora Doutora Teresa Pinho

Declaração de Integridade

Eu, acima identificado, declaro ter atuado com absoluta integridade na elaboração deste trabalho, confirmo que em todo o trabalho conducente à sua elaboração não recorri a qualquer forma de falsificação de resultados ou à prática de plágio (ato pelo qual um indivíduo, mesmo por omissão, assume a autoria do trabalho intelectual pertencente a outrem, na sua totalidade ou em partes dele). Mais declaro que todas as frases que retirei de trabalhos anteriores pertencentes a outros autores foram referenciadas ou redigidas com novas palavras, tendo neste caso colocado a citação da fonte bibliográfica.

Apresentação Publica

15 de maio de 2021: Apresentação nas XXIX Jornadas Científicas de Medicina Dentária de comunicação sob a forma de Poster com o título "**Apresentação de várias aparatologias ortodônticas e sua envolvênciestética"** Salvador P.,Pascoal S., Leite,L & Pinho T.

21 de maio de 2020: Apresentação nas XXVIII Jornadas Científicas de Medicina Dentária de comunicação sob a forma de Poster com o título " **Nanoparticulas de prata vs naturais na irrigação endodôntica"** Meneghel S.[1], Salvador P.[1], Calheiros-Lobo M.[2,4]; Miller P.[2,4]; Ferreira S. [2,3]

Agradecimentos

À minha mulher e filha, a mim.

À minha Orientadora Selma Pascoal, à Professora Dr.ª Teresa Pinho e à Professora Dr.ª Maria Gonçalves pela sua dedicação e ensinamentos que delas recebi.
Em particular, por ter me incluído neste trabalho que se insere num projeto de investigação do IINFACTS "OrthoAlign_PI2RL_IINFACTS_2021", que tem como investigador principal a Professora Doutora Teresa Pinho e Co-Orientadora a Professora Doutora Manuela Leite.

RESUMO

As expectativas estéticas dos pacientes não estão apenas relacionadas com o resultado estético final do tratamento ortodôntico, mas também com a escolha do tipo de aparelho utilizado. A diferente perceção entre Médicos Dentistas e pacientes pode levar os pacientes a não aceitar planos de tratamento.

OBJECTIVO

O objetivo deste estudo descritivo transversal, foi avaliar a perceção estética do sorriso e dos aparelhos utilizados no tratamento ortodôntico do ponto de vista de Leigos e trabalhadores da área da Medicina Dentária e compreender o impacto do uso de máscaras faciais no período pandémico na escolha do aparelho ortodôntico.

MATERIAIS E MÉTODOS

Foram recolhidos dados de 760 questionários sobre a perceção estética de diferentes aparelhos ortodônticos.

RESULTADOS e DISCUSSÃO

Tanto os leigos como os trabalhadores da área da Medicina Dentária, têm a mesma ordem de preferência na escolha do tratamento ortodôntico: Alinhadores, seguidos de Braquetes Estéticos com fio Estético, seguidos de Braquetes Estéticos com fio Metálico, seguidos de Braquetes Metálicos com fio Estético, seguidos de Braquetes Metálicos com fio Metálico. Tendo em conta a pandemia covid-19, o uso obrigatório de máscaras, influenciam esta selecção.

CONCLUSÃO

Maior conhecimento na área da ortodontia demonstra aumentar a perceção das necessidades estéticas. A atratividade do aparelho diminui à medida que a quantidade de metal visível aumenta, mas existe uma discrepância entre o que é considerado mais estético e o que as pessoas estariam dispostas a usar. Os leigos e os trabalhadores da área da Medicina Dentária estariam dispostos a submeter-se a um tratamento ortodôntico metálico fixo associado ao uso de uma máscara facial.

Palavras-chave: Ortodontia, Estética, Inquérito, Alinhadores, Brakets.

Abstract

INTRODUCTION

In orthodontic field patients' aesthetic expectations are not only related to the final aesthetic result, but also the treatment's appliance choice. The different perception of aesthetic and functional priorities between dentists and patients can lead patients not to accept the proposed treatment plans.

OBJECTIVE

The aim of this descriptive cross-sectional study was to evaluate the aesthetic perception of the smile and the appliances used in orthodontic treatment among Laypeople and Dental Workers, and to understand the impact of the use of face masks in the pandemic period in the choice of orthodontic appliance for the performance of a treatment.

MATERIALS AND METHODS

A total of 760 questionnaires were collected on the aesthetic perception of different orthodontic appliances.

RESULTS

Laypeople and Dentistry Workers have the same order of preference when choosing orthodontic treatment appliances: Aligners, followed by Aesthetic Brackets with Aesthetic Wire, followed by Aesthetic Brackets with Metallic Wire, followed by Metallic Brackets with Aesthetic Wire, followed by Metallic Brackets with Metallic Wire. Taking into account the covid-19 pandemic, the mandatory use of protective face masks may influence this selection.

CONCLUSION

The aesthetic perception and the need of intervention is greater as the knowledge in dentistry and in orthodontic specialty increases. Appliance's attractiveness decreases as the quantity of visible metal increases, but there is a discrepancy between what is considered most beautiful, and what people would be willing to "wear". Laypeople and dentistry workers would be willing to undergo a fixed metallic orthodontic treatment associated with the use of a face mask.

Keywords: Orthodontic, Aesthetic, Survey, Aligners, Brackets.

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- LP: Laypeople;
- DW: Dentistry Workers;
- OP: Orthodontic Practitioners;
- GD: General Dentists.

Introduction:

Functional occlusion and aesthetic smiles are the primary goal of modern dentistry.

Facial and dental aesthetics are becoming increasingly important: the dental field has seen a particular increase in attention about orthodontic care, due to the dominant role played by smile and perioral area in people's life. (1-3)

Patients' aesthetic expectations are not only related to the final aesthetic result, but also the treatment's appliance choice. The concern for highly visible orthodontic appliances have also prompted the development of more aesthetic solutions, such as the lingual technique, plastic, composite and ceramic material brackets, aesthetic archwire, up to clear aligners.(4)

In literature, there are still only a few studies which analyze the liking for different types of devices.

Some of them were carried out to measure the preference for different types of braces virtually fitted using a photo editing program or using the Eye-Tracking-System to evaluate which one caught people's focus for more time. From these studies it emerged that patients would invest about twice the price of a metal multi-bracket device for the latest-generation aligners or aesthetic brackets. (5,6)

Today, almost every orthodontic treatment can have multiple approaches, and patients considering treatment can choose from the many available appliances. Taking into account patients' aesthetic self-perception, practitioners define a unique treatment plan and choose the best appliances in order to get their compliance. (7)

The different perceptions of aesthetic and functional priorities of dentists and patients can lead patients away from accepting proposed treatment plans. It is therefore important to identify the most relevant parameters that allow to increase the satisfaction of patients undergoing treatments, and on the other hand, increase the receptiveness of patients to the proposals, namely convince those with higher aesthetic standards and in more advanced age groups, who are usually more distant from this type of treatment option. The aim of this study is to evaluate the aesthetic perception of the smile and the appliances used in orthodontic treatment, among laypeople and dental workers, and to understand the impact of the use of face masks in the pandemic period in the choice of orthodontic appliance for the performance of a treatment.

Matherial and Methods

This is a descriptive, cross-sectional study, in which data were collected through a questionnaire (Appendix 1) on the aesthetic perception of different orthodontic appliances.

Assessment Instrument:

The questionnaire's consisted of a script introduction, verification of age, gender, ethnicity, education, dental education and orthodontic history; The first group of questions concerned an aesthetic rating of the natural smile of the model (figure 2), perception of orthodontic needs and general appliance preferences (figure 3). The second group of questions concerned the preference, by comparing two pairs of appliances in terms of aesthetics (Table 1) and, in the least question, the availability/readiness to undergo treatment with metallic appliance taking into account the mandatory use of masks inherent to the pandemic (Figure 3, image A).

Figure 1 The model's smile.

Table 1. Distribution of the comparation between appliances.

Comparation between appliances;

1° comparation:	A with B
2° comparation:	A with D
3° comparation:	D with E
4° comparation:	B with E
5° comparation:	C with E

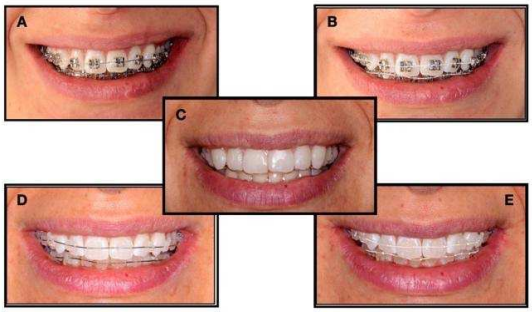


Figure 2. Images of different appliances used to evaluate preferences and frequencies.

The images, incorporated into the questionnaire, represent the most popular devices used on orthodontic treatments and were taken from the same live model (figure 3):

- A: Metallic Brackets RMO trimorphic (Rocky Mountain) with Metallic Wire Ni-ti .012 (Leone);
- B: Metallic Brackets RMO trimorphic (Rocky Mountain) with Esthetic Wire Ni-Ti aesthetic Full Form (Elude);
- C: Polyurethane vacuum-formed Aligner with anterior attachments;
- D: Composite Esthetic Brackets DB OrthoFlex Roth (OrthoTechnology) with Metallic Wire;
- E: Composite Esthetic Brackets DB OrthoFlex Roth (OrthoTechnology) with Esthetic Wire.

For the images depicting brackets, these were fixed with an atraumatic protocol using the white liquid dam Opal-Dam (Ultradent); Following "debonding" with Hu-Friedy college tweezer, brush and toothpaste.

For the images depicting aligners with attachments, the aligners containing attachments, were fabricated and filled with shade A2 G-Aenial Anterior (GC Europe), and worn by the model. Attachments were not bonded to the model.

Images were taken with Nikond D 1000 Camera with AF-S Micro Nikkor 85 mm lens (Nikon Corporation) by a single photographer in the same location to ensure for analogous lighting conditions and positioning of each photograph using a Flesh Metz Mecabits 15 MS-1 with fixed focus to 50 mm.

To minimize any distraction variables, the images were framed to display only the smile, to the exclusion of any other facial structures.

Among the respondent, individuals with no experience in dentistry were regarded as "Laypeople" while, individuals like dentists, dental hygienists, prosthetic technicians and assistants, were regarded as "Dentistry Workers".

Sample Collection Procedures:

The study was approved by the Ethics Committee of the Instituto Universitário de Ciências da Saúde (Appendix 2), all procedures were carried out in accordance with the principles of the Declaration of Helsinki.

This is a convenience sample, collected through the "Snowball" method, in which the questionnaire carried out in Lime Survey 5.0.1 was shared through social networks and personalized contacts to university students, dentists and other individuals (messages via WhatsApp, Messenger, Instagram, e-mail), informing about the purpose of the study, inviting them to participate and share it with their contacts, having sent the link. Each individual who accepted to participate, was sharing and so on.

Statistical analysis:

Data were collected and further processed with the statistical program SPSS (Statistical Package for Social Sciense) version 27.0 for Windows.

Descriptive statistics were performed to estimate frequencies and percentages.

To compare the Laypeople with the Dentistry Workers, and General Dentists with the Orthodontic Practitioners, with regard to aesthetic perception, the chi-square test was used.

To simplify the statistical analysis, 170 professionals were selected for comparison and divided into 2 subgroups; 96 General Dentists and 74 Orthodontic Practitioners. The dentists with other specializations were excluded.

The established level of significance was 0.05.

Results

Sample:

A total of 760 questionnaires were fully completed and were accepted for inclusion in the study.

541 respondents are female and 219 are male.

The sample is composed of students and workers of different areas divided into macro areas such as: Art and Cultural area, Engineering area, Humanitarian area, Social and Economic area, Health areas not inherent with dentistry, for a total of 475 people considered Laypeople group (62,5% of the total of the sample); 285 people instead had a direct relation with dentistry like Dentist, Oral Hygienists, Prosthetic Technicians and Assistants considered Dentistry Workers group (37,5% of the total of the sample);

Comparison between Laypeople (LP) and Dentistry Workers (DW):

Regarding the aesthetic rating of the model's smile, as shown in table 2, statistically significant differences were found between the groups analyzed ($\chi 2 = 40.668$; $p < 0.00$).

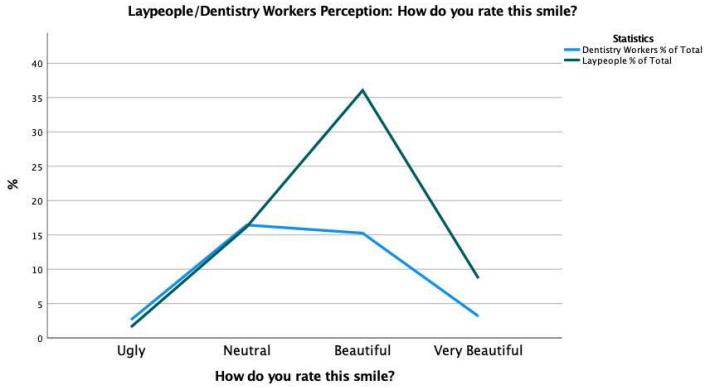
Among the LP group the smile is considered ugly by 12 (2.5%) of the group, neutral from 123 (25.9%), beautiful from 274 (57.7%) and very beautiful from 66 (13.9%); while among the DW group, the smile is considered ugly by 20 (7%), neutral from 125 (43.9%), beautiful from 116 (40.7%) and very beautiful from 24 (8.4%), thus recording a general decrease in approval.

Table 2. How do you rate this smile? comparison between Laypeople/Dentistry Workers and Chi-Square Tests.

Laypeople/Dentistry Workers * How do you rate this smile?

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	40,668[a]	3	0,000

		Ugly	Neutral	Beautiful	Very Beautiful	Total
Dentistry Workers	Count	20	125	116	24	**285**
	% within Laypeople/Dentistry Workers	7,0%	43,9%	40,7%	8,4%	**100,0%**
	% of Total	2,6%	16,4%	15,3%	3,2%	**37,5%**
Laypeople	Count	12	123	274	66	**475**
	% within Laypeople/Dentistry Workers	2,5%	25,9%	57,7%	13,9%	**100,0%**
	% of Total	1,6%	16,2%	36,1%	8,7%	**62,5%**
Total	Count	32	248	390	90	**760**
	% within Laypeople/Dentistry Workers	4,2%	32,6%	51,3%	11,8%	**100,0%**
	% of Total	4,2%	32,6%	51,3%	11,8%	**100,0%**



Graph 1. How do you rate this smile? comparison between Laypeople/Dentistry Workers.

Regarding the orthodontic need perceptions, as shown in table 3, statistically significant differences were found between the groups analyzed ($\chi 2 = 43.073$; $p < 0.00$).

If it was their smile, 100 (21,1%) of the LP group, consider it important to improve the smile with an orthodontic treatment, 134 (28,2%) perhaps, while 241 (50,7%) do not consider it important to improve it with orthodontic treatment.

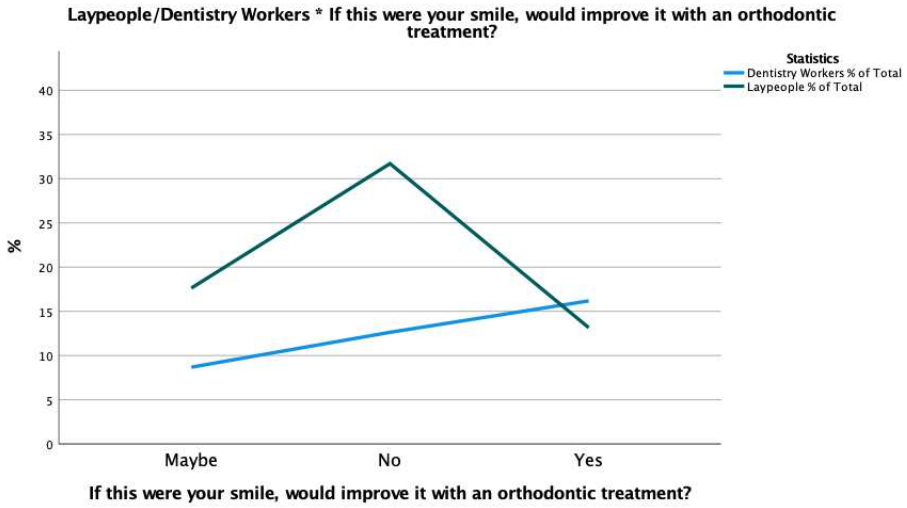
Among the DW group, 123 (43.2%) consider it important to improve the smile with an orthodontic treatment, 66 (23.2%) perhaps, while 96 (33.7%) do not consider it important to improve it with orthodontic treatment.

Table 3. If this were your smile, would you improve it with an orthodontic treatment? Comparison between Laypeople/Dentistry Workers and Chi-Square Tests.

Laypeople/Dentistry Workers * If this were your smile, would improve it with an orthodontic treatment?

Chi-Square Tests	Value	df	Asymptotic Significance
Pearson Chi-Square	43,073[a]	2	0,000

		Maybe	No	Yes	Total
Dentistry Workers	Count	66	96	123	**285**
	% within Laypeople/Dentistry Workers	23,2%	33,7%	43,2%	**100,0%**
	% of Total	8,7%	12,6%	16,2%	**37,5%**
Laypeople	Count	134	241	100	**475**
	% within Laypeople/Dentistry Workers	28,2%	50,7%	21,1%	**100,0%**
	% of Total	17,6%	31,7%	13,2%	**62,5%**
Total	Count	200	337	223	**760**
	% within Laypeople/Dentistry Workers	26,3%	44,3%	29,3%	**100,0%**
	% of Total	26,3%	44,3%	29,3%	**100,0%**



Graph 2. If this were your smile, would you improve it with an orthodontic treatment? Comparison between Laypeople/Dentistry Workers.

Regarding which orthodontic appliance they would use if they were to undergo orthodontic treatment, as shown in table 4, statistically significant differences were found between the groups analyzed ($\chi 2 = 15{,}320$; $p = 0.04$).

338 (71,2%) of the LP group choose the Aligners (C) > 57 (12%) the Fixed Metallic Appliance (A) = 57 (12%) the Aesthetic Fixed Appliance with Aesthetic Wire (E) > 12 (2,5%) the Fixed Metallic Appliance with Aesthetic Wire (B) > 11 (2,3%) the Aesthetic Fixed Appliance with Metal Wire (D);

206 (72,3%) of the DW group choose the Aligners (C) > 38 (13,3%) the Fixed Metallic Appliance (A) > 18 (6,3%) the Aesthetic Fixed Appliance with Metal Wire (D) > 16 (5,6%) the Aesthetic Fixed Appliance with Aesthetic Wire (E) > 7 (2,5%) the Fixed Metallic Appliance with Aesthetic Wire (B).

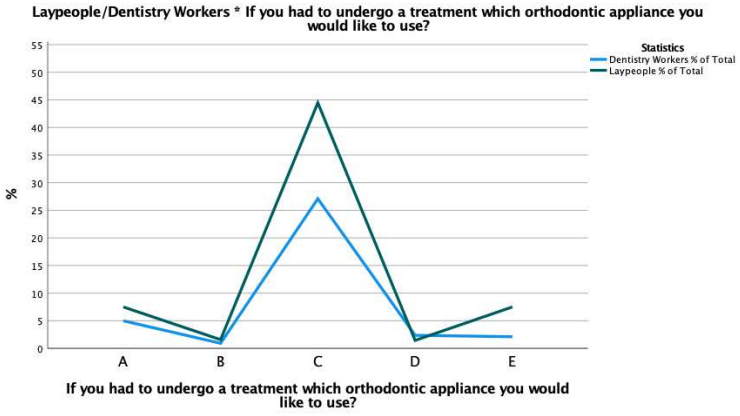
Regarding the order of preference, as shown in table 5, LP and DW agree by recording C > E > D > B > A.

Table 4. If you had to undergo a treatment which orthodontic appliance would you use? comparison between Laypeople/Dentistry Workers and Chi-Square Tests

Laypeople/Dentistry Workers * If you had to undergo a treatment which orthodontic appliance you would like to use?

Chi-Square Tests	Value	df	Asymptotic Significance (2-...
Pearson Chi-Square	15,320[a]	4	0,004

		A	B	C	D	E	Total
Dentistry Workers	Count	38	7	206	18	16	285
	% within Laypeople/Dentistry Workers	13,3%	2,5%	72,3%	6,3%	5,6%	100,0%
	% of Total	5,0%	0,9%	27,1%	2,4%	2,1%	37,5%
Laypeople	Count	57	12	338	11	57	475
	% within Laypeople/Dentistry Workers	12,0%	2,5%	71,2%	2,3%	12,0%	100,0%
	% of Total	7,5%	1,6%	44,5%	1,4%	7,5%	62,5%
Total	Count	95	19	544	29	73	760
	% within Laypeople/Dentistry Workers	12,5%	2,5%	71,6%	3,8%	9,6%	100,0%
	% of Total	12,5%	2,5%	71,6%	3,8%	9,6%	100,0%



Graph 3. If you had to undergo a treatment which orthodontic appliance would you use? comparison between Laypeople/Dentistry Workers.

Table 5.Laypeople/Dentistry Workers aesthetic preference order about the frequency.

Laypeople/Dentistry Workers aesthetic preference order: frequencies

		A	B	C	D	E	
Dentistry Workers	1° Choice	31	10	203	18	23	C
	2° Choice	38	24	40	37	146	E
	3° Choice	38	40	14	147	46	D
	4° Choice	50	133	12	56	34	B
	5° choice	128	78	16	27	36	A
Laypeople	1° Choice	56	15	335	16	53	C
	2° Choice	62	43	81	51	238	E
	3° Choice	49	73	24	248	81	D
	4° Choice	89	222	18	90	56	B
	5° choice	219	122	17	70	47	A

When pairs of appliances are compared with each other:

1° Comparison: A with B (Figure 4)

222 (46,7%) choose A among the LP group, 253 (53,3%) B .

147 (51.6%) of the DW group choose A, 138 (48.4%) to B.

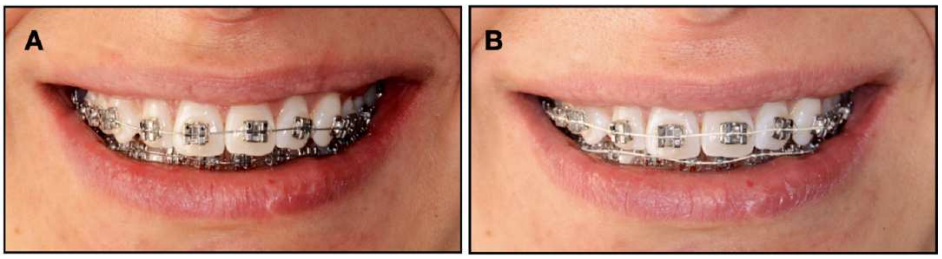


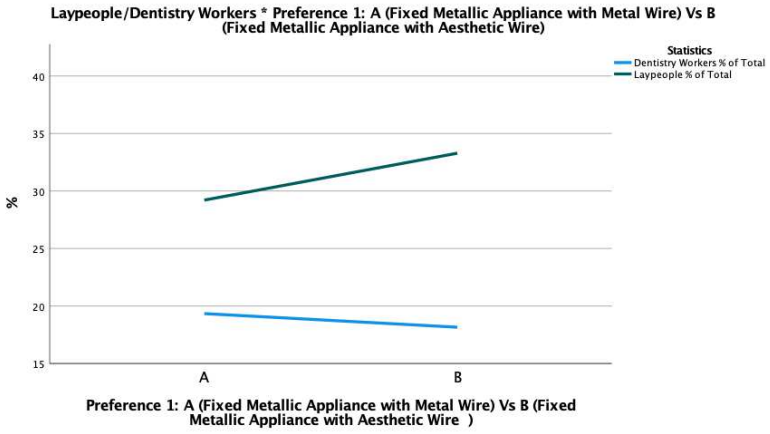
Figure 3. 1° Comparison between A (Fixed Metallic Appliance with Metal Wire) and B (Fixed Metallic Appliance with Aesthetic Wire).

Table 6. 1° Comparison Laypeople/Dentistry Workers preference between A and B appliances and Chi-Square Tests.

Laypeople/Dentistry Workers * Preference 1: A (Fixed Metallic Appliance with Metal Wire) Vs B (Fixed Metallic Appliance with Aesthetic Wire)

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1,672[a]	1	0,196

		A	B	Total
Dentistry Workers	Count	147	138	285
	% within Laypeople/Dentistry Workers	51,6%	48,4%	100,0%
	% of Total	19,3%	18,2%	37,5%
Laypeople	Count	222	253	475
	% within Laypeople/Dentistry Workers	46,7%	53,3%	100,0%
	% of Total	29,2%	33,3%	62,5%
Total	Count	369	391	760
	% within Laypeople/Dentistry Workers	48,6%	51,4%	100,0%
	% of Total	48,6%	51,4%	100,0%



Graph 4. 1° Comparison Laypeople/Dentistry Workers preference between A and B appliances.

2° Comparison: A with D (Figure 5).

When comparing A with D, the preference shifts for each group towards D, 314 (66.1%) of the LP group, 185 (64,9%) of the DW group.

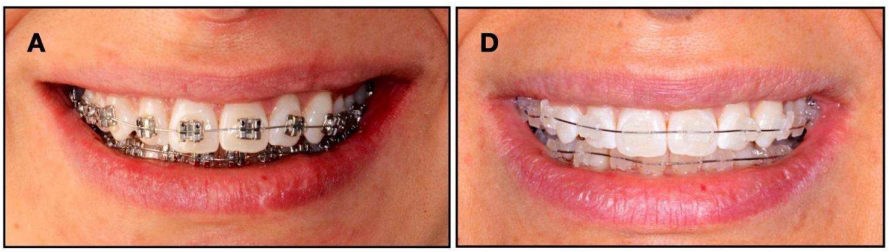


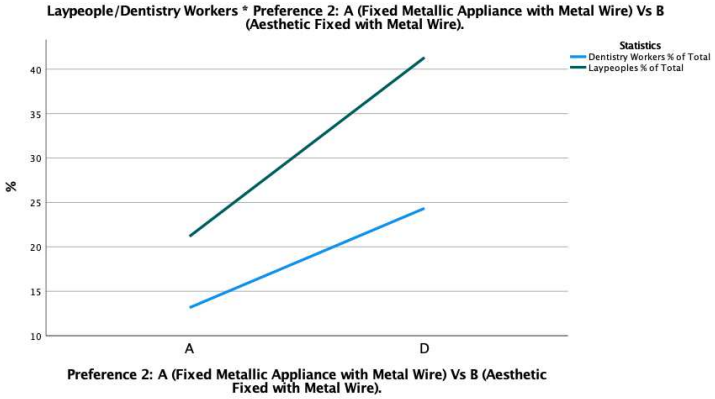
Figure 4. 2° Comparison between A (Fixed Metallic Appliance with Metal Wire) and D (Fixed Aesthetic Appliance with Aesthetic Wire).

Table 7.2° Comparison Laypeople/Dentistry Workers preference between A and D appliances and Chi-Square Tests.

Laypeople/Dentistry Workers * Preference 2: A (Fixed Metallic Appliance with Metal Wire) Vs B (Aesthetic Fixed with Metal Wire).

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	,112[a]	1	0,737

		A	D	Total
Dentistry Workers	Count	100	185	285
	% within Laypeople/Dentistry Workers	35,1%	64,9%	100,0%
	% of Total	13,2%	24,3%	37,5%
Laypeoples	Count	161	314	475
	% within Laypeople/Dentistry Workers	33,9%	66,1%	100,0%
	% of Total	21,2%	41,3%	62,5%
Total	Count	261	499	760
	% within Laypeople/Dentistry Workers	34,3%	65,7%	100,0%
	% of Total	34,3%	65,7%	100,0%



Graph 5. 2° Comparison Laypeople/Dentistry Workers preference between A and D appliances.

3° comparison: D with E (Figure 6).

When comparing D with E appliances, as shown in table 8, there are statistically significant differences between the groups analyzed ($\chi 2 = 16{,}303$; $p < 0.000$).

The use of aesthetic wire compared to metallic wire changes the percentage of preference for all groups:

379 (79.8%) of LP group and 190 (66.7%) of DW group prefer E.

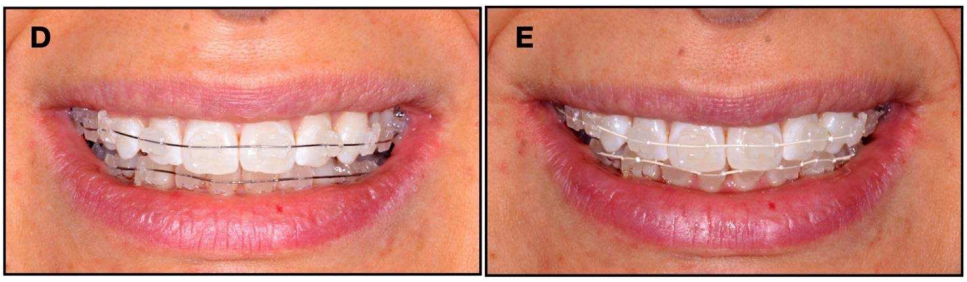


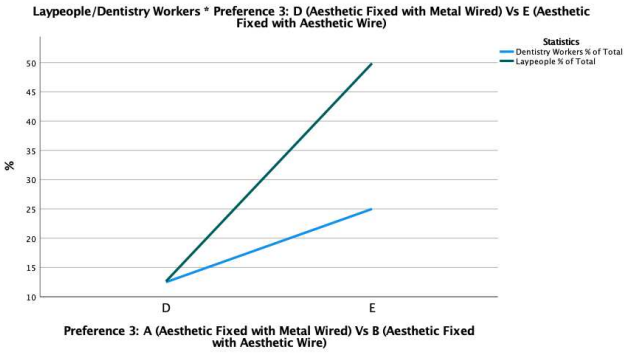
Figure 5. 3° Comparison between D (Aesthetic Fixed Appliance with Metal Wire) and E (Aesthetic Fixed with Aesthetic Wire).

Table 8. 3° Comparison Laypeople/Dentistry Workers preference between D and E appliances and Chi-Square Tests.

Laypeople/Dentistry Workers * Preference 3: D (Aesthetic Fixed with Metal Wired) Vs E (Aesthetic Fixed with Aesthetic Wire)

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16,303[a]	1	0,000

		D	E	Total
Dentistry Workers	Count	95	190	285
	% within Laypeople/Dentistry Workers	33,3%	66,7%	100,0%
	% of Total	12,5%	25,0%	37,5%
Laypeople	Count	96	379	475
	% within Laypeople/Dentistry Workers	20,2%	79,8%	100,0%
	% of Total	12,6%	49,9%	62,5%
Total	Count	191	569	760
	% within Laypeople/Dentistry Workers	25,1%	74,9%	100,0%
	% of Total	25,1%	74,9%	100,0%



Graph 6. 3° Comparison Laypeople/Dentistry Workers preference between D and E appliances.

4° comparison: B with E (Figure 7).

When comparing B with E the general preference is confirmed for E with 373 (78.5%) among LP group and 220 (77.2%) among DW group.

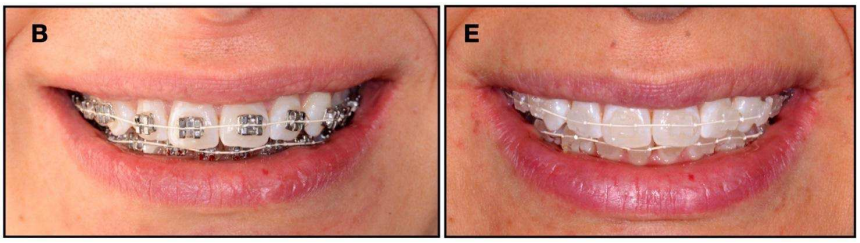


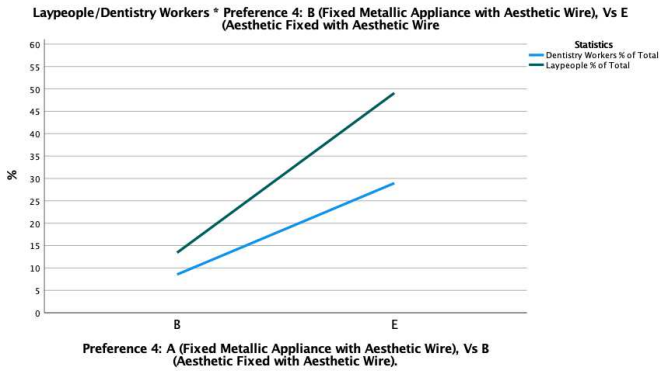
Figure 6. 4° Comparison between B (Metallic Fixed Appliance with Aesthetic Wire) and E (Aesthetic Fixed with Aesthetic Wire).

Table 9. 4° Comparison Laypeople/Dentistry Workers preference between B and E appliances and Chi-Square Tests.

Laypeople/Dentistry Workers * Preference 4: B (Fixed Metallic Appliance with Aesthetic Wire), Vs E (Aesthetic Fixed with Aesthetic Wire

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	,185[a]	1	0,667

		B	E	Total
Dentistry Workers	Count	65	220	**285**
	% within Laypeople/Dentistry Workers	22,8%	77,2%	**100,0%**
	% of Total	8,6%	28,9%	**37,5%**
Laypeople	Count	102	373	**475**
	% within Laypeople/Dentistry Workers	21,5%	78,5%	**100,0%**
	% of Total	13,4%	49,1%	**62,5%**
Total	Count	167	593	**760**
	% within Laypeople/Dentistry Workers	22,0%	78,0%	**100,0%**
	% of Total	22,0%	78,0%	**100,0%**



Graph 7. 3° Comparison Laypeople/Dentistry Workers preference between B and E appliances.

5° comparison: C with E (Figure 8).

When comparing Aligners with Aesthetic Fixed with Aesthetic Wire, the preference follows a uniform trend for Aligners, reaching 426 (89.7%) among the LP group, and 249 (87.4%) among the DW group.

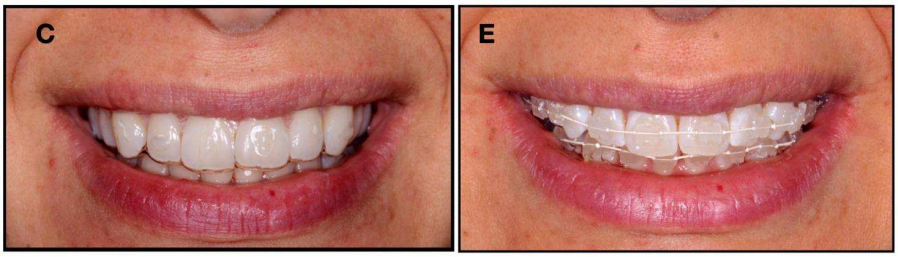


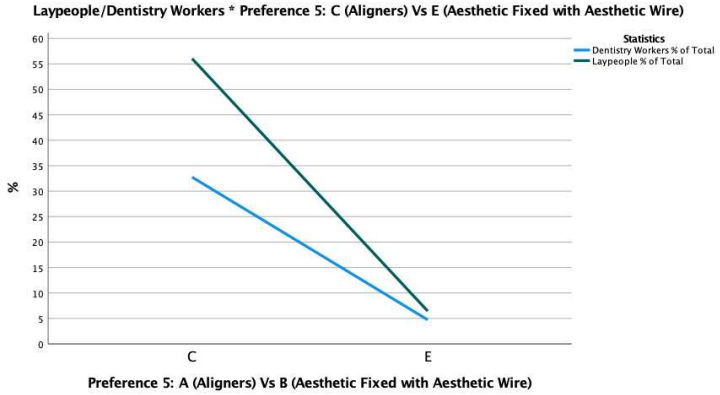
Figure 7. 5° Comparison between C (Aligners) and E (Aesthetic Fixed with Aesthetic Wire).

Table 10. 5° Comparison Laypeople/Dentistry Workers preference between C and E appliances and Chi-Square Tests.

Laypeople/Dentistry Workers * Preference 5: C (Aligners) Vs E (Aesthetic Fixed with Aesthetic Wire)

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	,962[a]	1	0,327

		C	E	Total
Dentistry Workers	Count	249	36	**285**
	% within Laypeople/Dentistry Workers	87,4%	12,6%	**100,0%**
	% of Total	32,8%	4,7%	**37,5%**
Laypeople	Count	426	49	**475**
	% within Laypeople/Dentistry Workers	89,7%	10,3%	**100,0%**
	% of Total	56,1%	6,4%	**62,5%**
Total	Count	675	85	**760**
	% within Laypeople/Dentistry Workers	88,8%	11,2%	**100,0%**
	% of Total	88,8%	11,2%	**100,0%**



Graph 8.5° Comparison Laypeople/Dentistry Workers preference between C and E.

Regarding readiness to undergo a treatment with metallic appliances (Figure 2-A), as shown in table 11, statistically significant differences were found between the groups analyzed ($\chi 2 = 8.658$; $p < 0.14$).

266 (56%) respondents in the LP group declare themselves willing to do this type of device, while among the DW group the number is 187 (65.6%).

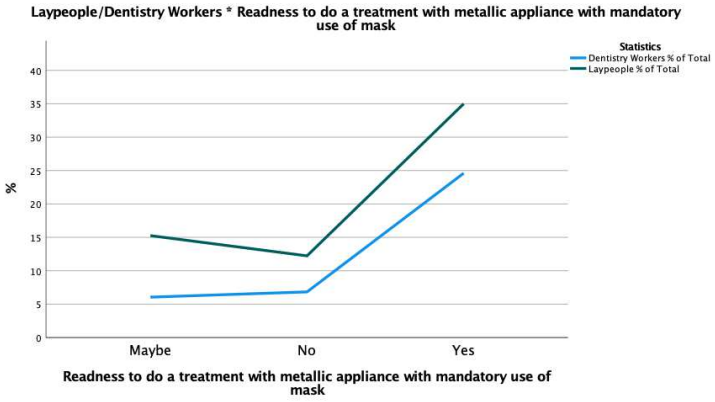
93 respondents (19.6%) of the LP group and in 52 (18.2) of the DW group declare themselves against; 116 (24.4%) undecided among LP, 46 (16.1%) among DW.

Table 11.Readiness to do a treatment with metallic appliance with mandatory use of mask; Comparison between Laypeople and Dentistry Workers.

Laypeople/Dentistry Workers * Readness to do a treatment with metallic appliance with mandatory use of mask

Chi-Square Tests	Value	df	Asymptotic Significance (2-
Pearson Chi-Square	8,658[a]	2	0,013

		Maybe	No	Yes	Total
Dentistry Workers	Count	46	52	187	**285**
	% within Laypeople/Dentistry Workers	16,1%	18,2%	65,6%	**100,0%**
	% of Total	6,1%	6,8%	24,6%	**37,5%**
Laypeople	Count	116	93	266	**475**
	% within Laypeople/Dentistry Workers	24,4%	19,6%	56,0%	**100,0%**
	% of Total	15,3%	12,2%	35,0%	**62,5%**
Total	Count	162	145	453	**760**
	% within Laypeople/Dentistry Workers	21,3%	19,1%	59,6%	**100,0%**
	% of Total	21,3%	19,1%	59,6%	**100,0%**



Graph 9.Readiness to do a treatment with metallic appliance with mandatory use of face mask; comparison between Laypeople and Dentistry Workers.

Comparison between General Dentists (GD) and Orthodontic Practitioners (OP):

Regarding the aesthetic rating of the model's smile, among the GD group the model's smile recorded a positive rating (beautiful and very beautiful) for 55 (57,3%); Among the OP group only for 29 (39,2%).

Among the GD group the model's smile recorded a negative rating (neutral and ugly) for 41 (42,7%);

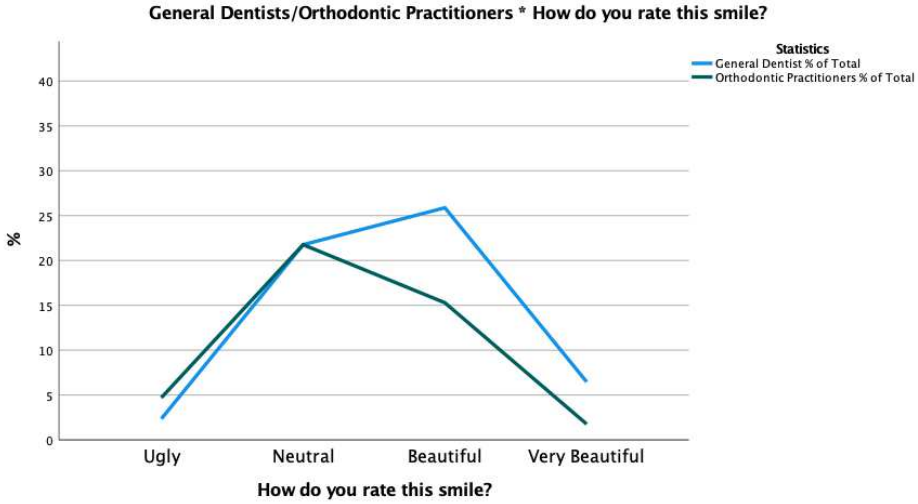
45 (60,8%) among the OP group.

Table 12.How do you rate this smile? comparison between General Dentists/Orthodontic Practitioners and Chi-Square Tests.

General Dentists/Orthodontic Practitioners * How do you rate this smile?

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7,817[a]	3	0,050

		Ugly	Neutral	Beautiful	Very Beautiful	Total
General Dentist	Count	4	37	44	11	96
	% within General Dentists/Orthodontic Practitioners	4,2%	38,5%	45,8%	11,5%	100,0%
	% of Total	2,4%	21,8%	25,9%	6,5%	56,5%
Orthodontic Practitioner	Count	8	37	26	3	74
	% within General Dentists/Orthodontic Practitioners	10,8%	50,0%	35,1%	4,1%	100,0%
	% of Total	4,7%	21,8%	15,3%	1,8%	43,5%
Total	Count	12	74	70	14	170
	% within General Dentists/Orthodontic Practitioners	7,1%	43,5%	41,2%	8,2%	100,0%
	% of Total	7,1%	43,5%	41,2%	8,2%	100,0%



Graph 10. How do you rate this smile? Comparison between General Dentists and Orthodontic Practitioners.

Regarding the orthodontic need perceptions, as shown in table 13, statistically significant differences were found between the groups analyzed ($\chi 2 = 16,608$; $p < 0.00$).

If it was their smile, 29 (30,2%) respondents in the GD group, consider it important to improve the smile with an orthodontic treatment, 29 (30,2%) maybe, while 38 (39,6%) do not consider it important to improve it with orthodontic treatment.

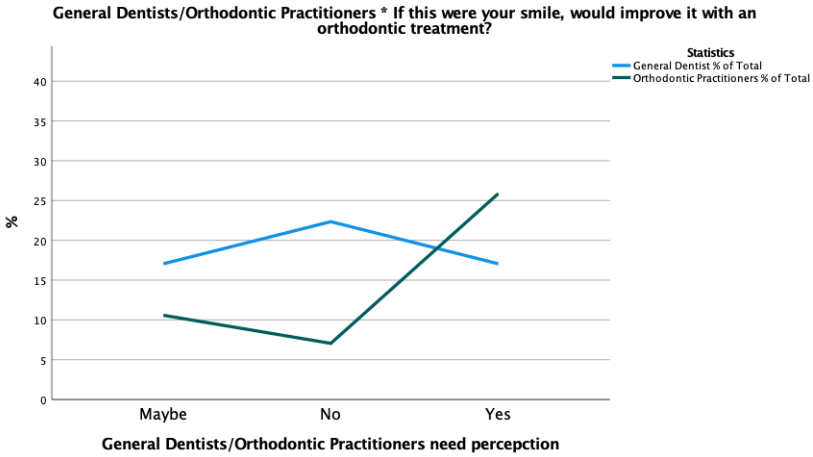
Among the OP group, 44 (59,5%) consider it important to improve the smile with an orthodontic treatment, 18 (24.3%) maybe, while 12 (16,2%) do not consider it important to improve it with orthodontic treatment.

Table 13. If this were your smile, would you improve it with an orthodontic treatment? Comparison between Laypeople/Dentistry Workers and Chi-Square Tests.

General Dentists/Orthodontic Practitioners * If this were your smile, would improve it with an orthodontic treatment?

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16,608[a]	2	0,000

		Maybe	No	Yes	Total
General Dentists	Count	29	38	29	**96**
	% within General Dentists/Orthodontic Practitioners	30,2%	39,6%	30,2%	**100,0%**
	% of Total	17,1%	22,4%	17,1%	**56,5%**
Orthodontic Practitioners	Count	18	12	44	**74**
	% within General Dentists/Orthodontic Practitioners	24,3%	16,2%	59,5%	**100,0%**
	% of Total	10,6%	7,1%	25,9%	**43,5%**
Total	Count	47	50	73	**170**
	% within General Dentists/Orthodontic Practitioners	27,6%	29,4%	42,9%	**100,0%**
	% of Total	27,6%	29,4%	42,9%	**100,0%**



Graph 11. If this were your smile, would you improve it with an orthodontic treatment? Comparison between Laypeople/Dentistry Workers

Regarding which orthodontic appliance they would use if they were to undergo orthodontic treatment, as shown in table 14, statistically significant differences were not found between the subgroups.

75 (78,1%) respondents in the GD group choose the Aligners (C) > 7 (7,3%) the Aesthetic Fixed Appliance with Metal Wire (D); > 6 (6,3%) the Fixed Metallic Appliance (A) > 5 (5,2%) the Aesthetic Fixed Appliance with Aesthetic Wire (E) > 3 (3,1%) the Fixed Metallic Appliance with Aesthetic Wire (B).

59 (79,7%) OP group choose the Aligners (C) > 6 (8,1%) the Fixed Metallic Appliance (A) = 6 (8,1%) the Aesthetic Fixed Appliance with Metal Wire (D) > 3 (4,1%) the Aesthetic Fixed Appliance with Aesthetic Wire (E) > 0 (0,0%) the Fixed Metallic Appliance with Aesthetic Wire (B).

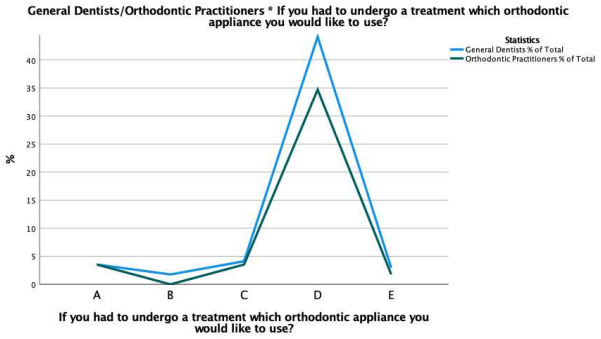
Regarding the order of preference, as shown in table 15, GD and OP groups agree by recording C > E > D > B > A.

Table 14. If you had to undergo a treatment which orthodontic appliance would you use? comparison between General Dentists/Orthodontic Practitioners and Chi-Square Tests

General Dentists/Orthodontic Practitioners * If you had to undergo a treatment which orthodontic appliance you would like to use?

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2,685[a]	4	0,612

		A	B	C	D	E	Total
General Dentists	Count	6	3	7	75	5	96
	% within General Dentists/Orthodontic Practitioners	6,3%	3,1%	7,3%	78,1%	5,2%	100,0%
	% of Total	3,5%	1,8%	4,1%	44,1%	2,9%	56,5%
Orthodontic Practitioners	Count	6	0	6	59	3	74
	% within General Dentists/Orthodontic Practitioners	8,1%	0,0%	8,1%	79,7%	4,1%	100,0%
	% of Total	3,5%	0,0%	3,5%	34,7%	1,8%	43,5%
Total	Count	12	3	13	134	8	170
	% within General Dentists/Orthodontic Practitioners	7,1%	1,8%	7,6%	78,8%	4,7%	100,0%
	% of Total	7,1%	1,8%	7,6%	78,8%	4,7%	100,0%



Graph 12. If you had to undergo a treatment which orthodontic appliance would you use? comparison between General Dentists/Orthodontic Practitioners.

Table 15. General Dentists/Orthodontic Practitioners aesthetic preference order about the frequency.

General Dentists/Orthodontic Practitioners Aesthetic preference order: frequencies

		A	B	C	D	E	
General Dentists	1° Choice	9	2	73	6	6	C
	2° Choice	7	6	9	17	57	E
	3° Choice	15	9	7	47	18	D
	4° Choice	24	46	4	15	7	B
	5° choice	41	33	3	11	8	A
Orthodontic Practitioners	1° Choice	5	3	53	5	8	C
	2° Choice	12	4	12	9	37	E
	3° Choice	13	7	2	41	11	D
	4° Choice	15	33	1	16	9	B
	5° choice	29	27	6	3	9	A

When pairs of appliances are compared with each other:

1° Comparison: A with B (Figure 4)

statistically significant differences were found between the groups analyzed ($\chi 2 = 4{,}659$ $p = 0.03$).

51 (53,1%) among the GD group the preference goes to B, 45 (46,9%) and to A .

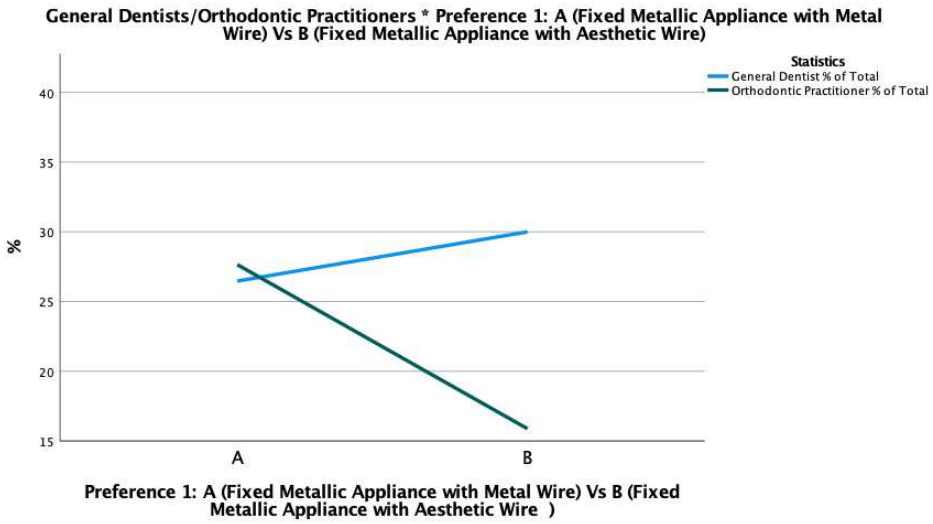
27 (37,5%) among the OP group the preference goes to B, 47 (63,5%) to A.

Table 16. 1° Comparison General Dentists/Orthodontic Practitioners preference between A and B appliances and Chi-Square Tests.

General Dentists/Orthodontic Practitioners * Preference 1: A (Fixed Metallic Appliance with Metal Wire) Vs B (Fixed Metallic Appliance with Aesthetic Wire)

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4,659[a]	1	0,031

		A	B	Total
General Dentists	Count	45	51	96
	% within General Dentists/Orthodontic Practitioners	46,9%	53,1%	100,0%
	% of Total	26,5%	30,0%	56,5%
Orthodontic Practitioners	Count	47	27	74
	% within General Dentists/Orthodontic Practitioners	63,5%	36,5%	100,0%
	% of Total	27,6%	15,9%	43,5%
Total	Count	92	78	170
	% within General Dentists/Orthodontic Practitioners	54,1%	45,9%	100,0%
	% of Total	54,1%	45,9%	100,0%



Graph 13. 1° Comparison General Dentists/Orthodontic Practitioners preference between A and B appliances.

2° comparison: A with D (Figure 5).

When comparing A with D the preference shifts for each group towards D;

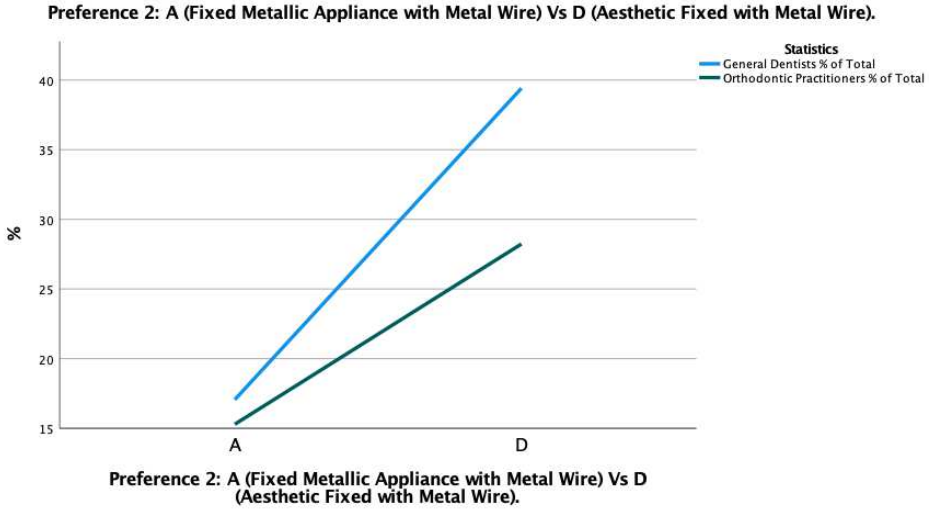
67 (69,8%) for the GD group, 48 (64,9%) for OP group.

Table 17. 2° Comparison General Dentists/Orthodontics Practitioners preference between A and D appliances and Chi-Square Tests..

Preference 2: A (Fixed Metallic Appliance with Metal Wire) Vs D (Aesthetic Fixed with Metal Wire).

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	,463[a]	1	0,496

		A	D	Total
General Dentist	Count	29	67	**96**
	% within General Dentists/Orthodontic Practitioners	30,2%	69,8%	**100,0%**
	% of Total	17,1%	39,4%	**56,5%**
Orthodontic Practitioner	Count	26	48	**74**
	% within General Dentists/Orthodontic Practitioners	35,1%	64,9%	**100,0%**
	% of Total	15,3%	28,2%	**43,5%**
Total	Count	55	115	**170**
	% within General Dentists/Orthodontic Practitioners	32,4%	67,6%	**100,0%**
	% of Total	32,4%	67,6%	**100,0%**



Graph 14. 2° Comparison General Dentists/Orthodontics Practitioners preference between A and D appliances.

3° comparison: D with E (Figure 6).

When comparing D with E the preference shifts for each group towards E;

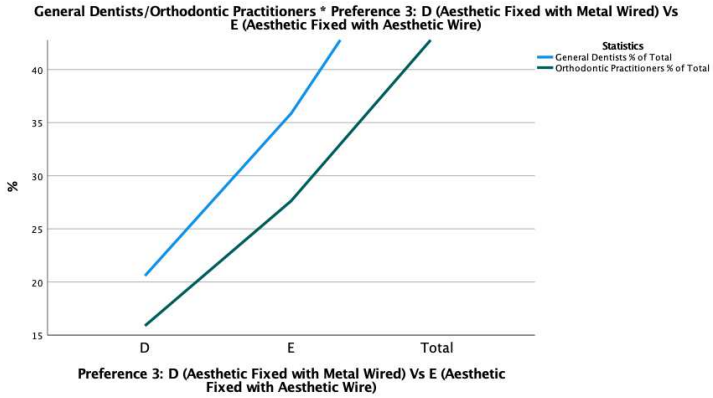
61 (63,5%) for the GD group, 47 (63,5%) for OP group.

Table 18. 3° Comparison Laypeople/Dentistry Workers preference between D and E appliances and Chi-Square Tests.

General Dentists/Orthodontic Practitioners * Preference 3: D (Aesthetic Fixed with Metal Wired) Vs E (Aesthetic Fixed with Aesthetic Wire)

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	,000[a]	1	0,997

		D	E	Total
General Dentists	Count	35	61	**96**
	% within General Dentists/Orthodontic Practitioners	36,5%	63,5%	**100,0%**
	% of Total	20,6%	35,9%	**56,5%**
Orthodontic Practitioners	Count	27	47	**74**
	% within General Dentists/Orthodontic Practitioners	36,5%	63,5%	**100,0%**
	% of Total	15,9%	27,6%	**43,5%**
Total	Count	62	108	**170**
	% within General Dentists/Orthodontic Practitioners	36,5%	63,5%	**100,0%**
	% of Total	36,5%	63,5%	**100,0%**



Graph 15. Comparison Laypeople/Dentistry Workers preference between D and E appliances.

4° comparison: B with E (Figure 7).

When comparing B with E the preference shifts for each group towards E;

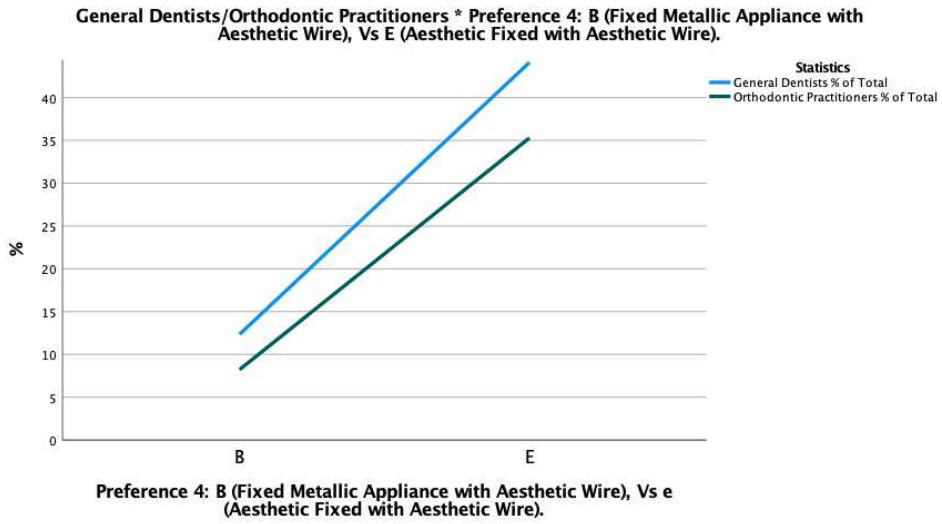
75 (78,1%) for the GD group, 60 (81,1%)for OP group.

Table 19. 4° Comparison General Dentists/Orthodontic Practitioners preference between B and E appliances and Chi-Square Tests.

General Dentists/Orthodontic Practitioners * Preference 4: B (Fixed Metallic Appliance with Aesthetic Wire), Vs E (Aesthetic Fixed with Aesthetic Wire).

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	,223[a]	1	0,637

		B	E	Total
General Dentists	Count	21	75	**96**
	% within General Dentists/Orthodontic Practitioners	21,9%	78,1%	**100,0%**
	% of Total	12,4%	44,1%	**56,5%**
Orthodontic Practitioners	Count	14	60	**74**
	% within General Dentists/Orthodontic Practitioners	18,9%	81,1%	**100,0%**
	% of Total	8,2%	35,3%	**43,5%**
Total	Count	35	135	**170**
	% within General Dentists/Orthodontic Practitioners	20,6%	79,4%	**100,0%**
	% of Total	20,6%	79,4%	**100,0%**



Graph 16. Comparison General Dentists/Orthodontic Practitioners preference between B and E appliances.

5° comparison: C with E (Figure 8).

When comparing C with E the preference shifts for each group towards C;

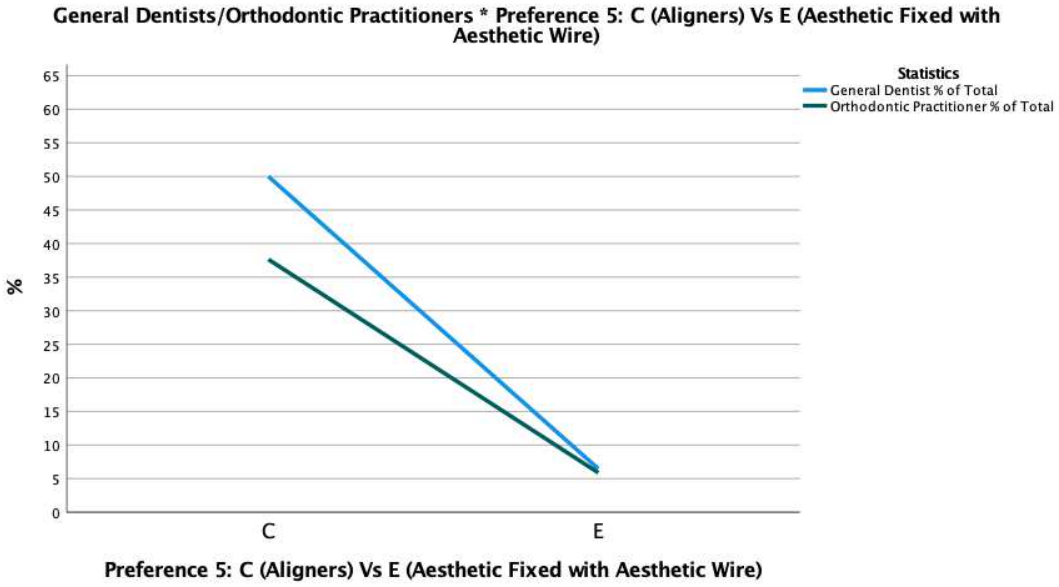
85 (88,5%)for the GD group, 64 (86,5%) for OP group.

Table 20. 5° Comparison General Dentists/Orthodontic Practitioners preference between C and E appliances and Chi-Square Tests.

General Dentists/Orthodontic Practitioners * Preference 5: C (Aligners) Vs E (Aesthetic Fixed with Aesthetic Wire)

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	,163[a]	1	0,686

		C	E	Total
General Dentist	Count	85	11	**96**
	% within General Dentists/Orthodontic Practitioners	88,5%	11,5%	**100,0%**
	% of Total	50,0%	6,5%	**56,5%**
Orthodontic Practitioner	Count	64	10	**74**
	% within General Dentists/Orthodontic Practitioners	86,5%	13,5%	**100,0%**
	% of Total	37,6%	5,9%	**43,5%**
Total	Count	149	21	**170**
	% within General Dentists/Orthodontic Practitioners	87,6%	12,4%	**100,0%**
	% of Total	87,6%	12,4%	**100,0%**



Graph 17. 5° Comparison General Dentists/Orthodontic Practitioners preference between C and E appliances.

Regarding readiness to do a treatment with metallic appliances (Figure 2-A), as shown in table 21, statistically significant differences were not found between the groups analyzed . 60 (62,5%) of GD group declare themselves willing to do with this type of device, 51 (68.9%) among the OP group.

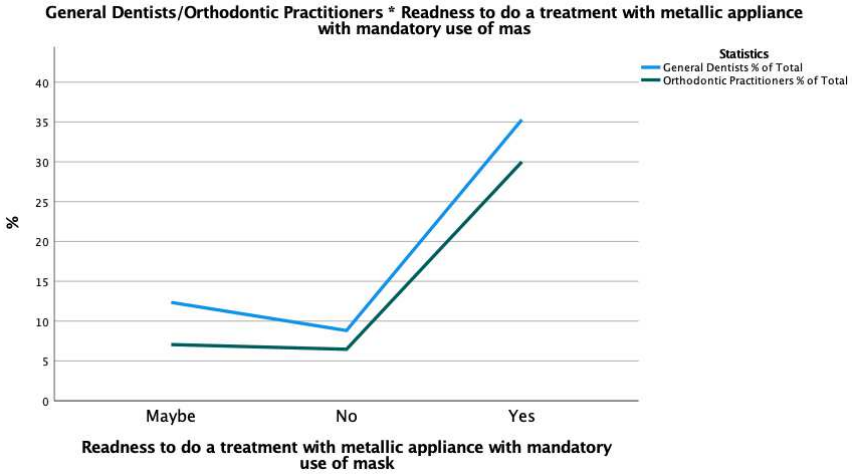
In 15 (15.6%) of GD group and in 11 (14.9) of OP group declare themselves against; undecided 21 (21,9%) among GD group, 12 (16.2%) among OP group.

Table 21. Readiness to do a treatment with metallic appliance with mandatory use of mask; Comparison between General Dentists/Orthodontic Practitioners and Chi-Square Tests.

General Dentists/Orthodontic Practitioners * Readness to do a treatment with metallic appliance with mandatory use of mas

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	,969[a]	2	0,616

		Maybe	No	Yes	Total
General Dentists	Count	21	15	60	96
	% within General Dentists/Orthodontic Practitioners	21,9%	15,6%	62,5%	100,0%
	% of Total	12,4%	8,8%	35,3%	56,5%
Orthodontic Practitioners	Count	12	11	51	74
	% within General Dentists/Orthodontic Practitioners	16,2%	14,9%	68,9%	100,0%
	% of Total	7,1%	6,5%	30,0%	43,5%
Total	Count	33	26	111	170
	% within General Dentists/Orthodontic Practitioners	19,4%	15,3%	65,3%	100,0%
	% of Total	19,4%	15,3%	65,3%	100,0%



Graph 18. Readiness to do a treatment with metallic appliance with mandatory use of mask; Comparison between General Dentists/Orthodontic Practitioners

Discussion

Beauty and aesthetics are abstract concepts linked to the perception of quality and can have objective and subjective characteristics. From such considerations, people may feel the need to change something in their appearance in order to make it more pleasing to their own eyes. In the dental field, the prescription to an orthodontic treatment is done by the normative evaluation of the occlusal and dental condition.(8) Nonetheless, literature has demonstrated the importance of defining the perception of the diagnosis in every person as the comprehension of the psychological and social implications of the smile.(9) In recent years, people's needs have pushed the orthodontic specialty to require the recognition of optimal dental and facial aesthetics during all stages of treatment including the selection of used devices. The spread of aligners and aesthetic appliances have allowed access to orthodontic therapy to patients who were previously opposed to it. (10)

In this study the first group of questions measured the aesthetic rating of the natural smile of the model, the perception of orthodontic needs and general appliance preferences. Findings showed that laypeople assigned higher scores to the model's smile, whereas professionals, particularly orthodontist practitioners, were the less tolerant group, assigning lower scores. Professionals tend to have a more critical judgment than laypeople in terms of the aesthetic liking of the model's smile, a great number of people related to the dentist's work find this smile nice, nevertheless they would improve it with an orthodontic treatment. Similar results have already been reported in the literature by Pinho et al. (2015, 2016, 2018), where they have shown that the practitioners tend to have stronger judgments and needs concerning the aesthetics of the smile. (11–13)

Analyzing sample opinions regarding the perception of the orthodontic devices, provided significant results.

In a general view, the orders of frequency of aesthetic preferences that emerged in this study do follow the orders of preferences recorded in the literature by Ziuchkovski JP et al. (2006) (14) and by Rosvall et al. (2009) (6): they investigated the attractiveness of orthodontic appliances by means of digital images, and showed that attractiveness ratings can be grouped in the hierarchy of lingual appliances and aligners, followed by ceramic and metallic appliances. In our findings laypeople, dentistry workers, general dentists and orthodontic practitioners have the same order of frequency in the choice: Aligners, followed by Aesthetic Brackets with Aesthetic Wire, followed by Aesthetic Brackets with Metallic

Wire, followed by Metallic Brackets with Aesthetic Wire, followed by Metallic Brackets with Metallic Wire. The appliances' attractiveness decrease depending on the quantity of visible metal.

When analyzed which orthodontic appliances respondents would use if they were to undergo orthodontic treatment, a discrepancy emerged between what is considered most beautiful in the literature where aligners are the first choice, followed by aesthetic appliances, and only at the end by hybrid solutions and stainless-steel appliances (5,6,10,14), and what people would be willing to "wear". In this study aligners record the highest frequency in each group, but, immediately afterwards, the metal device is chosen. The mixed solutions, fixed aesthetic appliance with metal wire, or metal appliance with aesthetic wire, obtain the lowest frequency. An explanation could be given by the type of question and system used: in the literature, the preference between different types of devices must be indicated with a VAS scale, or with the Eye-Tracking System, (15,5) used to evaluate which one catches people's eyes for more. In our study, in addition to giving a value to preference using the VAS scale, it was explicitly requested to indicate which appliances people would have decided to use if they had to undergo orthodontic treatment. Taking into account the covid-19 pandemic, the mandatory use of protective face masks may influence this selection.

The second group of questions concerned people's preferences, by comparing two pairs of appliances in terms of aesthetics and, in the last question, the willingness to undergo treatment with metallic appliances taking into account the mandatory use of face masks inherent to the ongoing pandemic.

The results show that, with the use of metal brackets, the aesthetic wire is more popular/welcome among laypeople than dentistry workers. The use of aesthetic wire takes on a significant value only when the brackets are aesthetic. Orthodontic practitioners, in particular, appreciate the metallic brackets with metal wire.

An explanation could be given by the functional optimization of the device linked to the metal characteristics, like resistance, stainless, less friction reported in literature, or simply given by their experience with this technique. (6,14)

Between metal and aesthetic brackets, laypeople and dentistry workers agree on aesthetic brackets.

These results have been observed in previous studies by Ziuchkovski JP. et al. (2006) (14) where the appearance of the wire is irrelevant if a stainless-steel appliance is used, but can vary in ceramic brackets appliances. In another study, Batista DM et al. (2019) (16) evaluated the attractiveness of the different types of metallic and aesthetic orthodontic wires. In their records the rate of wire attractiveness did not present statistically significant differences between the evaluators. As a consequence, they assumed that in the evaluation of the attractiveness of orthodontic wires, specialists' view did not differ from a laypeople's one. In our study, laypeople, dentistry workers, general dentists and orthodontic practitioners showed different opinions on the wire depending on the brackets used. Nonetheless, in most cases, fixed orthodontic therapy cannot be completed without some metallic auxiliaries and wires, because, for the time being, white wires are only available in round configurations. These results do not lead to clinical guidance in practice, but to a greater comprehension of preference.

The readiness to undergo a treatment with metallic appliances is always significantly related to patients' aesthetics demands. In the last few years the presence of metal components negatively influenced the readiness and the aesthetic self-perception, to the point that many people have declared themselves willing to invest double the price to have something aesthetic because the smile played a dominant role, where the observer's gaze focuse.(15,16) The mandatory use of face masks outdoors and in the workplace, due to the covid-19 pandemic, has led many people to change their minds about their "taboos". Today, with the use of face masks, people are significantly less concerned with their smile and dental aesthetic. (18) Within the limitations of this study, most of Laypeople, Dentistry Workers, Dentists and Orthodontic Practitioners would be willing to undergo a fixed metallic orthodontic treatment with a metallic wire associated with the use of a face mask. It is important to take this result into account since we do not know for how long face masks will be mandatory. Based on future evolution, we recognize the importance of replicating the question related to the use of metallic devices with metallic arches, with or without the use of a face mask, in order to compare the results and to assess their impact on decision-making.

Covid-19 outbreak has currently forced changes in how dental practice and orthodontics are exercised. Changes at issue consist in focusing on prevention and, as key to avoid contamination, encouraging dental procedures that do not generating aerosol. Based on the evaluation of the number of appointments, the number of emergency visits and the overall treatment time, aligners are considered the relatively safest solutions from the orthodontic community. (19,20) In the informed-consent process, practitioners must keep discussing appliance options with their patients; given how quickly preferences can change according to situations. An appliance must be selected on the basis of more than just appearance. The change in mentality during the pandemic made us explore other paths that could be perpetuated in the near future.

Conclusion

Professionals tend to have a more critical judgment than laypeople in terms of aesthetic preference regarding the rating of the model's smile. The aesthetic perception and the needs of intervention is greater as the knowledge in dentistry and in orthodontic specialty increases.

The aesthetic preferences orders of frequency that emerged does follow the orders of preferences recorded in the literature: Aligners, followed by Aesthetic Fixed Appliances, followed by Metal Fixed Appliances. The appliance's attractiveness decreases as the quantity of visible metal increases, a discrepancy is found between what is considered most beautiful, and what people would be willing to "wear".

Within the limitations of this study, laypeople and dentistry workers would be willing to undergo a fixed metallic orthodontic treatment with a metallic wire associated with the use of a face mask.

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Appendix

Appendix 1. Questionnaire pag. 1

Evaluation of the aesthetic perception of Orthodontic Appliances

This survey "Evaluation of the aesthetic perception of different orthodontic appliances" is included in an IUCS-CESPU research project coordinated by Prof. Dr. Teresa Pinho, with the aim of better understanding the importance of the aesthetic impact of orthodontics appliances, as well as the factors that can influence it.
Participation is voluntary and anonymous.
We count on your cooperation.
We thank you in advance for your participation and interest.
The research team:
Professor Dr. Teresa Pinho
The collected data will be processed for scientific research purposes. There are 26 questions in this survey.

I agree to voluntarily participate in the survey; I declare that I have been informed about the objectives and confidentiality of this survey, as well as its use for scientific research purposes. *
Choose only one of the following Choose only one of the following:
- I agree;
- I don't agree;

Generalities

Age

Choose only one of the following Choose only one of the following:
≥ 18 and <30 years
≥ 31 and <40 years
≥ 41 and <50 years
≥ 51 and <60 years
≥ 61 and <71 years

Gender

Choose only one of the following Choose only one of the following:
Male
Female
Other

Nationality

Choose only one of the following Choose only one of the following:
Portuguese
Italian
Other

Appendix 1. Questionnaire pag. 2

Qualification

Choose only one of the following

Secondary Education / Higher Student
Three-year degree
Master's Degree
Doctorate
Other

Field of study:

Choose only one of the following Choose only one of the following:
High school student
Bachelor's Degree Student
Master's Degree Student
Specialization Doctoral Student
Other

Study area:

Choose only one of the following:

Student of Dentistry and Dental Prosthetics
Dental Hygiene Student of other Health Areas
Engineering student
Student of Humanitarian Subjects
Student of Social and Economic Matters
Student of the Arts and Cultural Heritage area
Other

Year of the Degree Course:

Choose only one of the following:
1st year
2nd year
3rd year
4th year
5th year
6th year

Area

Choose only one of the following:

Dentistry and Dental Prosthetics
Dental Hygienist
Prosthetic Technician
ASO Assistant Other Health Areas
Humanities Area
Engineering area
Social Area
Economic Area
Arts Area and Cultural Heritage Area
Other

How long have you been practicing:

Choose only one of the following:
≤ 5 years
≥ 6 and <10 years
≥ 11 and <20 years
≥ 20 years

Qualification / Specialization

Choose only one of the following:
Generic Dentist Doctor
General Dentist who practices less than 50% of Orthodontics
General Dentist who practices more than 50% of Orthodontics
Master in Orthodontics
Specialist in Orthodontics
Other

How long have you been practicing Orthodontics:

Choose only one of the following:
≤ 5 years
≥ 6 and <10 years
≥ 11 and <20 years
≥ 20 years

Appendix 1. Questionnaire pag. 4

Aesthetic perception
Below we will present some orthodontic appliances asking you to select from the options presented which one is your favorite:

How do you ate this smile?

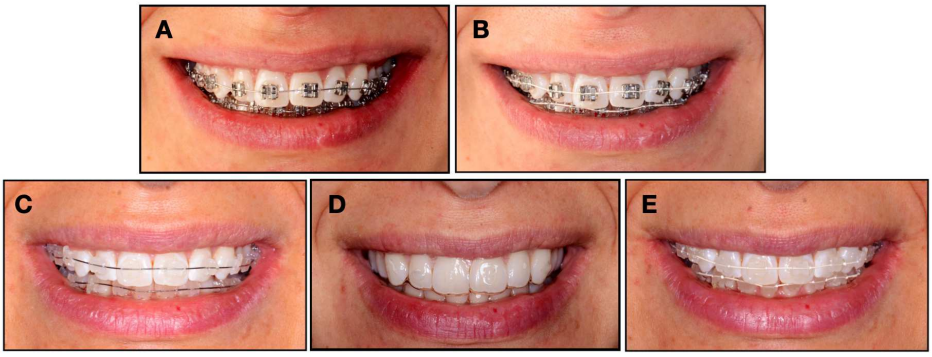
Choose only one of the following:

1 Very bad
2 Ugly
3 Neutral
4 Beautiful
5 Very Beautiful

If this were your smile, would you consider it important to improve it with orthodontic treatment?

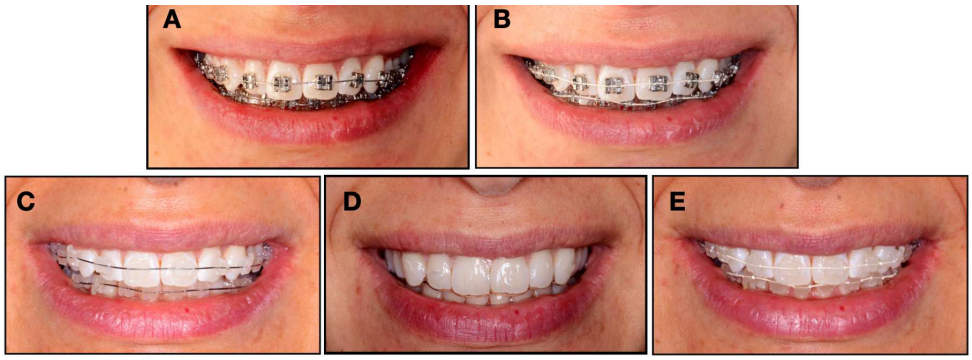
Yes
No
Maybe

If you had to undergo to a treatment, which orthodontic appliance would you like to use?



Choose only one of the following:
A (Fixed Metallic Appliance)
B (Fixed Metallic Fixture + Aesthetic Wire)
C (Fixed Aesthetic Fixture + Metallic Wire)
D (Aligners)
E (Fixed Aesthetic Luminaire + Aesthetic Wire)

Sort the following photos according to your preferences, placing your favorite at the top and the least favorite at the bottom.



*

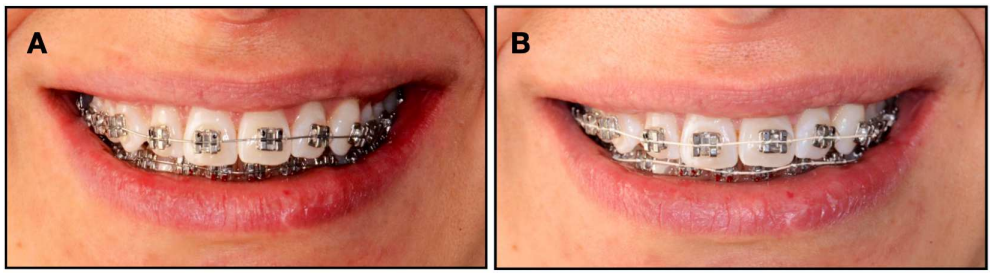
Double click or drag and drop.
All answers must be different and ranked in order

_____ A
_____ B
_____ C
_____ D
_____ E

Double click or drag and drop.
All answers must be different and ranked in order

Preference
Below we present some pairs of orthodontic devices asking you to select your preference from the answers:

Indicate your preference:



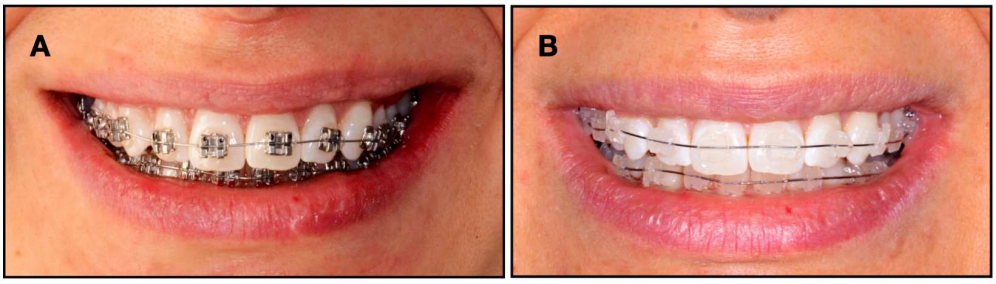
Indicate your preference:

◯ A
◯ B

Indique a sua preferência:

Appendix 1. Questionnaire pag. 6

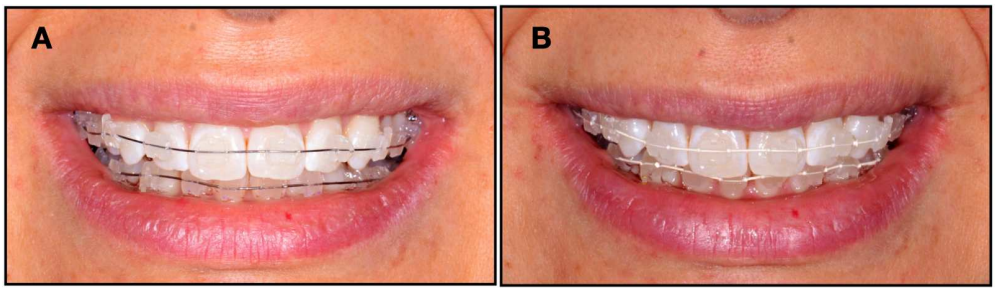
Indicate your preference:



Indicate your preference:

◯ A
◯ B

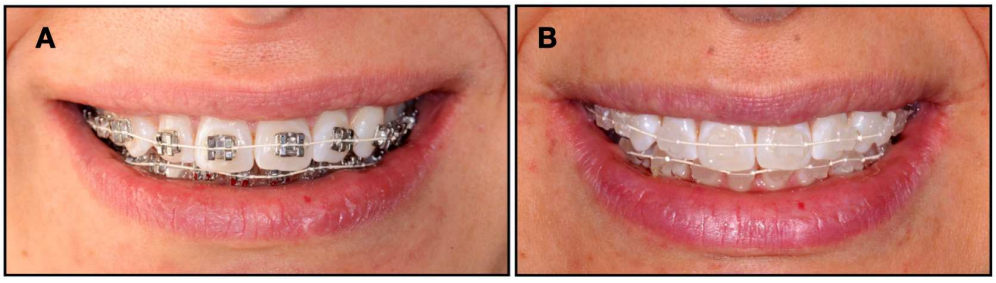
Indicate your preference:



Indicate your preference:

◯ A
◯ B

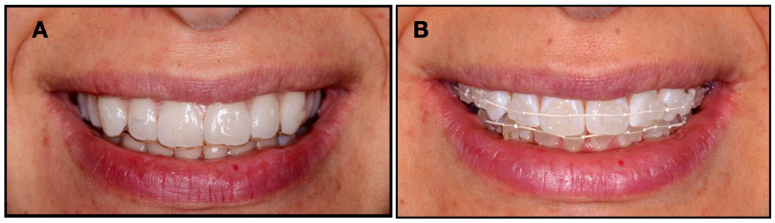
Indicate your preference:



Indicate your preference:

◯ A
◯ B

Indicate your preference:



Indicate your preference:

○ A
○ B

Taking into account the pandemic we live in and the mandatory use of a face mask, would you use this device?

Choose only one of the following:
Yes
No
Maybe

!Testo

Have you already undergone any orthodontic treatment?

Choose only one of the following:
Never
Yes, right now
Yes, but more than 2 years ago
Yes, but more than 5 years ago

What type of orthodontic appliance do you use / have you used?

Choose only one of the following:
Fixed Metallic
Fixed Aesthetic
Aligners

Do the results obtained coincide with those hoped for?

Choose only one of the following:
Yes
No
Approx

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Comissão de Ética

Exma. Senhora Investigadora
Teresa Maria da Costa Pinho

N/Ref.ª: CE/IUCS/CESPU-11/21 **Data:** 2021/maio/10

Assunto: - Parecer relativo ao Projeto de Investigação: 12/CE-IUCS/2021
- Título do Projeto: *"Aparelhos ortodônticos: Perceção estética e grau de satisfação"*
- Investigador responsável: Teresa Maria da Costa Pinho

Exma. Senhora,

Informo V. Exa. que o projeto supracitado foi analisado na reunião da Comissão de Ética do IUCS, da CESPU, CrI, no dia 06/05/2021.

A Comissão de Ética emitiu um parecer **favorável** à realização do projeto tal como apresentado.

Com os melhores cumprimentos.

CESPU
INSTITUTO UNIVERSITÁRIO
DE CIÊNCIAS DA SAÚDE
Rua Central de Gandra, 1317
4585-116 GANDRA PRD • Portugal
T. +351 224157100 • F. +351 224157101
www.cespu.pt

Prof. Doutor José Carlos Márcia Andrade
Presidente da Comissão de Ética do IUCS

Appendix 2. 1 Approvation by the Ethics Committee of the Instituto Universitário de Ciências da Saúde.