GRADUATION PROJECT

Degree in Dentistry

Correction of class II malocclusion in growing patients with aligners versus functional appliances. Survey election.

Madrid, academic year 2025/2026

Identification number: 82

ABSTRACT

Introduction: Class II malocclusion is a common anomaly requiring orthodontic intervention. Functional appliances and clear aligners are two major therapeutic options, whose clinical success depends heavily on patient compliance and acceptance. **Objective:** The main objective was to evaluate the perceptions, preferences, and decision-making criteria of dental students and professors at the European University of Madrid regarding the choice between clear aligners and functional appliances for growing patients. **Materials and methods:** A cross-sectional observational study was conducted using a structured Microsoft Forms questionnaire, distributed to the academic dental population to collect quantitative data on their aesthetic, functional, and psychosocial considerations. **Results:** The data show excellent awareness of both devices (over 93%). However, 97% of respondents anticipate significant social discomfort with a visible functional appliance, compared to high tolerance for clear aligners. Although 86% expect interference with their daily activities, preserving basic oral functions remains an absolute priority. Furthermore, 72% of participants display a notable optimism bias regarding their own capacity for treatment compliance. **Conclusions:** The choice of an orthodontic appliance is massively influenced by psychosocial and aesthetic factors. The clear preference for aligners is explained by the patients' desire to avoid the social stigma associated with visible functional appliances.

KEYWORDS

dentistry, orthodontics, class II malocclusion, clear aligners, functional appliances, growing patients

RESUMEN

Introducción: La maloclusión de clase II es una anomalía frecuente que requiere intervención ortodóntica. Los aparatos funcionales y los alineadores transparentes son dos opciones terapéuticas principales, cuyo éxito clínico depende en gran medida del cumplimiento y la aceptación por parte del paciente. **Objetivo:** El objetivo principal fue evaluar las percepciones, preferencias y criterios de decisión de los estudiantes y profesores de odontología de la Universidad Europea de Madrid en cuanto a la elección entre alineadores transparentes y aparatos funcionales para pacientes en fase de crecimiento. **Material y métodos:** Se realizó un estudio observacional transversal mediante un cuestionario estructurado en Microsoft Forms, distribuido a la población académica dental para recopilar datos cuantitativos sobre sus consideraciones estéticas, funcionales y psicosociales. **Resultados:** Los datos muestran un excelente nivel de conocimiento de ambos dispositivos (más del 93 %). Sin embargo, el 97 % de los encuestados anticipa una fuerte incomodidad social con un aparato funcional visible, frente a una gran tolerancia hacia los alineadores transparentes. Aunque el 86 % espera interferencias con sus actividades diarias, la preservación de las funciones orales básicas sigue siendo una prioridad absoluta. Además, el 72 % de los participantes muestra un notable sesgo de optimismo respecto a su propia capacidad para cumplir con el tratamiento. **Conclusiones:** La elección de un aparato de ortodoncia está fuertemente influenciada por factores psicosociales y estéticos. La clara preferencia por los alineadores se explica por el deseo de los pacientes de evitar el estigma social asociado a los aparatos funcionales visibles.

PALABRAS CLAVE

odontología, ortodoncia, maloclusión de clase II, alineadores transparentes, aparatología funcional, pacientes en crecimiento

ÍNDICE

1. INTRODUCTION 1

1.1. Definitions and concepts 1
1.1.1. Concept of Class II malocclusion 1
1.1.2. Concept of overjet 1
1.1.3. Concept of overbite 1
1.1.4. Subdivisions of class II malocclusions 2

1.2. Differences between dental, skeletal and mixed class II 2
1.2.1. Dental class II malocclusion 2
1.2.2. Skeletal class II malocclusion 2
1.2.3. Mixed of class II malocclusions 3

1.3. From a cephalometric point of view 3
1.3.1. Cephalometry as a diagnostic tool 3
1.3.2. Cephalometric landmarks 3
1.3.3. key cephalometric measurements 4

1.4. Epidemiology and clinical importance of class II 5

1.5. Use of clear aligners in Class II malocclusion and their biomechanical functioning 5
1.5.1. Rise of clear aligners 5
1.5.2. How clear aligners work 5
1.5.3. Clear aligners for class II treatments 6
1.5.4. Mandibular advancement system 6

1.6. Functional appliances 6
1.6.1. Definition and use of functional appliances 6
1.6.2. The Twin-block 7
1.6.3. The Herbst 7
1.6.4. The Bionator 7

2. OBJETIVE 8

2.1. General Objective 8

2.2. Specific Objectives 8

2.3. Research Question 8

2.4. PICO Question 8

3. MATERIAL AND METHODS 10

3.1. Study design 10

3.2. Study Population 10
3.2.1. Target population 10
3.2.2. Inclusion criteria 10

3.2.3. Exclusion criteria 10

3.3. Questionnaire design 11

4. RESULTS 12

5. DISCUSION 22

5.1. Prior awareness of functional appliances 22

5.2. Prior awareness of clear aligners 22

5.3. Understanding of treatment differences 22

5.4. Influence of external opinions on treatment choice 23

5.5. Psychosocial impact: Visible functional appliances vs. Clear aligners 23

5.6. Self-perceived capacity for treatment compliance 24

5.7. Anticipated interference with daily activities 24

5.8. Importance of Daily Functions: Speech and Eatin 25

5.9. Importance de l'hygiène et temps de nettoyage 25

5.10. General tolerance to pain 25

5.11. The duration-comfort trade-off 26

5.12. The financial factor and the concept of "added value" 26

5.13. Trust in the orthodontist vs. Initial preference 26

6. CONCLUSIONS 28

7. SUSTAINABILITY 29

8. REFERENCES 30

1. INTRODUCTION

1.1. Definitions and concepts

1.1.1. Concept of Class II malocclusion

From a clinical point of view, Angle Class II malocclusion can be defined as a molar relationship in which the mesiobuccal cusp of the upper first molar is located mesially to the buccal groove of the lower first molar. Usually, this discrepancy extends to the canine relationship, with the upper canine positioned mesially to the lower canine.(1)

1.1.2. Concept of overjet

Class II malocclusion is generally associated with an increased overjet. The term “overjet” refers to the distance (horizontally) between the incisal edge of the upper central incisor and the lower central incisor.(1) It is measured when the teeth are in centric occlusion. In a normal occlusion, the overjet typically has a value between 1 to 3 mm**,** allowing an adequate occlusion and a functional contact between anterior teeth.(1) In Class II cases, the measure of the overjet is usually superior to 4 mm.(2) This leads either to a pronounced protrusion of the upper incisors or a retrusion of the lower incisors, depending on the underlying origin. (3)

1.1.3. Concept of overbite

Class II malocclusion and increased overjet are commonly associated with an increased overbite**.**(4) The “overbite” can be defined as the vertical overlap of the upper and lower incisors**.**(4) In Class II division 2 cases for example, retroclined upper central incisors can produce a deep bite. Sometimes, it covers more than two-thirds of the lower incisor crown height. Conversely, Class II division 1 malocclusions generally present proclined upper incisors and a reduced or normal overbite.(5) Typically, Class II patients present a convex facial profile, either due to a retrusive mandible or a prominent maxilla. The nasolabial angle can appear more obtuse, and the lower facial third can seem shortened.(6) From a functional point of view, mandibular retrusion may affect the balance of the orofacial muscles and lips.(6) Therefore, when assessing Class II malocclusion we must analyze not only the molar and canine relationships but also the overjet, overbite, facial profile, and soft-tissue balance. All these elements together help to determine whether the malocclusion has a dental, skeletal or mixed origin, which directly influences the treatment approach.(7)(8)

1.1.4. Subdivisions of class II malocclusions

Class II malocclusions are typically subdivided into division 1 and 2 depending on inclination and position of superior incisors, which directly influences the treatment strategy.(9) In class II division 1, maxillary incisors are typically proclined, which induces an increased overjet, a frequent lip incompetence and a convex facial profile.(9)(10) This subtype is typically associated with mandibular retrognathia and it tends to respond better to functional appliance therapy when treated during the growth period.(9) In contrast, Class II Division 2 is characterized by retroclined maxillary central incisors. It is often accompanied by a deep overbite and an increased upper lip tonicity.(11) The overjet may appear reduced, making the diagnosis more complex and the treatment more difficult.(12) This division usually requires incisors decompensation before any orthopedic correction, and the therapeutic approach must be adapted to the type of malocclusion (dental or skeletal). (5)

1.2. Differences between dental, skeletal and mixed class II

1.2.1. Dental class II malocclusion

A dental Class II malocclusion results from a teeth malposition or misalignment rather than a discrepancy between the maxilla and the mandible. It typically includes a proclination of the upper incisors, a retroclination of the lower incisors, and/or a distalisation of mandibular teeth compared to the maxillary arch.(13) In this situation, the patient can presents an increased overjet despite a relatively normal skeletal base. The facial profile usually remains harmonious, without a marked mandibular retrusion or maxillary prominence as it can be the case with skeletal class II.(14) Cephalometric analysis usually shows normal ANB and Wits values**.** This indicates that the anomaly is restricted to the dental level. In dental Class II, treatment typically involves an orthodontic tooth movement (such as distalization of the upper molars, retraction of the incisors, or correction of anchorage discrepancies).(15) In this case, we can either use fixed appliances or clear aligners. The objective is to restore a proper occlusal relationships without modifying the skeletal framework.(15)

1.2.2. Skeletal class II malocclusion

On the other hand, skeletal Class II reflects a true maxillo-mandibular discrepancy. It can originates from a mandibular retrognathia, a maxillary prognathia, or a combination of both.(16) This condition typically originates from genetic,(17) but it can also be influenced by functional factors, such as atypical swallowing, oral breathing, or altered muscular patterns.(18) Clinically, skeletal Class II malocclusion is characterized by a convex facial profile, a retrusive chin, or an increased overjet.(16)

It also presents typical cephalometric values (ANB angle superior to 4°, increased Wits value or a reduced SNB angle) which indicates a posteriorly positioned mandible.(19)
In growing patients, the treatment aims to influence mandibular growth in order to obtain harmonious skeletal bases. This is commonly treated with functional appliances (Twin-block, Herbst, or Bionator), which posture the mandible forward promoting remodeling at the condylar level.(20)

1.2.3. Mixed of class II malocclusions

The mixed Class II is the most complex form. Both dental and skeletal factors coexist. For example, patients can present a mild mandibular retrusion associated with proclined upper incisors, thus increasing the overjet.(21) In this case, the orthodontist must determine the main etiologic component to establish the most suitable treatment plan targeting the predominant factor. The therapeutic approach is usually multifactorial. We must combine orthopedic correction during growth with orthodontic tooth movement.(22)

Understanding whether a Class II malocclusion is dental, skeletal, or mixed is crucial to determine the mechanism of correction, to predict the stability of results, and to prevent relapses. A correct diagnosis, based on clinical examination and cephalometric analysis is necessary to ensure that the treatment is appropriate and esthetically harmonious.(22)

1.3. From a cephalometric point of view

1.3.1. Cephalometry as a diagnostic tool

Cephalometry is an essential diagnostic tool for us, as it allows the precise evaluation of the skeletal, dental and soft-tissue structures. When using standardized lateral radiographs and a series of landmarks, we can obtain objective measurements of the anatomical relationships between the maxilla and the mandible. This way, we determine whether a Class II malocclusion originates from dental malposition, skeletal discrepancy or both.(23)(24)

1.3.2. Cephalometric landmarks

Here are the most commonly used skeletal landmarks for cephalometric interpretation:
Point A (subspinale) : It is the deepest point on the curvature between the anterior nasal spine and the maxillary alveolar process. It represents the anteroposterior position of the maxilla.
Point B (supramentale) : This is the deepest point on the curvature between the mandibular alveolar process and the pogonion. It represents the anteroposterior position of the mandible.

Nasion (N): this point serves as reference for the cranial base. It is the anterior point of intersection between the frontal and nasal bones.

Sella (S): It is the midpoint of the sella turcica, we use it to construct the Sella-Nasion plane which is a stable cranial reference line.

Condylion (Co) and Gnathion (Gn): they are the landmarks used to determine the mandibular length and the growth direction.

these points allow the construction of key cephalometric measurements that we use to define Class II malocclusion.(23)

1.3.3. key cephalometric measurements

The main measurements we use to diagnose class II are the following :

ANB angle : It quantifies the relationship between the maxilla (point A) and the mandible (point B) using the Nasion as a reference. A normal ANB value ranges from 1° to 3°. An ANB angle superior to 4° is considered a skeletal Class II (due to maxillary protrusion, mandibular retrusion or both).(25) However, this value can be influenced by the cranial base morphology. Therefore, complementary measurements are often necessary.

Wits appraisal : it measures the anteroposterior relationship between upper and lower jaws, projecting points A and B onto the functional occlusal plane. It is a more reliable value than the ANB angle, as the reference (occlusal plane) is less affected by some cranial/jaw rotations. In males, normal values are around -1 mm, and around 0 mm in females. A value greater than +2 mm is associated with a skeletal Class II malocclusion. The Wits appraisal is particularly useful when the ANB angle may be misleading, as it avoids the variability related to the cranial base angulation.(26)

SNA and SNB angles : SNA angle indicates the anteroposterior position of the maxilla (relative to the anterior cranial base). While the SNB angle reflects the mandibular position.(25) Therefore, a reduced SNB indicates a mandibular retrusion. The difference between SNA and SNB allows us to understand whether a Class II has predominantly a maxillary, mandibular, or mixed origin.

Mandibular length (condylion-gnathion) : The linear measurement between Condylion (Co) and Gnathion (Gn) gives us information about the mandibular length. A shorter Co-Gn is associated with mandibular retrognathia, which is a common feature of skeletal Class II. This measurement is also used to assess changes in mandibular growth during the treatment, typically when functional appliances or mandibular advancement systems are used.

1.4. Epidemiology and clinical importance of class II

According to the WHO, malocclusion is considered the third priority in term of oral health diseases. In primary dentition, Angle Class II malocclusion affects 23.29% of the population worldwide. In mixed dentition, it represents 29% of the population, and in permanent dentition : 24.7%. Untreated class II leads to several problems. It can affect different oral functions such as chewing, swallowing and speaking skills. It can also impacts airways and respiratory patterns in some cases. Moreover, temporomandibular joint can be affected and finally, it can also impact dentofacial aesthetics and subsequently, the patient self-confidence. (27)

An early orthodontic treatment, allows us to act on the patient while he/she is still growing (in mixed/early permanent dentition). Acting during the pre-pubertal and pubertal period is crucial. Functional appliances or mandibular advancement systems can thus be used to modify mandibular growth, achieving anterior repositioning of the mandible and a more balanced skeletal relationship.(28)

1.5. Use of clear aligners in Class II malocclusion and their biomechanical functioning

1.5.1. Rise of clear aligners

Clear aligners have increased in popularity over the last decade. They can be considered as a modern alternative to fixed appliances. They provide esthetic, comfort and a removable treatment option. Their use has particularly increased among adolescents and young adults seeking discreet orthodontic care. At first, this treatment option was limited to mild crowding and alignment corrections. Some technological advancements (especially digital planning, optimized attachments, and mandibular advancement features) have expanded their indications and it can now be used for treating more complex malocclusions cases, including Class II malocclusions

1.5.2. How clear aligners work

From a biomechanical perspective, clear aligners function through a series of sequential, digitally programmed tooth movements. Each aligner is designed to produce small, controlled displacements (usually between 0.1 and 0.25 mm per aligner) by applying forces to specific surfaces of the teeth. Treatment planning is performed digitally using a 3D software that enables the precise visualization of dental movements and simulation of distalization, rotation control, vertical corrections, and arch coordination.

1.5.3. Clear aligners for class II treatments

In the context of Class II malocclusion, clear aligners aim to correct sagittal discrepancy primarily through dentoalveolar mechanisms. The most common strategies include : a distalization of the upper molars and premolars, often staged consecutively(29)(from molars to anterior teeth), a retraction or torque control of upper incisors to reduce overjet, a mesialization or advancement of lower dentition when needed and finally an anchorage reinforcement using optimized attachments or elastics(29). Elastics play a central role in Class II correction with aligners. They are often used between the upper canines and lower molars to create a force that shifts mandibular dentition forward and maxillary dentition backward, thus improving the molar and canine relationships. However, this approach is largely dental and it relies a lot on patient compliance.

1.5.4. Mandibular advancement system

More recently, systems such as Invisalign Mandibular Advancement have incorporated precision wings, a feature designed to advance the mandible when the patient wears the aligner, thus replicating the action of functional appliances. Although this innovation improves the ability to treat Class II growing patients, studies suggest that the skeletal effects remain moderate, with the main improvements occurring at the dentoalveolar level rather than a true mandibular growth stimulation. therefore, aligner therapy is more suited for dental or mixed Class II cases, while real skeletal discrepancies may require traditional functional appliances during growth or orthognathic approaches in adulthood..(30).(31)(32)

1.6. Functional appliances

1.6.1. Definition and use of functional appliances

Functional appliances are orthodontic devices that are made to modify the growth and improve the skeletal relationship between the maxilla and mandible. They work by positioning the mandible in an anterior position. This produces a series of neuromuscular, skeletal, and dentoalveolar adaptations. These types of appliances are especially effective in growing patients, during the pre-pubertal and pubertal period. Over time, functional appliances create a remodeling of the condyle and the glenoid fossa. When using this type of appliance for Class II treatment, the main objective is to correct skeletal discrepancies, rather than just acting on dental aspects. By holding the mandible forward for extended periods, They promote a more harmonious maxillo-mandibular relationship.(33)

1.6.2. The Twin-block

The Twin-block is a removable device composed of two interlocking bite blocks, it positions the mandible anteriorly during function. When it is used at the optimal growth stage, it produces both dento-alveolar and modest skeletal effects, including condylar adaptation and improved mandibular projection. (34)

1.6.3. The Herbst

The Herbst appliance is a fix(31)ed functional device that maintains a continuous mandibular advancement through a rigid telescopic mechanism that connects both the upper and lower arches. Its efficacy does not depends on patient compliance, allowing a more predictable and reproducible dento-skeletal changes. many studies have reported significant improvements in SNB and ANB angles with increased mandibular length (Co–Gn)**.**(34)

1.6.4. The Bionator

The Bionator is a removable device. It works the same way as the Twin-Block, with a forward-posturing principle but is usually considered a less aggressive appliance, as it induces smaller skeletal changes while maintaining patient comfort and ease of wear.(35)

2. OBJETIVE

2.1. General Objective

The primary objective of this study is to evaluate the perceptions, preferences, and decision-making criteria of dental students and professors at the European University of Madrid regarding the selection of orthodontic appliances for the correction of Class II malocclusion, with a specific comparison between clear aligners and functional appliances in growing patients.

2.2. Specific Objectives

1. To assess the level of knowledge and initial awareness of potential patients regarding clear aligners and functional appliances used for the correction of Class II malocclusion.
2. To evaluate the aesthetic, social, and psychological impact associated with each type of orthodontic appliance, including perceived embarrassment, visibility, and social acceptance.
3. To analyze the perceived influence of daily life constraints, such as speech, eating, school or work activities, and treatment compliance, on patients' treatment preferences.
4. To investigate the importance attributed by patients to oral hygiene maintenance, comfort, and pain tolerance during orthodontic treatment.
5. To determine how treatment duration, cost, and perceived value influence the choice between clear aligners and functional appliances.
6. To assess the degree of trust placed in the orthodontist's recommendation, even when it differs from the patient's initial preference.

2.3. Research Question

Among potential orthodontic patients requiring correction of Class II malocclusion, which factors most strongly influence the preference for clear aligners versus functional appliances, considering aesthetic, psychological, functional, economic, and lifestyle-related criteria?

2.4. PICO Question

- P (Population): Potential orthodontic patients or parents/legal guardians of growing patients with Class II malocclusion
- I (Intervention): Orthodontic treatment using clear aligners
- C (Comparison): Orthodontic treatment using functional appliances

- O (Outcome): Patient-reported perceptions, preferences, and criteria influencing treatment selection

Growing patients were defined as individuals who have not completed craniofacial growth and therefore retain potential for skeletal modification of Class II malocclusion. Orthodontic studies and recent systematic reviews of both functional appliances and mandibular advancement aligners include pediatric and adolescent patients, typically starting treatment between approximately 8 and 14 years of age, which corresponds to the pre-pubertal and pubertal growth phases most responsive to orthopedic modulation of mandibular position and dentoskeletal effects.(36)(37) This evidence supports the inclusion of patients aged 7–14 years as the target population for this study.

3. MATERIAL AND METHODS

3.1. Study design

This study was conducted as a cross-sectional, questionnaire-based observational study. The aim was to investigate patients' perceptions, preferences, and decision-making criteria regarding orthodontic treatment options for the correction of Class II malocclusion, with a specific comparison between clear aligners and functional appliances.

A quantitative approach was adopted in order to collect standardized responses and allow descriptive and comparative analysis of patient-reported outcomes.

3.2. Study Population

3.2.1. Target population

The target population consisted of potential orthodontic patients and parents or legal guardians of growing patients, who may be candidates for orthodontic treatment. The study focused on perceptions and expectations rather than on previously experienced clinical outcomes.

3.2.2. Inclusion criteria

Patients from 7 to 14 years old (36)(37)
Growing patients
articles published within the last 15 years
Patients treated with clear aligners or funcional appliances
Orthodontic articles

3.2.3. Exclusion criteria

Patients under 7 years old
Patient over 14 years old
Non-growing patients
non-relevant articles
articles published more than 15 years ago
General dentistry articles

3.3. Questionnaire design

A self-administered questionnaire was developed for this study, in accordance with the study objectives and the orthodontic literature. The questionnaire was created using Microsoft Form and distributed electronically via email and through a Whatsapp group to dental students and professors of the European University of Madrid.

The questionnaire was divided into the following sections:

1. General knowledge of orthodontic treatments
2. Perception of clear aligners
3. Perception of functional appliances
4. Aesthetic, social, and psychological considerations
5. Daily life impact and compliance expectations
6. Pain, comfort, and oral hygiene considerations
7. Treatment duration, cost, and trust in professional recommendation

Most of the questions were closed-ended, using multiple-choice formats and Likert scales (ranging from 1 to 5) to facilitate quantitative analysis.

3.4. Data collection and ethical considerations

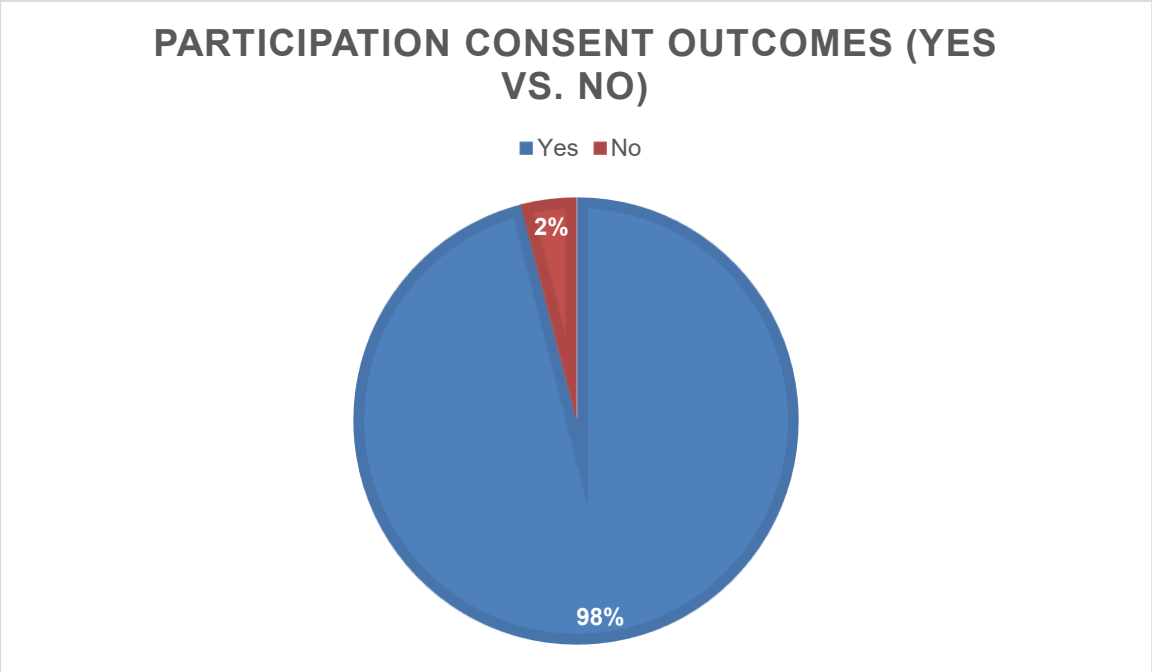
Data were collected over one month using Micorsoft Forms. Responses were automatically recorded. Participants were required to read an information statement explaining the purpose of the study and to provide informed consent before accessing the questionnaire.

The Microsoft Form questionnaire used in this study was reviewed and approved by the Ethics Committee prior to distribution, under approval number OD.053/2526.

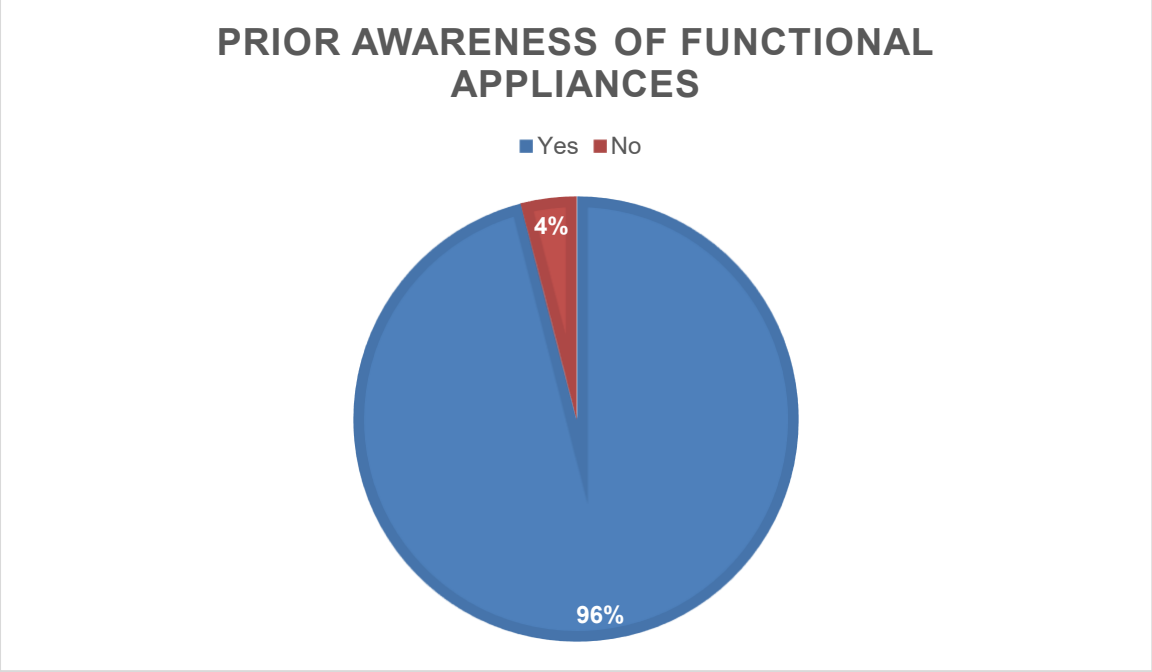
The ethics committee approval document as well as the informed consent form used in this study are included in the annexes.

4. RESULTS

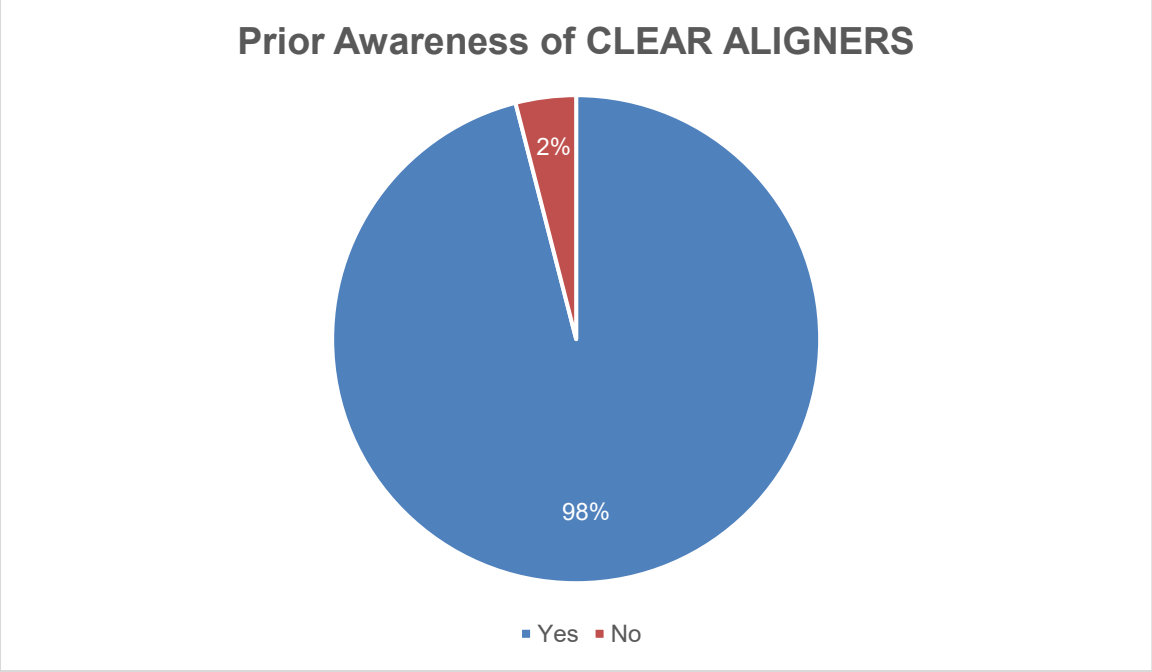
1 - Do you give your consent to participate in the survey ? (after reading the informed consent)



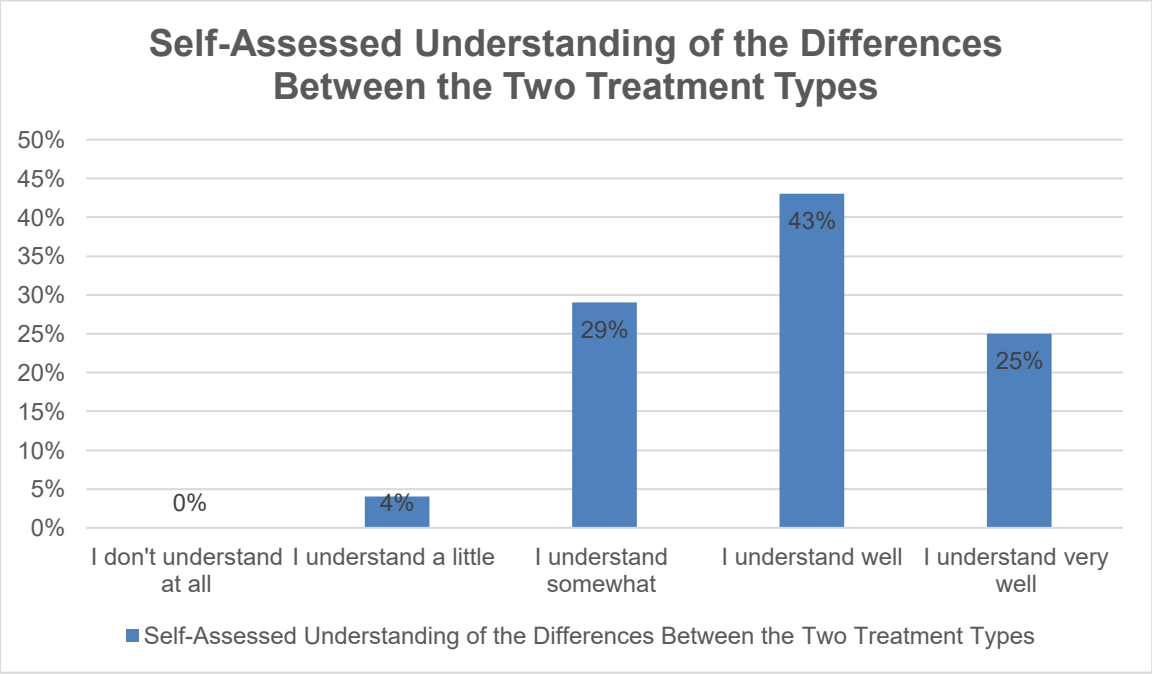
2 - Before starting this questionnaire, have you ever heard about functional appliances ?



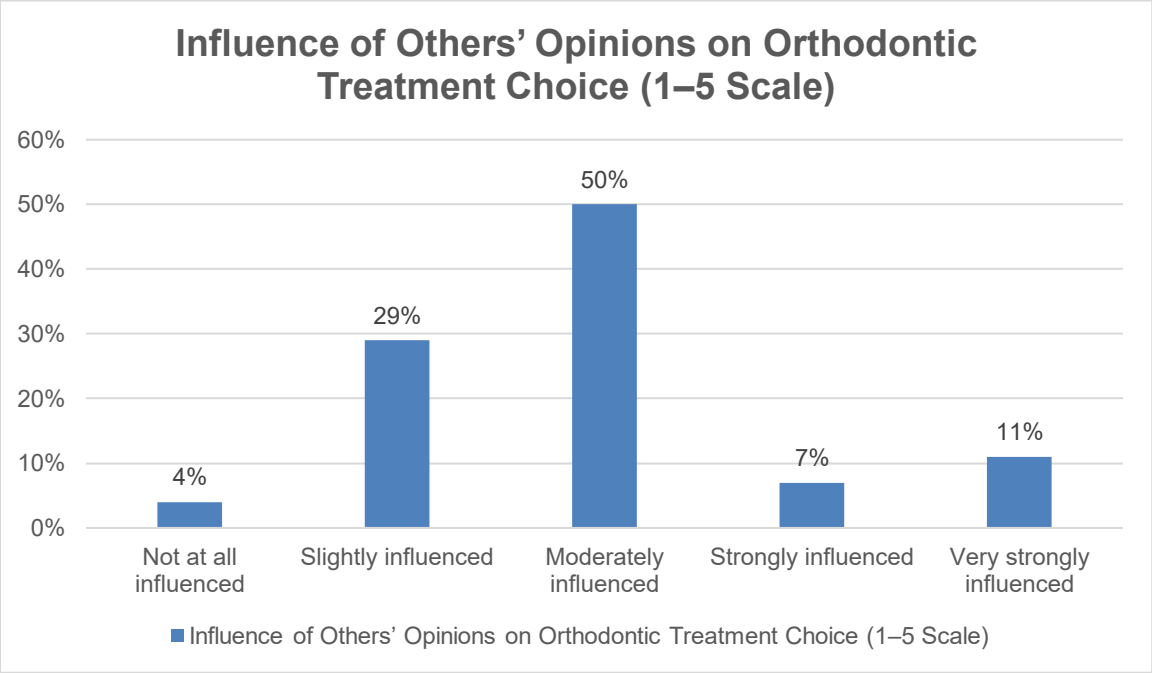
3 - Have you ever heard about clear aligners ?



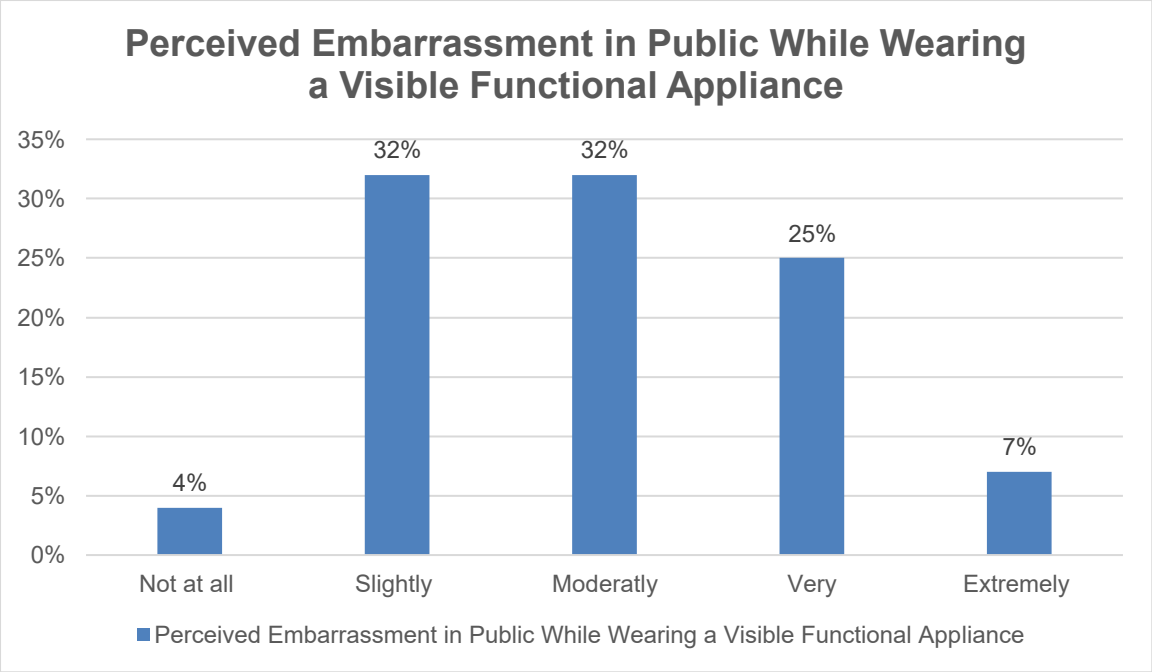
4 - On a scale from 1 to 5 how well do you think you understand the differences between these two types of treatment ?



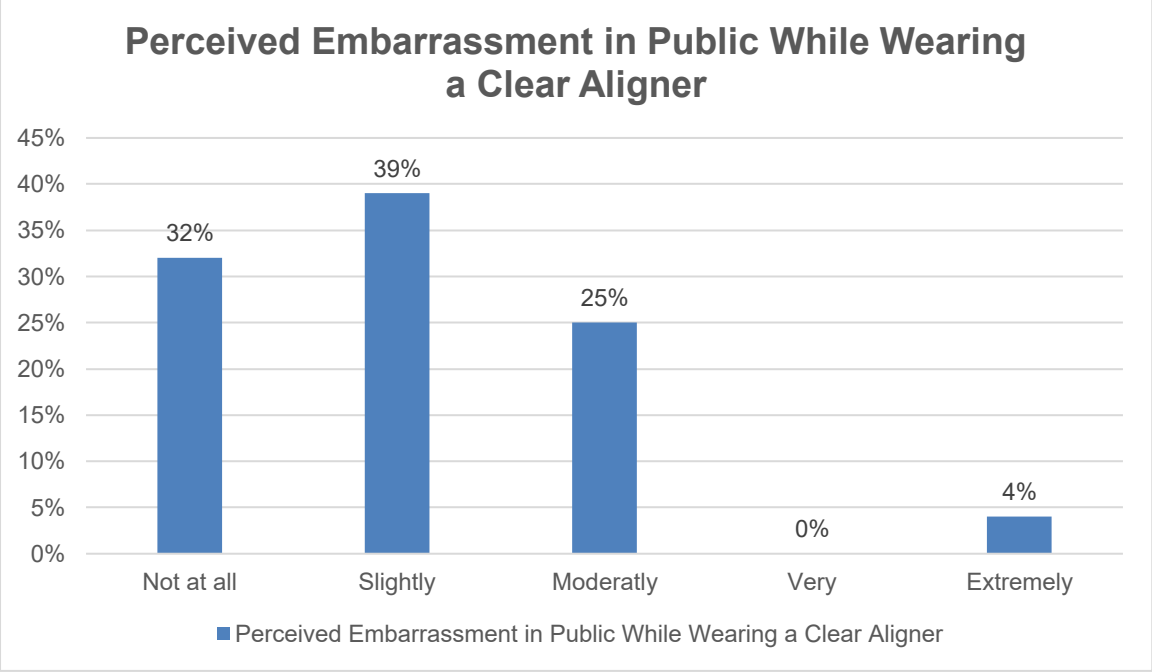
5 - On a scale from 1 to 5, to what extent does the opinion of others (family, friends, colleagues, classmates) influence your choice of orthodontic treatment ?



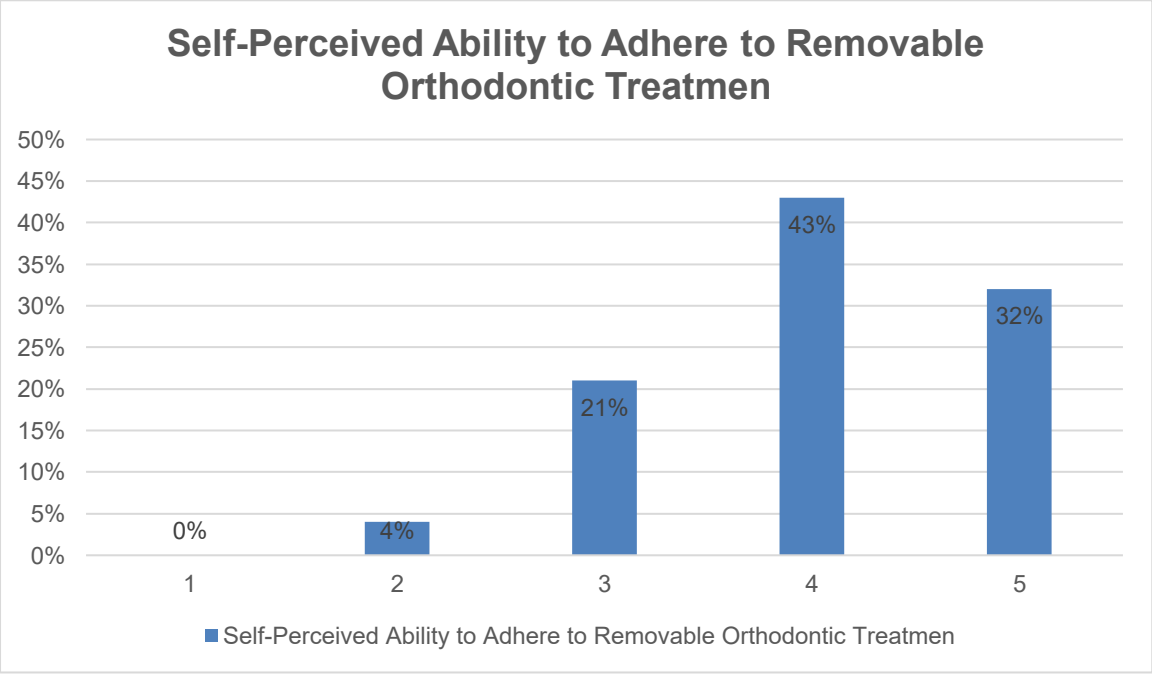
6 - Would you be embarrassed to speak, smile or laugh in public while wearing a visible functional appliance ?



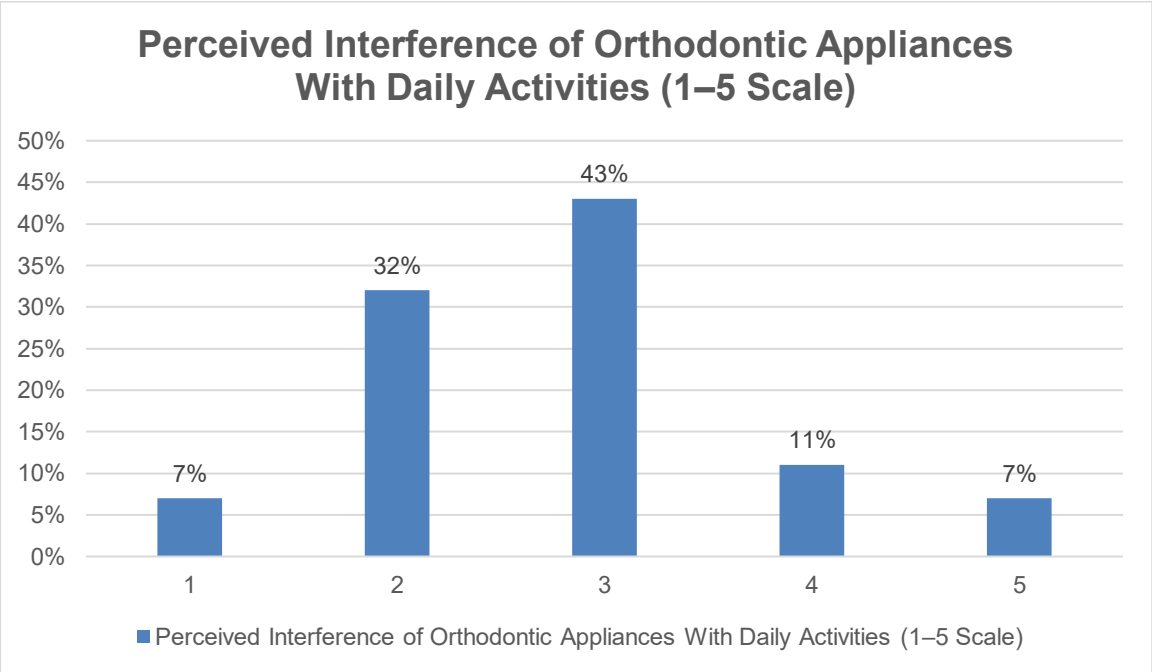
7 - Would you be embarrassed to speak, smile, or laugh in public while wearing a clear aligner?



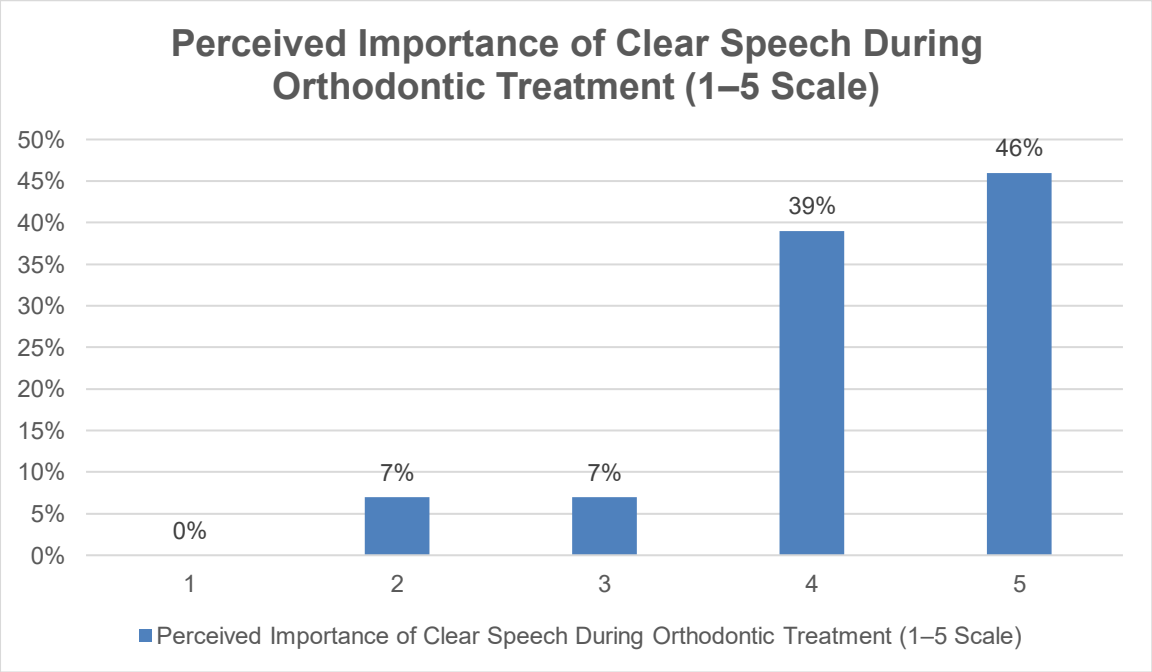
8 - On a scale from 1 to 5, how capable do you consider yourself of following the treatment plan properly and wearing the appliance consistently as recommended?



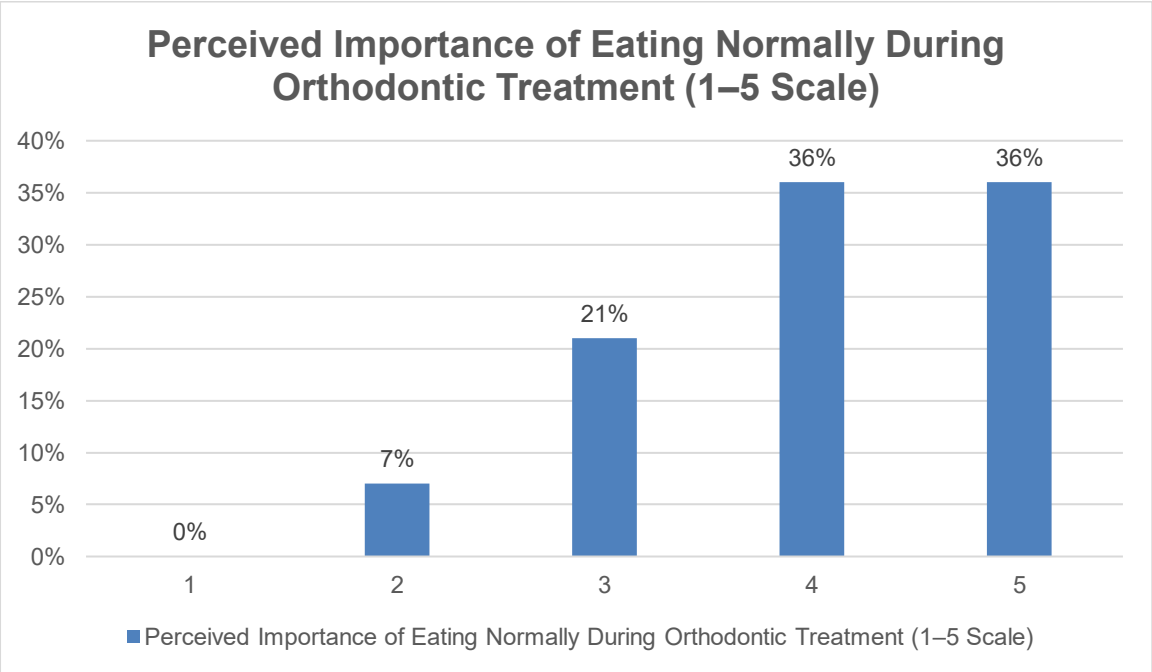
9 - On a scale from 1 to 5, to what extent could wearing an orthodontic appliance interfere with your daily activities (school, work, social activities) ?



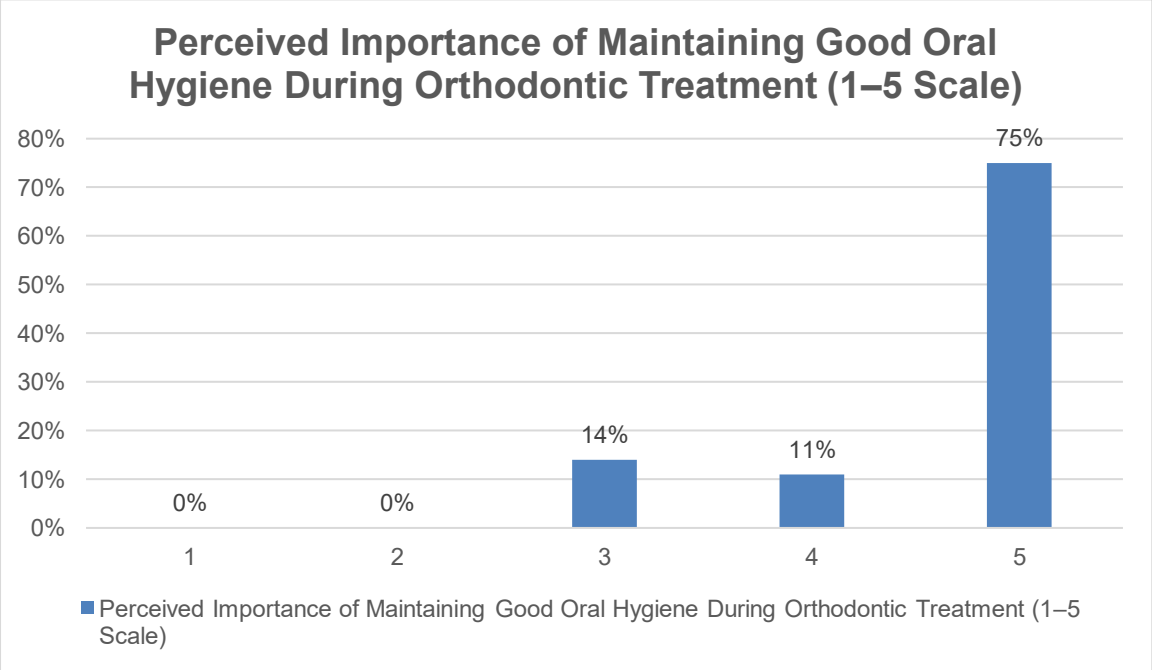
10 - On a scale from 1 to 5, how important is the ability to speak clearly during orthodontic treatment to you ?



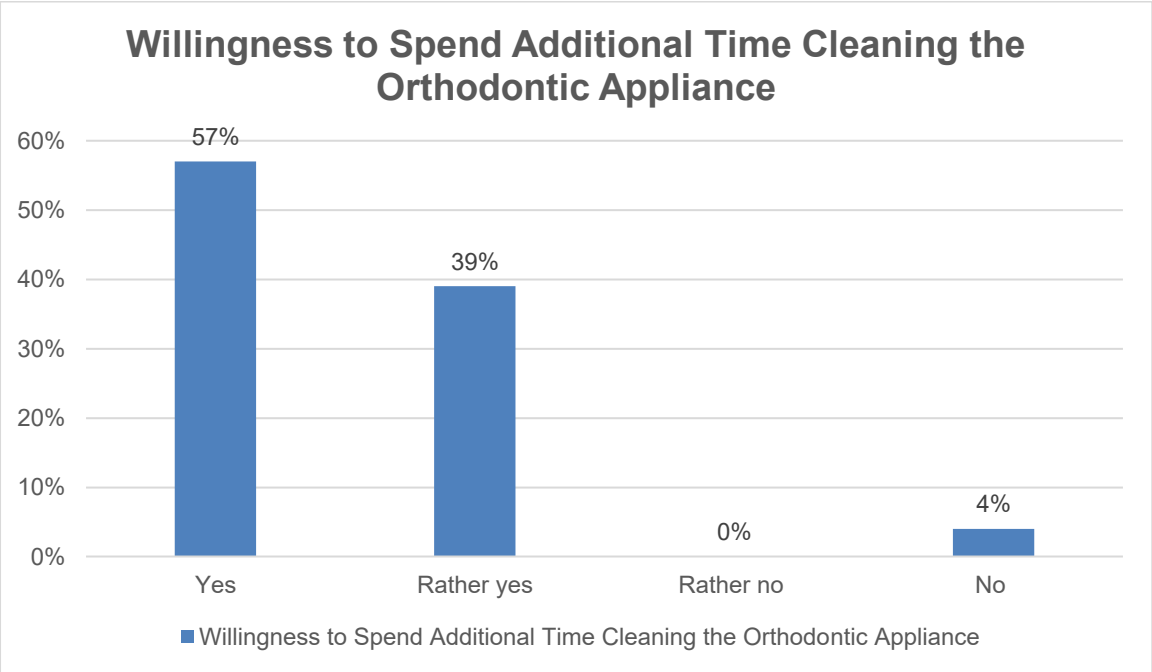
11 - On a scale from 1 to 5, how important is the ability to eat normally during orthodontic treatment to you?



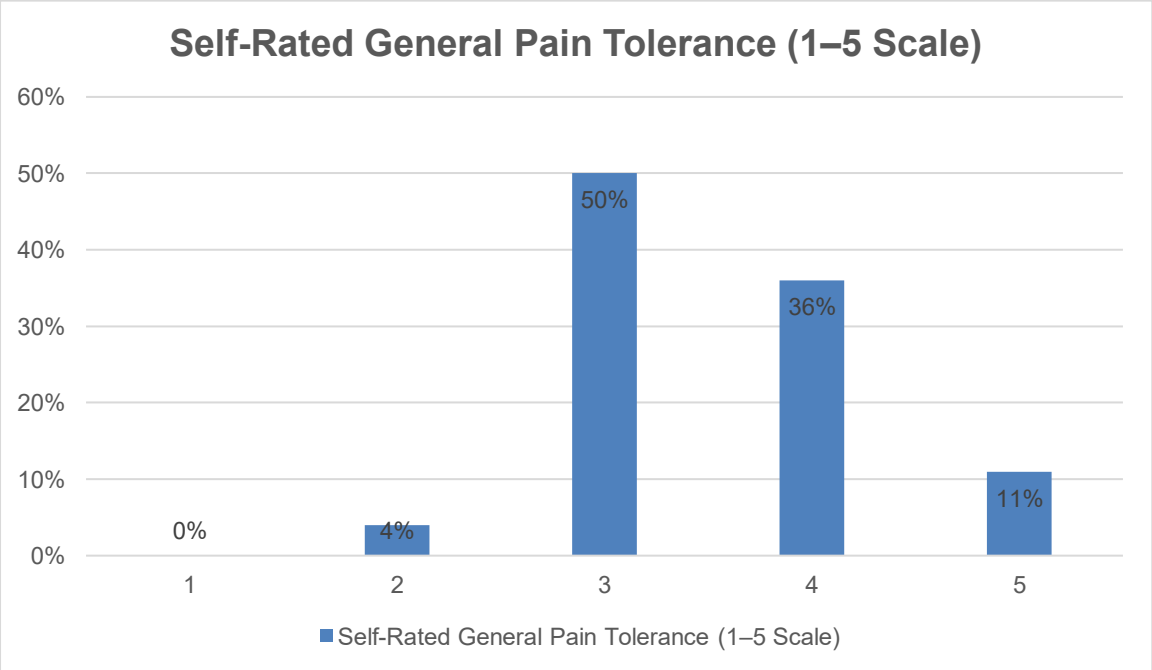
12 - On a scale from 1 to 5, how important is the ease of maintaining good oral hygiene during orthodontic treatment to you ?



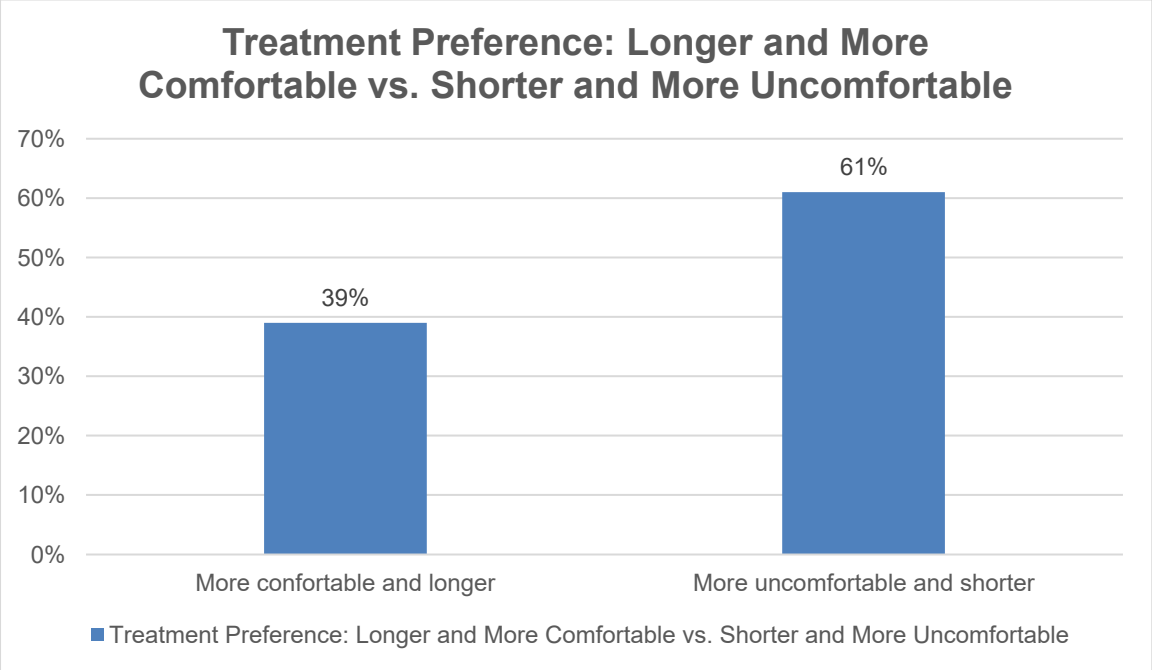
13 - Would you be willing to spend more time each day cleaning your appliance if it improves the final treatment outcome?



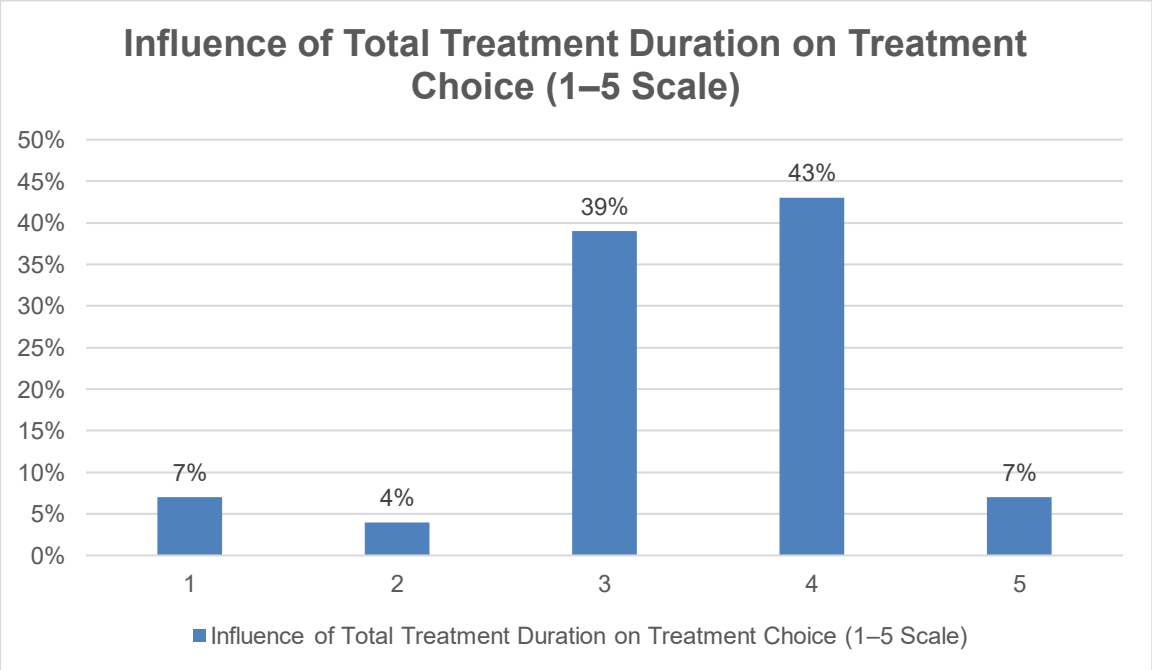
14 - On a scale from 1 to 5, how would you rate your general tolerance to pain?



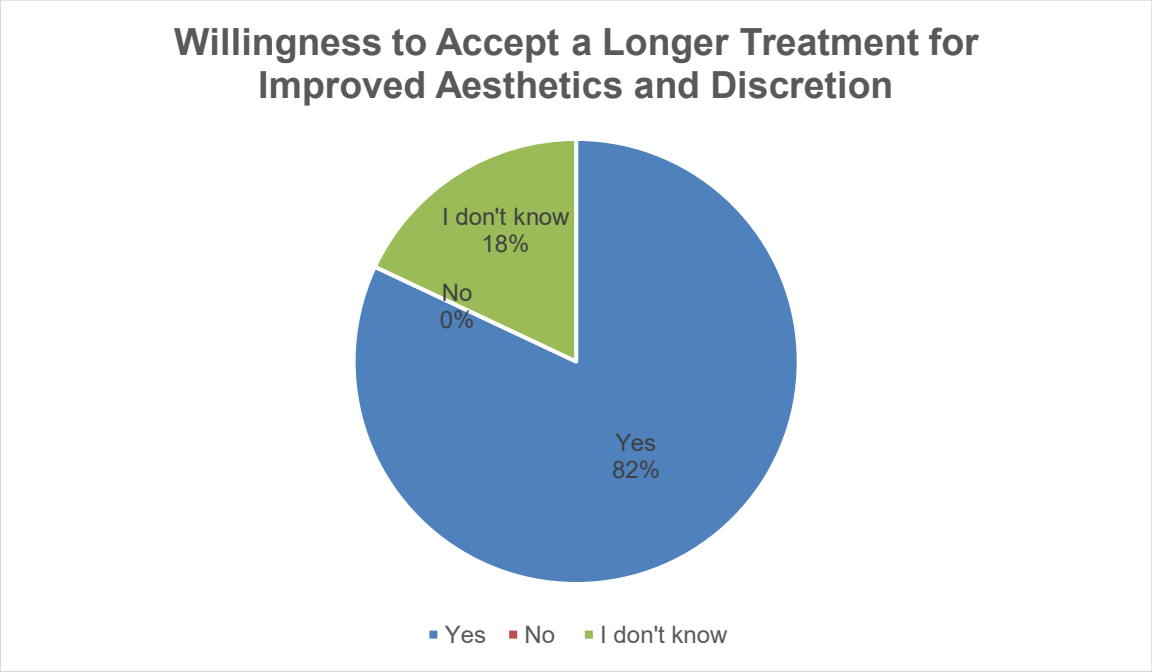
15 - Would you prefer a slightly longer but more comfortable treatment, or a shorter but more uncomfortable one?



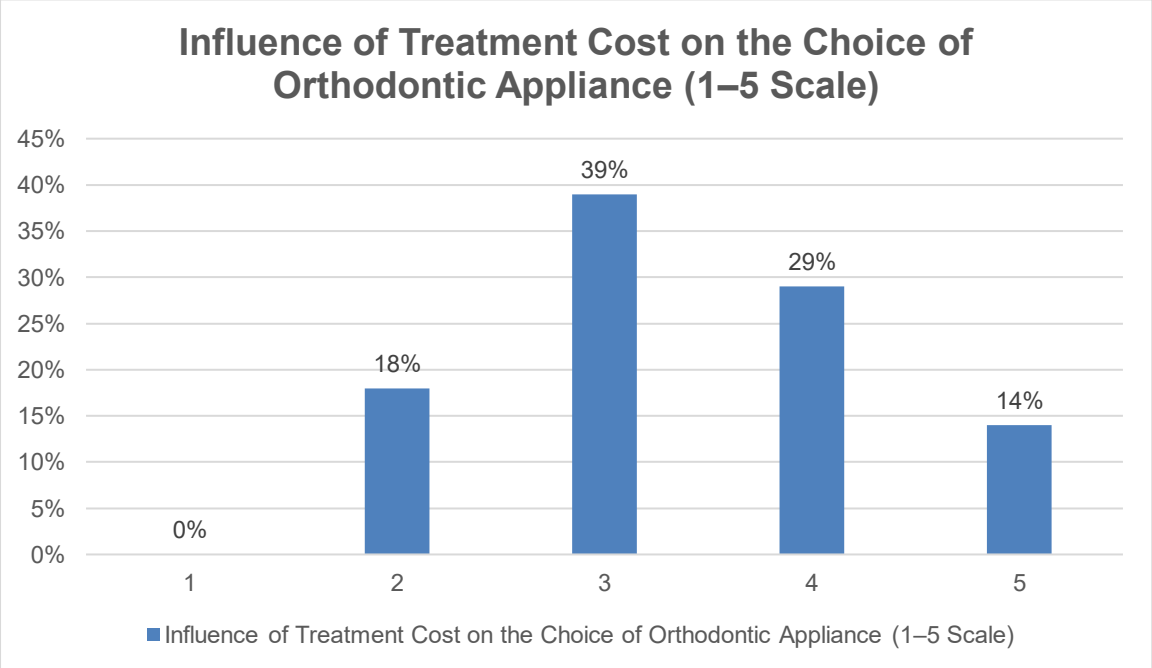
16 - On a scale from 1 to 5, to what extent does the total treatment duration influence your choice?



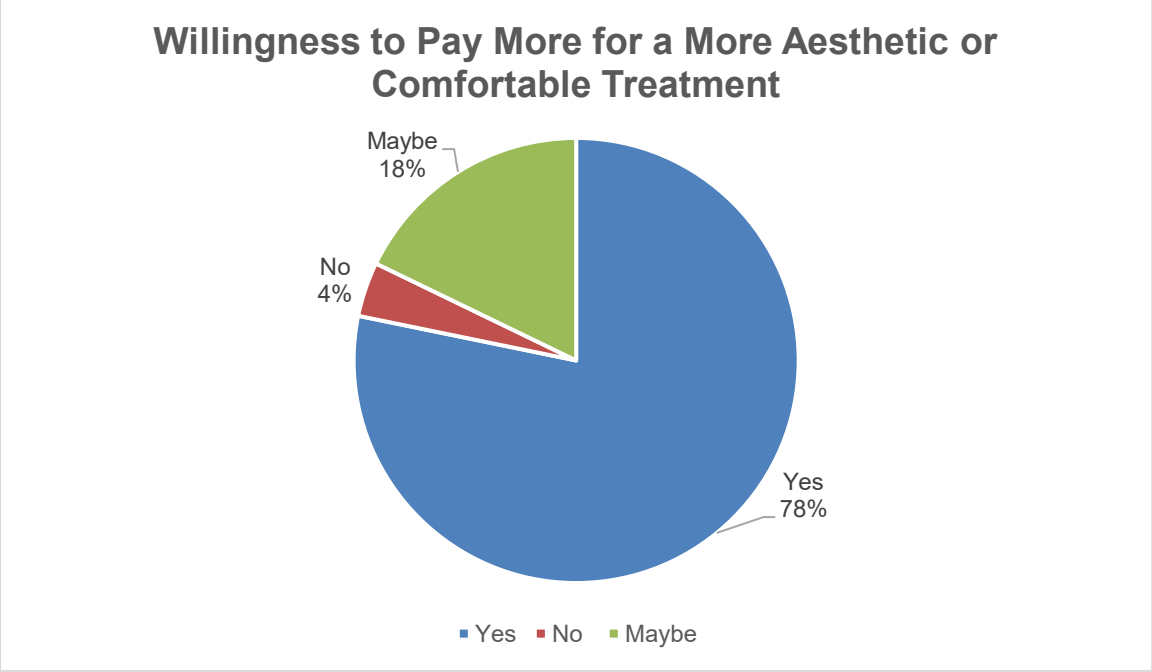
17 - Would you be willing to accept a longer treatment if it is more aesthetic and discreet?



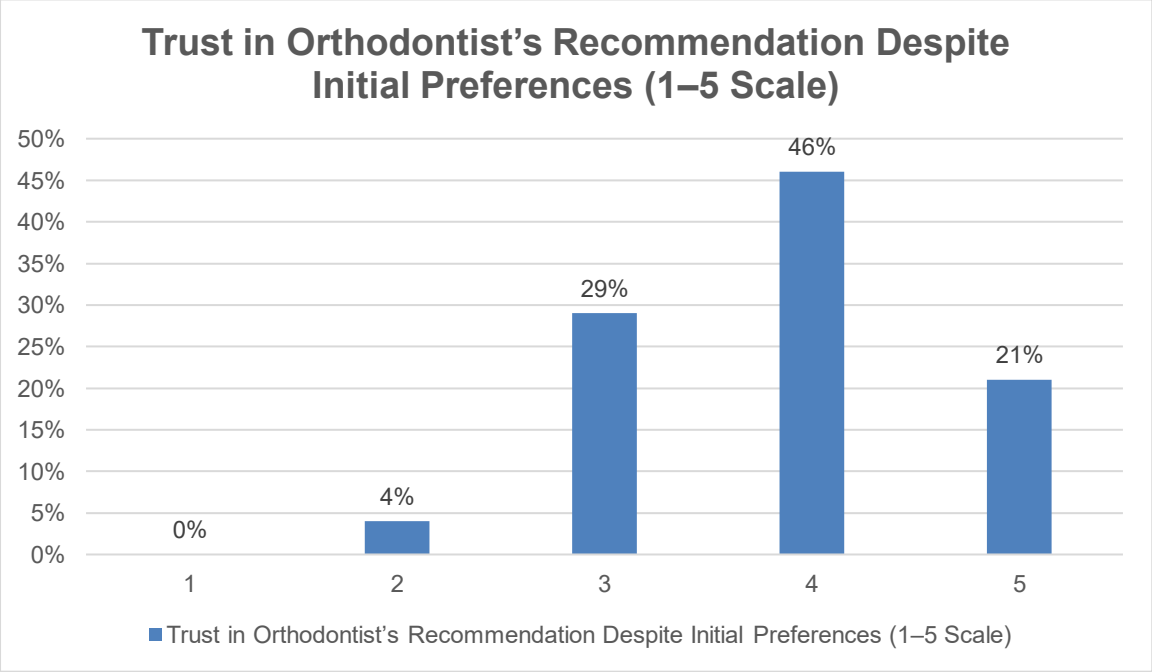
18 - **On a scale from 1 to 5, to what extent does the cost of treatment influence your choice of orthodontic appliance ?**



19 - Would you be willing to pay more for a more aesthetic or more comfortable treatment ?



20 - On a scale from 1 to 5, to what extent would you trust your orthodontist's recommendation, even if it does not match your initial preference ?



5. DISCUSION

5.1. Prior awareness of functional appliances

“Before starting this questionnaire, have you ever heard about functional appliances ?” : the percentage of people who have heard of functional appliances is 94%. This percentage is relatively high. This can be explained by the profile of the people in the sample. Indeed, they are exclusively dental students and professors for whom functional appliances are part of the theoretical teaching provided during their studies. However, there is a major recruitment bias: this percentage does not represent the reality of the general public or parents of patients, but that of a population of experts. Furthermore, in academic settings, respondents tend to overestimate their actual knowledge in order to meet the expectations of their course, this is called the “self-assessment bias”. A recent study(38) shows that while medical students are much more aware of treatments than others, this awareness often remains superficial and does not guarantee an understanding of treatment mechanisms. In my study, the 6% who answered “No” could correspond to students at the beginning of their studies (1st or 2nd year) who have not yet covered clinical orthodontics.

5.2. Prior awareness of clear aligners

“Before starting this questionnaire, have you ever heard about clear aligners ?” : the results to this question (93% of “yes”) is quit similar to the previous one about functional appliances. This result confirm that both technologies are now equally established in the modern dental curriculum of the European University of Madrid. However, this result may be subject to a "Media Exposure Bias". Unlike functional appliances, which are concepts that are primarily learned in dental school, clear aligners are subject to intense « Direct-To-Consumer » (DTC) marketing, which may inflate the perceived knowledge of the respondents.

5.3. Understanding of treatment differences

“On a scale from 1 to 5 how well do you think you understand the differences between these two types of treatment ?” : regarding the understanding of the differences between functional appliances and clear aligners, 73% of respondents reported high confidence (42% "well" and 31% "very well"). This reflects a strong perceived competence within the UEM academic population. However, this should be nuanced by the "Dunning-Kruger Effect," where students may overestimate

their mastery of complex biomechanics due to a lack of extensive clinical experience.
In addition, there is a significant gap between digital predictability and clinical reality. They emphasize that while software can simulate complex Class II movements, the actual success depends on biological responses that the virtual plan cannot guarantee. This suggests that the high confidence observed in the survey might be influenced by a false sense of security provided by digital planning tools, which act as a guide rather than a guaranteed orthopedic result.(39)

5.4. Influence of external opinions on treatment choice

"On a scale from 1 to 5, to what extent does the opinion of others (family, friends, colleagues, classmates) influence your choice of orthodontic treatment ?" : the answers to this question show that the majority of respondents (89%) would be influenced by the opinions of others (friends, family, coworkers, etc.) when selecting an orthodontic treatment. Among them, 66% reported being moderately to very strongly influenced, while only 11% claimed to be "not influenced at all." These results suggest that the decision-making process involved in selecting an orthodontic appliance is not based solely on clinical or biomechanical considerations, but is strongly shaped by the patient's social environment.
These findings are consistent with recent literature. In a qualitative study conducted by Johal et al. in 2024, the authors found that "social factors and appliance features influence an adult's decision-making in selecting a specific orthodontic appliance"(40). Their study highlights the significant role of psychosocial factors in patients' choice of orthodontic treatment modality. Therefore, the preference for discreet appliances such as clear aligners over more visible functional appliances can largely be explained by the need for social acceptance (40).

5.5. Psychosocial impact: Visible functional appliances vs. Clear aligners

"Would you be embarrassed to speak, smile or laugh in public while wearing a visible functional appliance ?" and "Would you be embarrassed to speak, smile or laugh in public while wearing a clear aligner?". When we compare the responses to questions 5 and 6, a marked contrast emerges regarding the psychosocial impact of the two treatments. When asked about wearing a visible functional appliance, 97% of respondents admitted they would feel some degree of embarrassment speaking, smiling, or laughing in public. On the other hand, the social perception of clear aligners is largely positive: 72% of participants would feel little to no embarrassment and almost no one reported a severe embarrassment.

This gap illustrates the psychological barrier associated with traditional visible orthodontics. The volume and the high visibility of functional appliances trigger a social anxiety, which directly compromise the patient compliance which is the most critical factor for the success of any removable orthopedic device. This aligns with the article “Adult orthodontics, motivations for treatment, choice, and impact of appliances: A qualitative study” who highlight that functional and psychological factors are strong influencers in the patients' treatment experience.(40)
Moreover, recent clinical evaluations confirm that patients treated with clear aligners report a significantly better psychosocial experience, showing higher self-esteem, better aesthetic self-perception, and fewer social interaction impairments compared to those wearing traditional visible appliances. Therefore, the contemporary shift toward clear aligners is largely driven by this need to avoid social stigma, prioritizing the patient's psychosocial well-being to ensure cooperation and treatment success.(41)

5.6. Self-perceived capacity for treatment compliance

The survey reveals that 72% of respondents consider themselves highly capable (scores of 4 and 5) of strictly following their orthodontic treatment, while only 3% express doubt (score of 2). These results reflect significant optimism and high self-confidence regarding their own discipline.
However, studies show that this self-assessment is often different from the clinical reality. The systematic review by Nahajowski and al. (2022)(42), which measured the actual patients cooperation, demonstrates that effective wear time is consistently lower than the orthodontist's recommendations.
Therefore, although patients have good intentions, objective data proves that they greatly overestimate their compliance. This “optimism bias” explains why clinicians cannot rely solely on patient reports, reinforcing the value of treatment options that are less dependent on human cooperation to ensure clinical effectiveness.

5.7. Anticipated interference with daily activities

The answers to the survey show that 86% of respondents think that wearing braces would interfere with their daily lives (school, work, social life). Only 14% do not anticipate any discomfort. These expectations are realistic when compared to the study entitled “Impact of orthodontic treatment on OHRQoL of adolescents: a longitudinal study”(43) . According to Guerino et al. (2024), the introduction of orthodontic appliances causes physical and psychological changes (pain, discomfort,

difficulty chewing). This impacts the daily life at the beginning of the treatment. However, the study shows that this alteration in quality of life is only temporary : the discomfort decreases as the patient adapts, giving way to long-term functional and aesthetic benefits.

5.8. Importance of Daily Functions: Speech and Eatin

When analyzing the answers to questions 9 and 10 we notice the absolute priority for patients to preserve their basic oral functions. The results are unanimous, 89% of respondents consider it “very” or “extremely” important to be able to speak clearly. The results are quit the same about the importance of being able to eat normally without restrictions. 0% considers these aspects are unimportant. This highlight the strong apprehension regarding the functional and social disruptions associated with traditional orthodontics. An appliance that alters phonetics or produces heavy daily dietary restrictions is likely to generate significant frustration and consequently a refusal to wear the appliance. So it could decreases the patient compliance. These data justify the current success of clear aligners. Indeed, they can be removed during meals so it completely eliminate the eating-related issues. In addition, they have a much lower impact on speech than bulky functional appliances or lingual brackets, thus perfectly meeting the psychosocial and functional requirements of patients.

5.9. Importance de l'hygiène et temps de nettoyage

The study shows that 89% of the respondents think that the ease of maintaining a good oral hygiene while wearing an orthodontic appliance is very to extremely important. And 94% are willing to spend more time everyday maintaining the hygiene of there appliance if it optimizes the results. These scores are relatively high. This reflects respondents' awareness of risks (tooth decay, gingivitis). However, the study by Shokeen and al. (2022) (44) shows that good intentions are not always enough. Traditional fixed appliances inevitably increase dental plaque and pathogenic bacteria. Conversely, clear aligners, help maintain healthy bacterial flora and stable periodontal indices (mainly because they are removable). Thus, to meet this requirement for rigorous hygiene, aligners are the ideal clinical solution.

5.10. General tolerance to pain

The survey results show that people consider themselves quite tolerant to pain. 51% rate their tolerance as high (4 to 5), 39% as moderate, and only 10% consider themselves sensitive.

These results show that patients can have a high level of confidenceat first. However, the study by Lorek et al. (2025)(45) reminds us that the perception of pain in orthodontics is mostly subjective. The authors also emphasize that pain is a determining factor in cooperation with treatment. Practitioners should therefore not rely on this apparent optimism. It is crucial to proactively minimize discomfort to prevent unexpected pain from destroying patient compliance.

5.11. The duration-comfort trade-off

These results show the classic dilemma in orthodontics : choosing between speed and comfort. The total treatment duration is a decisive factor for 55% of respondents and a majority of them (57%) states they are willing to endure more discomfort if it helps shorten this duration. However, the remaining 43% prioritize the gentleness of the therapy over the duration. This almost perfect division proves that there is no standard patient profile. This highlights the absolute necessity for the practitioner to assess the individual priorities of each patient during the initial consultation in order to recommend the appliance best suited to their psychology.

5.12. The financial factor and the concept of "added value"

The results of these two questions are very interesting. It highlights the patient point of view on the financial aspect of the treatment. On the one hand, cost remains an important decision-making criterion as 43% of respondents state that it highly or extremely influences their choice (scores of 4 and 5). But on the other hand, the following question put into perspective this financial barrier. In fact, a large majority (75%) is willing to pay more if the treatment offers better comfort or aesthetics. Only 2% categorically refuse any additional cost. These results demonstrate that while patients are price-sensitive, they primarily think in terms of "added value." Aesthetics (with clear aligners) and comfort (thanks to the removability) are not just perceived as superficial options, but as major benefits justifying an additional financial effort. This could explains the massive acceptance of clear aligner treatments nowadays, despite their cost often being higher than that of traditional braces.

5.13. Trust in the orthodontist vs. Initial preference

The survey reveals massive trust : 74% of patients would follow their orthodontist's recommendation, even if it contradicts their initial desire (for example when a patient wants aligners while braces are needed). According to the study of Barber et al. (46), practitioners often fear this conflict of opinion during Shared Decision-Making. However, our results prove that patients are very

willing to listen. Therefore, the practitioner must use this trust not to impose a choice, but to collaboratively explain why the patient's preference is not clinically ideal.

6. CONCLUSIONS

The level of theoretical knowledge regarding clear aligners and functional appliances is very high among the studied population, although this high awareness may be partly amplified by a self-assessment bias and the growing media exposure to aesthetic treatments. The aesthetic, social, and psychological impact proves to be a major decision-making criterion: almost all participants would feel significant discomfort in public with a visible functional appliance, whereas clear aligners enjoy highly positive social acceptance. The constraints of daily life and the opinion of peers strongly influence treatment preferences, with the vast majority of potential patients dreading the interference of an orthodontic appliance with their academic, professional, and social spheres. Patients give absolute priority to preserving fundamental oral functions (especially speech and normal eating), considering comfort and the maintenance of oral hygiene as essential during treatment. Although considerations related to overall cost and treatment duration play a role in decision-making, patients tend to value the discretion and aesthetics of the device more, even if it means adjusting their economic expectations. Patients display a clear "optimism bias" regarding their own ability to rigorously wear the appliance and follow the treatment. This overestimation of therapeutic compliance makes the orthodontist's professional recommendation even more crucial to ensure clinical effectiveness, especially when using removable devices.

7. SUSTAINABILITY

Orthodontic treatment of Class II malocclusions in growing patients aligns directly with Sustainable Development Goal (SDG) 3: Good Health and Well-being. The correction of skeletal and dental imbalances improves stomatognathic functionality while preserving adolescents' self-esteem, which drastically reduces the stigmatization and social anxiety documented in this study.

In terms of environmental sustainability (SDG 12: Responsible Consumption and Production), reflection is needed between the two therapeutic modalities. Clear aligner therapies involve manufacturing a large quantity of plastic (polyurethane) trays and single-use 3D-printed resin models, generating a substantial volume of non-biodegradable waste. Conversely, traditional functional appliances are generally made as a single robust device (acrylic and metal) designed to last for months, thus limiting the continuous production of waste.

Finally, in terms of economic sustainability (SDG 8), the cost of clear aligners is often considerably higher due to the underlying digital technology. It is therefore the clinician's responsibility to guide the patient toward a treatment offering an optimal balance between psychosocial well-being, economic cost, and environmental footprint.

8. REFERENCES

1. Ghodasra R, Brizuela M. Orthodontics, Malocclusion. En: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 [citado 28 de enero de 2026]. Disponible en: http://www.ncbi.nlm.nih.gov/books/NBK592395/ PubMed PMID: 37276298.

2. Nishi S, Basri R, Rahman N, Husein A, Alam M. Association between muscle activity and overjet in class II malocclusion with surface electromyography. J Orthod Sci. 2018;7(1):3. doi:10.4103/jos.JOS_74_17

3. Batista KB, Thiruvenkatachari B, Harrison JE, O'Brien KD. Orthodontic treatment for prominent upper front teeth (Class II malocclusion) in children and adolescents. Cochrane Oral Health Group, editor. Cochrane Database Syst Rev. 13 de marzo de 2018;2018(3). doi:10.1002/14651858.CD003452.pub4

4. Watted N, Lone IM, Zohud O, Midlej K, Proff P, Iraqi FA. Comprehensive Deciphering the Complexity of the Deep Bite: Insight from Animal Model to Human Subjects. J Pers Med. 8 de octubre de 2023;13(10):1472. doi:10.3390/jpm13101472

5. Uzuner FD, Aslan BI, Dinçer M. Dentoskeletal morphology in adults with Class I, Class II Division 1, or Class II Division 2 malocclusion with increased overbite. Am J Orthod Dentofacial Orthop. agosto de 2019;156(2):248-256.e2. doi:10.1016/j.ajodo.2019.03.006

6. Dodda K, Prasad SingamsettyERV, Kanuru R, Nalluri S, Mittapalli R, Raghavendra. Diagnostic features of Angle's Class II div 2 malocclusion. J Int Soc Prev Community Dent. 2015;5(6):513. doi:10.4103/2231-0762.170528

7. Kiełczykowski M, Perkowski K, Kamiński K, Zadurska M, Czochrowska E. Evaluation of the soft tissue facial profile in different skeletal malocclusions in relation to age. BMC Oral Health. 20 de junio de 2024;24(1):711. doi:10.1186/s12903-024-04486-1

8. Ghodasra R, Brizuela M. Orthodontics, Malocclusion. En: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 [citado 28 de enero de 2026]. Disponible en: http://www.ncbi.nlm.nih.gov/books/NBK592395/ PubMed PMID: 37276298.

9. Ghodasra R, Brizuela M. Orthodontics, Malocclusion. En: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 [citado 2 de febrero de 2026]. Disponible en: http://www.ncbi.nlm.nih.gov/books/NBK592395/ PubMed PMID: 37276298.

10. Prasad SERV, Indukuri RR, Singh R, Nooney A, Palagiri FB, Narayana V. Pathognomonic features of Angle's Class II division 2 malocclusion: A comparative cephalometric and arch width study. J Int Soc Prev Community Dent. diciembre de 2014;4(Suppl 2):S105-109. doi:10.4103/2231-0762.146212 PubMed PMID: 25558449; PubMed Central PMCID: PMC4278101.

11. Millett DT, Cunningham SJ, O'Brien KD, Benson PE, De Oliveira CM. Orthodontic treatment for deep bite and retroclined upper front teeth in children. Cochrane Oral Health Group, editor. Cochrane Database Syst Rev. 2 de octubre de 2017. doi:10.1002/14651858.CD005972.pub3

12. Prasad SERV, Indukuri RR, Singh R, Nooney A, Palagiri FB, Narayana V. Pathognomonic features of Angle's Class II division 2 malocclusion: A comparative

cephalometric and arch width study. J Int Soc Prev Community Dent. diciembre de 2014;4(Suppl 2):S105-109. doi:10.4103/2231-0762.146212 PubMed PMID: 25558449; PubMed Central PMCID: PMC4278101.

13. Kirschneck C, Römer P, Proff P, Lippold C. Association of dentoskeletal morphology with incisor inclination in angle class II patients: a retrospective cephalometric study. Head Face Med. diciembre de 2013;9(1):24. doi:10.1186/1746-160X-9-24

14. Rédua RB. Different approaches to the treatment of skeletal Class II malocclusion during growth: Bionator versus extraoral appliance. Dent Press J Orthod. marzo de 2020;25(2):69-85. doi:10.1590/2177-6709.25.2.069-085.bbo PubMed PMID: 32490927; PubMed Central PMCID: PMC7265671.

15. Dipalma G, Marinelli G, Inchingolo F, Longo M, Di Giulio Cesare M, Di Serio S, et al. Clinical Efficacy of Clear Aligners in Class II Malocclusion: From Pediatric to Adult Cases–A Narrative Review. J Funct Biomater. 19 de septiembre de 2025;16(9):354. doi:10.3390/jfb16090354

16. Lone IM, Zohud O, Midlej K, Proff P, Watted N, Iraqi FA. Skeletal Class II Malocclusion: From Clinical Treatment Strategies to the Roadmap in Identifying the Genetic Bases of Development in Humans with the Support of the Collaborative Cross Mouse Population. J Clin Med. 6 de agosto de 2023;12(15):5148. doi:10.3390/jcm12155148 PubMed PMID: 37568550; PubMed Central PMCID: PMC10420085.

17. George AM, Felicita AS, Milling Tania SD, Priyadharsini JV. Systematic review on the genetic factors associated with skeletal Class II malocclusion. Indian J Dent Res Off Publ Indian Soc Dent Res. 2021;32(3):399-406. doi:10.4103/ijdr.IJDR_59_20 PubMed PMID: 35229783.

18. Severino M, Mattei A, Vena F, Viarchi A, Truppa CT, Lombardo G, et al. Associations between oral habits and specific malocclusion traits in children: a retrospective cross-sectional study in Italy. BMC Oral Health. 6 de octubre de 2025;25(1):1534. doi:10.1186/s12903-025-06892-5

19. Ajami S, Morovvat A, Khademi B, Jafarpour D, Babanouri N. Dentoskeletal effects of class II malocclusion treatment with the modified Twin Block appliance. J Clin Exp Dent. 2019;0-0. doi:10.4317/jced.56241

20. Xu F, Fang Y, Sui X, Yao Y. Comparison of Twin Block appliance and Herbst appliance in the treatment of Class II malocclusion among children: a meta-analysis. BMC Oral Health. 26 de febrero de 2024;24(1):278. doi:10.1186/s12903-024-04027-w PubMed PMID: 38409017; PubMed Central PMCID: PMC10895725.

21. Oh H, Baumrind S, Korn EL, Dugoni S, Boero R, Aubert M, et al. A retrospective study of Class II mixed-dentition treatment. Angle Orthod. enero de 2017;87(1):56-67. doi:10.2319/012616-72.1

22. Rédua RB. Different approaches to the treatment of skeletal Class II malocclusion during growth: Bionator versus extraoral appliance. Dent Press J Orthod. marzo de 2020;25(2):69-85. doi:10.1590/2177-6709.25.2.069-085.bbo

23. Bimalrag BR, Ephraim R, Ayilliath A, Punathil S, James J, Venugopal J. Cephalometric Evaluation of the Pre- and Posttreatment Changes after the Correction of Class II Division 1 Malocclusion with Twin Block Appliance in Mixed Dentition. Int J Clin Pediatr Dent. julio de 2024;17(7):783-9. doi:10.5005/jp-journals-10005-2943 PubMed PMID: 39372531; PubMed Central PMCID: PMC11451920.

24. Kirschneck C, Römer P, Proff P, Lippold C. Association of dentoskeletal morphology with incisor inclination in angle class II patients: a retrospective cephalometric study. Head Face Med. diciembre de 2013;9(1):24. doi:10.1186/1746-160X-9-24

25. Proffit WR, Fields HW, Larson BE, Sarver DM. Contemporary orthodontics. Sixth edition. Philadelphia, PA: Elsevier; 2019. 729 p.

26. Nandakishor Mude N, Kumar A, Irfan G, Virupakshappa D, Bharisharanesha R, Chatterjee S, et al. Assessing sagittal discrepancies using beta angle, ANB angle and WITS appraisal: A cephalometric study. Bioinformation. 2025;21(11):4173-8. doi:10.6026/973206300214173 PubMed PMID: 41657626; PubMed Central PMCID: PMC12880165.

27. Lombardo G, Vena F, Negri P, Pagano S, Barilotti C, Paglia L, et al. Worldwide prevalence of malocclusion in the different stages of dentition: A systematic review and meta-analysis. Eur J Paediatr Dent. junio de 2020;21(2):115-23. doi:10.23804/ejpd.2020.21.02.05

28. Kaje R, Rashme R, Manimegalan P, Vundela RR, Saidalavi SK, Jadhav AV. Assessing the Efficacy of Early versus Late Orthodontic Intervention in the Management of Class II Malocclusion: A Comparative Analysis. J Pharm Bioallied Sci. julio de 2024;16(Suppl 3):S2691-3. doi:10.4103/jpbs.jpbs_370_24

29. Liu X, Cheng Y, Qin W, Fang S, Wang W, Ma Y, et al. Effects of upper-molar distalization using clear aligners in combination with Class II elastics: a three-dimensional finite element analysis. BMC Oral Health. 1 de diciembre de 2022;22(1):546. doi:10.1186/s12903-022-02526-2 PubMed PMID: 36456944; PubMed Central PMCID: PMC9714146.

30. Meade MJ, Weir T. Clinical efficacy of the Invisalign mandibular advancement appliance: A retrospective investigation. Am J Orthod Dentofacial Orthop. mayo de 2024;165(5):503-12. doi:10.1016/j.ajodo.2023.11.008

31. Dipalma G, Marinelli G, Inchingolo F, Longo M, Di Giulio Cesare M, Di Serio S, et al. Clinical Efficacy of Clear Aligners in Class II Malocclusion: From Pediatric to Adult Cases–A Narrative Review. J Funct Biomater. 19 de septiembre de 2025;16(9):354. doi:10.3390/jfb16090354

32. Ravera S, Castroflorio T, Galati F, Cugliari G, Garino F, Deregibus A, et al. Short term dentoskeletal effects of mandibular advancement clear aligners in Class II growing patients. A prospective controlled study according to STROBE Guidelines. Eur J Paediatr Dent. 2021;22(2):119-24. doi:10.23804/ejpd.2021.22.02.6

33. Santamaría-Villegas A, Manrique-Hernandez R, Alvarez-Varela E, Restrepo-Serna C. Effect of removable functional appliances on mandibular length in patients with class II

with retrognathism: systematic review and meta-analysis. BMC Oral Health. diciembre de 2017;17(1):52. doi:10.1186/s12903-017-0339-8

34. Xu F, Fang Y, Sui X, Yao Y. Comparison of Twin Block appliance and Herbst appliance in the treatment of Class II malocclusion among children: a meta-analysis. BMC Oral Health. 26 de febrero de 2024;24(1):278. doi:10.1186/s12903-024-04027-w

35. Bock NC, Von Bremen J, Ruf S. Stability of Class II fixed functional appliance therapy—a systematic review and meta-analysis. Eur J Orthod. abril de 2016;38(2):129-39. doi:10.1093/ejo/cjv009

36. Ghorbani M, Mousavi SA, Bardideh E, Saeedi P, Shahnaseri S, Shafaee H, et al. The Effectiveness of Functional Clear Aligners for Class II Correction in Growing Patients: A Systematic Review and Meta-Analysis. Orthod Craniofac Res. agosto de 2025;28(4):577-92. doi:10.1111/ocr.12908

37. Khalil AS, Alrehaili RS, Mahmoud Z, Alrashidi R, Alkhalaf A, Abdelmaksoud M, et al. Interceptive Treatment of Class II Malocclusion in Pediatric Patients Using Clear Aligner Mandibular Advancement: A Systematic Review Following PRISMA Guidelines. Cureus. 11 de abril de 2025. doi:10.7759/cureus.82089

38. Ali HMHM, Abukhier MBH, Alsalam AMA, Alamir AH, Zain EMM, Bahmaid KMM. Orthodontic awareness among medical and non-medical university students, Sudan. BMC Oral Health. 6 de julio de 2025;25(1):1121. doi:10.1186/s12903-025-06526-w PubMed PMID: 40619396; PubMed Central PMCID: PMC12232687.

39. Dipalma G, Marinelli G, Inchingolo F, Longo M, Di Giulio Cesare M, Di Serio S, et al. Clinical Efficacy of Clear Aligners in Class II Malocclusion: From Pediatric to Adult Cases–A Narrative Review. J Funct Biomater. 19 de septiembre de 2025;16(9):354. doi:10.3390/jfb16090354

40. Johal A, Damanhuri SH, Colonio-Salazar F. Adult orthodontics, motivations for treatment, choice, and impact of appliances: A qualitative study. Am J Orthod Dentofacial Orthop. julio de 2024;166(1):36-49. doi:10.1016/j.ajodo.2024.02.009

41. Meazzini MC, Tortora C, Cohen N, Mazzoleni F, Balbo N, Donati V, et al. Comparison of the psychosocial impact on patients affected by cranio facial anomalies between traditional orthodontic brackets and aligners. Int J Adolesc Med Health. 10 de octubre de 2022;34(5):357-65. doi:10.1515/ijamh-2020-0117

42. Nahajowski M, Lis J, Sarul M. Orthodontic Compliance Assessment: A Systematic Review. Int Dent J. octubre de 2022;72(5):597-606. doi:10.1016/j.identj.2022.07.004

43. Guerino P, Ortiz FR, Marquezan M, Ardenghi TM, Ferrazzo VA. Impact of orthodontic treatment on OHRQoL of adolescents: a longitudinal study. Dent Press J Orthod. 2024;29(1):e2423136. doi:10.1590/2177-6709.29.1.e2423136.oar

44. Shokeen B, Viloria E, Duong E, Rizvi M, Murillo G, Mullen J, et al. The impact of fixed orthodontic appliances and clear aligners on the oral microbiome and the association with clinical parameters: A longitudinal comparative study. Am J Orthod Dentofacial Orthop. mayo de 2022;161(5):e475-85. doi:10.1016/j.ajodo.2021.10.015

45. Lorek M, Jarząbek A, Sycińska-Dziarnowska M, Gołąb S, Cichocka E, Spagnuolo G, et al. Personality traits, pain perception, and patient attitudes toward orthodontic treatment with fixed appliances. Front Neurol. 7 de marzo de 2025;16:1547095. doi:10.3389/fneur.2025.1547095

46. Barber SK, Ryan F, Cunningham SJ. Knowledge of, and attitudes to, shared decision-making in orthodontics in the UK. J Orthod. diciembre de 2020;47(4):294-302. doi:10.1177/1465312520941526

ANNEXES

Universidad Europea

Comisión de Investigación

Villaviciosa de Odón, 20 de febrero de 2026

Estimado/a investigador/a,

La Comisión de Investigación de la Unidad de Investigación, una vez revisada la documentación e información, remitida por el investigador responsable con fecha 04/02/2026, relativa al proyecto abajo indicado, autoriza su desarrollo en la Universidad Europea.

Título del proyecto:	CORRECTION OF CLASS II MALOCCLUSION IN GROWING PATIENTS WITH ALIGNERS VERSUS FUNCTIONAL APPLIANCES. SURVEY ELECTION
Tipo de proyecto:	TFG
Investigador/a responsable:	[redacted]
Código CI:	2026-256
Código OTRI:	Sin especificar
Código Departamento:	OD.053/2526
Dictamen:	APROBADO

Atentamente,

Ruth M. Risueño

Universidad Europea
ESCUELA DE DOCTORADO E INVESTIGACIÓN

Dra. Ruth Muñoz Risueño

Directora de Investigación

ci@universidadeuropea.es

INFORMED CONSENT

This survey is part of the Graduation Project in Dentistry at Universidad Europea of Madrid titled "Correction
of class II malocclusion in growing patients with aligners versus functional appliances. Survey election."
and directed by [redacted] The purpose of this work is to Evaluate the patients' criterias in the selection of orthodontic appliances for the treatment of class II malocclusion (aligners versus functional appliances) and the information will be collected through a brief survey.

Your participation in this study is voluntary. You may request to be withdrawn from the study without prior justification or prejudice to you. The information collected will be kept confidential and will not be used for any other purpose outside this research and research dissemination purposes. The data collected will be completely anonymous. No personal identifying information will be requested. Information collected in the survey will be treated in accordance with the provisions of Organic Law 3/2018, of December 5, Protection of Personal Data and Guarantee of Digital Rights.

Do you give your consent to participate in the survey as a volunteer for the results to be used in the Final Degree Project "Correction of class II malocclusion in growing patients with aligners versus functional appliances. Survey election."?

Yes ☐ **No** ☐

For the purposes of the provisions of the regulation of the Organic Law 3/2018, of 5 December, on the Protection of Personal Data and Guarantee of Digital Rights, you are informed and expressly consent that the data provided in the survey may be used for the aforementioned purposes. This consent is granted without prejudice to all the rights that you have in relation to the aforementioned regulations, with the possibility of accessing the information provided, rectification, cancellation and opposition at any time you wish. For such purposes, you must write to the tutor Prof. [redacted]



patients' criteria in the selection of functional appliances/clear aligners for class II

Evaluation of patients' criteria in the selection of orthodontic appliances for the treatment of class II malocclusion: aligners versus functional appliances

Dear Participant, You are invited to participate in a research study evaluating patients' criteria for selecting treatment appliances for Class II malocclusion, with a focus on the use of clear aligners versus functional appliances in growing patients.

Participation is anonymous, voluntary, and takes approximately 2 minutes. By checking the box "yes" on the informed consent you confirm that you consent to participate in this study.

Thank you for your collaboration.

Lorsque vous soumettez ce formulaire, il ne collecte pas automatiquement vos détails, tels que le nom et l'adresse e-mail, sauf si vous le fournissez vous-même.

1. INFORMED CONSENT

This survey is part of the Graduation Project in Dentistry at Universidad Europea of Madrid titled "Correction of class II malocclusion in growing patients with aligners versus functional appliances. Survey election."and directed by [redacted] The purpose of this work is to Evaluate the patients' criterias in the selection of orthodontic appliances for the treatment of class II malocclusion (aligners versus functional appliances) and the information will be collected through a brief survey.

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Do you give your consent to participate in the survey as a volunteer for the results to be used in the Final Degree Project "Correction of class II malocclusion in growing patients with aligners versus functional appliances. Survey election."?

- ◯ Yes
- ◯ No

2. **A class II malocclusion is a condition where the upper teeth or jaw are positioned too far forward compared to the lower teeth or jaw. Depending on the case, this condition can be corrected either by using a clear aligner or a functional appliance.**

Before starting this questionnaire, have you ever heard about functional appliances ?

- ◯ Yes
- ◯ No

3. **Have you ever heard about clear aligners ?**

- ◯ Yes
- ◯ No

4. **On a scale from 1 to 5 how well do you think you understand the differences between these two types of treatment ?**

- ◯ 1 - I don't understand at all
- ◯ 2 - I understand a little
- ◯ 3 - I understand somewhat
- ◯ 4 - I understand well
- ◯ 5 - I understand very well

5. **On a scale from 1 to 5, to what extent does the opinion of others (family, friends, colleagues, classmates) influence your choice of orthodontic treatment ?**

- ◯ 1 - Not at all influenced
- ◯ 2 - Slightly influenced
- ◯ 3 - Moderately influenced
- ◯ 4 - Strongly influenced
- ◯ 5 - Very strongly influenced

6. **Would you be embarrassed to speak, smile or laugh in public while wearing a visible functional appliance ?**

- ◯ Not at all
- ◯ slightly
- ◯ moderately
- ◯ Very
- ◯ extremely

7. **Would you be embarrassed to speak, smile or laugh in public while wearing a clear aligner?**

- ◯ Not at all
- ◯ slightly
- ◯ moderately
- ◯ Very
- ◯ extremely

8. **Clear aligners and some functional appliances (such as the Bionator or the Twin Block) are removable. In these cases, the success of the treatment largely depends on the patient's discipline in wearing the appliance as prescribed.**
On a scale from 1 to 5, how capable do you consider yourself of following the treatment plan properly and wearing the appliance consistently as recommended?

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5

9. **On a scale from 1 to 5, to what extent could wearing an orthodontic appliance interfere with your daily activities (school, work, social activities) ?**

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5

10. **On a scale from 1 to 5, how important is the ability to speak clearly during orthodontic treatment to you ?**

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5

11. **On a scale from 1 to 5, how important is the ability to eat normally during orthodontic treatment to you?**

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5

12. **On a scale from 1 to 5, how important is the ease of maintaining good oral hygiene during orthodontic treatment to you ?**

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5

13. **Would you be willing to spend more time each day cleaning your appliance if it improves the final treatment outcome?**

- ◯ Yes
- ◯ Rather yes
- ◯ Rather no
- ◯ No

14. **On a scale from 1 to 5, how would you rate your general tolerance to pain?**

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5

15. **Would you prefer a slightly longer but more comfortable treatment, or a shorter but more uncomfortable one?**

- ◯ More confortable and longer
- ◯ More uncomfortable and shorter

16. **On a scale from 1 to 5, to what extent does the total treatment duration influence your choice?**

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5

17. **Would you be willing to accept a longer treatment if it is more aesthetic and discreet?**

- ◯ Yes
- ◯ No
- ◯ I don't know

18. **On a scale from 1 to 5, to what extent does the cost of treatment influence your choice of orthodontic appliance?**

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5

19. **Would you be willing to pay more for a more aesthetic or more comfortable treatment?**

- ◯ Yes
- ◯ No
- ◯ Maybe

20. **On a scale from 1 to 5, to what extent would you trust your orthodontist's recommendation, even if it does not match your initial preference?**

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5