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Factors influencing the decision to initiate orthodontic treatment in patients seeking orthodontic consultation

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ABSTRACT

Introduction and aim. The decision to initiate orthodontic treatment is influenced by multiple factors beyond clinical need alone. Even patients with comparable malocclusion severity may differ in their willingness to undergo therapy. This study aimed to evaluate the association between selected demographic and occlusal characteristics and the decision to initiate orthodontic treatment in a retrospective clinical cohort.

Material and methods. A retrospective analysis was conducted using clinical records of 902 patients attending an initial orthodontic consultation between 2022 and 2024. Data collected during the first visit included gender, age, skeletal class, dental crowding, spacing, crossbite, scissor bite, and vertical overbite. Patients were categorized into three age groups. The outcome variable was treatment initiation, defined as the start of active orthodontic therapy. The proportion of patients initiating treatment was calculated for each subgroup and compared statistically.

Results. Age was significantly associated with treatment initiation ($p < 0.001$), with the highest uptake observed in younger patients (62.59%) and the lowest in older individuals (27.12%). Dental crowding was also significantly associated with treatment decisions (58.81% vs. 50.00%, $p = 0.038$). No significant

differences were found for gender, skeletal class, spacing, crossbite, scissor bite, or vertical overbite ($p > 0.05$).
Conclusions. Age and dental crowding were the only factors significantly associated with the decision to initiate orthodontic treatment. Other analysed occlusal characteristics did not demonstrate a significant relationship with treatment uptake. These findings suggest that treatment decisions are influenced selectively by factors that are more directly perceived by patients, rather than uniformly by all clinical features.

Keywords: orthodontic treatment; malocclusion; patient acceptance of health care; dental crowding; dental esthetics.

Introduction

Orthodontic treatment plays an important role in improving dental function, facial aesthetics, and patient-reported outcomes, including aspects of psychosocial well-being. Despite the potential benefits of treatment, the presence of malocclusion alone does not necessarily lead to treatment initiation, as even individuals with greater clinical treatment needs do not always proceed with therapy [1]. In routine clinical practice, some patients choose to undergo orthodontic treatment, whereas others – despite comparable clinical findings – do not.

The decision to undergo orthodontic treatment is a multifactorial process that reflects not only clinical characteristics but also individual perceptions, expectations, and practical considerations. Previous research has shown that treatment uptake is influenced by perceived aesthetic concerns, oral health–related quality of life, and contextual factors such as cost and treatment duration [2,3]. In addition, concerns related to discomfort, appliance visibility, and the anticipated burden of treatment may further affect patients' willingness to initiate therapy [4].

Most available studies have focused either on the prevalence and distribution of malocclusion traits or on comparisons between treated and untreated groups. In contrast, relatively few studies have examined treatment initiation as an outcome in relation to specific clinical characteristics in routine practice. However, less attention has been given to evaluating how frequently patients with defined clinical features decide to undergo treatment. Such an approach may provide a more clinically intuitive perspective, as it reflects the probability of treatment initiation within clearly defined subgroups encountered during initial consultation.

From a clinical standpoint, understanding which patient- and malocclusion-related factors are associated with the decision to initiate treatment may support more effective communication, improve expectation management, and facilitate decision-making during the first orthodontic visit.

Therefore, this study aimed to evaluate the association between selected demographic and occlusal factors and the decision to undergo orthodontic treatment in a retrospective clinical cohort.

Material and methods

Study design and setting

A retrospective study design was applied using routinely collected clinical data from an orthodontic practice (BlueMed Orthodontic and Medical Centre, Bydgoszcz, Poland). Records of patients attending an initial orthodontic consultation between 2022 and 2024 were reviewed. The analysis focused on information obtained during the first diagnostic visit.

Participants and eligibility criteria

The study population consisted of patients who attended their first orthodontic consultation within the study period and were at least 11 years of age at the time of assessment. Inclusion required the availability of complete diagnostic documentation necessary for the evaluated variables.

A total of 902 individuals met these criteria and were included in analyses involving demographic (gender, age) and skeletal variables. For occlusal characteristics (crowding, spacing, crossbite, and scissor bite), complete data were available for 840 patients, whereas vertical overbite assessment was based on 833 individuals with corresponding records.

For analytical purposes, participants were categorised into three age groups: younger (11–20 years), adults (21–40 years), and older individuals (41–60 years).

Outcome definition

The outcome of interest was orthodontic treatment uptake. Treatment initiation was identified from clinical records and defined as the start of active orthodontic therapy at the study centre, including placement of a fixed appliance or other documented therapeutic intervention.

Within each subgroup defined by the analysed variables, the proportion of patients who initiated treatment was calculated and expressed as a percentage.

Variables and study model measurements

The analysis included the following variables: gender (female/male), age category (younger, adult, older), skeletal class (class I, II, III), presence of dental crowding (yes/no), presence of spacing (yes/no), presence of crossbite (yes/no), presence of scissor bite (yes/no), and vertical overbite.

Vertical overbite categories were defined according to clinical measurements as follows: open bite (<0 mm), edge-to-edge bite (0 mm), normal overbite (1–2 mm), and deep bite (>2 mm).

All occlusal features were assessed from routinely collected clinical documentation obtained during the initial consultation and recorded as categorical variables for statistical analysis.

Study model analysis procedure

Clinical data were extracted from electronic records using a predefined data collection framework. Occlusal characteristics were evaluated according to standard clinical assessment protocols applied during the initial visit and subsequently entered into a structured dataset.

For each analysed factor, patients were grouped according to the presence or category of the given characteristic. The proportion of individuals who initiated orthodontic treatment was then calculated within each group, and differences between subgroups were analysed statistically.

Ethics and data protection

This study was based on a retrospective analysis of existing clinical data. A formal statement confirmed that the project did not constitute a medical experiment under applicable regulations (decision no. KB-775/25). All data were anonymised prior to analysis and handled in accordance with institutional data protection standards.

Results

Table 1 presents a comparison of the proportion of individuals who decided to undergo orthodontic treatment across different demographic and clinical subgroups. The n represents the total number of individuals in each subgroup, while % "yes" indicates the percentage of participants who chose orthodontic treatment.

Regarding gender, 53.78% of females (n = 608) and 55.44% of males (n = 294) opted for orthodontic treatment. The difference was not statistically significant (p = 0.639).

A significant association was observed for age (p < 0.001). The highest proportion of treatment decisions was found in the younger group (62.59%, n = 433), followed by adults (49.75%, n = 408), whereas the lowest

▼ Table 1. Comparison of the proportion of individuals who decided to undergo orthodontic treatment across different demographic and clinical subgroups.

	n	% "yes"	p-value
Gender			
– female	608	53.78	0.639
– male	294	55.44	
Age			
– younger	433	62.59	<0.001*
– adult	408	49.75	
– older	59	27.12	
Skeletal class			
– class I	426	53.05	0.767
– class II	389	55.53	
– class III	87	55.17	
Crowding			
– yes	670	58.81	0.038*
– no	170	50.00	
Spacing			
– yes	182	53.85	0.328
– no	658	57.90	
Crossbite			
– yes	163	58.02	0.497
– no	677	56.87	
Scissor bite			
– yes	7	100.00	0.070
– no	833	56.66	
Vertical overbite			
– normal overbite	130	56.15	0.428
– open bite	78	51.28	
– deep bite	570	58.95	
– edge-to-edge bite	55	50.91	

* statistically significant difference.

percentage was observed in older individuals (27.12%, n = 59).

No statistically significant differences were found between skeletal classes (p = 0.767). The proportion of individuals choosing treatment was similar across class I (53.05%, n = 426), class II (55.53%, n = 389), and class III (55.17%, n = 87).

Dental crowding was significantly associated with the decision to undergo treatment (p = 0.038). Individuals with crowding (n = 670) were more likely to choose treatment (58.81%) than those without crowding (50.00%, n = 170).

For other occlusal characteristics, no statistically significant differences were observed. The presence of spacing showed similar treatment rates between those with spacing (53.85%, n = 182) and without spacing (57.90%, n = 658) (p = 0.328). Likewise, the presence of a crossbite did not significantly affect treatment decisions (58.02%, n = 163 vs. 56.87%, n = 677; p = 0.497).

All individuals with scissor bite (100%, n = 7) opted for treatment; however, the difference compared with those without this condition (56.66%, n = 833) did not reach statistical significance (p = 0.070), likely due to the very small sample size.

Finally, the decision to undergo treatment did not differ significantly across vertical overbite categories (p = 0.428). The percentages were 56.15% in individuals with normal overbite (n = 130), 51.28% in those with open bite (n = 78), 58.95% in those with deep bite (n = 570), and 50.91% in those with edge-to-edge bite (n = 55).

Overall, age and dental crowding were the only factors significantly associated with the decision to undergo orthodontic treatment.

Discussion

This study examined the association between selected demographic and occlusal characteristics and the decision to initiate orthodontic treatment in a retrospective clinical cohort. The results indicate that treatment uptake was not uniformly related to the analysed variables, suggesting that the decision to begin therapy is selective rather than directly determined by the presence of specific clinical features. Age emerged as the most influential factor associated with treatment initiation, while dental crowding showed a more moderate but statistically significant relationship. In contrast, most other occlusal characteristics did not significantly differentiate between individuals who initiated treatment and those who did not, indicating that not all clinically identifiable features contribute equally to decision-making in routine orthodontic practice.

The decision to initiate orthodontic treatment should be interpreted within a broader behavioural framework, in which clinical findings represent only one component of a multifactorial process. Available evidence indicates that patients' willingness to undergo orthodontic therapy is influenced by esthetic concerns and perceived treatment need, as well as by social and motivational factors [5]. In addition, preferences regarding orthodontic care are shaped by practical considerations related to the treatment process, including its duration, financial cost, and perceived benefits [6]. Treatment-related factors, such as the expected length and overall burden of therapy, may not only influence the decision to initiate treatment but also affect patient adherence and engagement throughout the course of therapy [7]. Within this context, treatment uptake can be understood as a selective process in which clinical characteristics contribute to decision-making primarily when the patient perceives them as relevant. A similarly multifactorial decision-making pattern has been reported in other areas of dentistry, where the choice between conservative and surgical treatment is influenced by both clinical findings and patient- and treatment-related factors [8].

Age was identified as the factor most strongly associated with the decision to initiate orthodontic treatment in the present study. The higher treatment uptake observed among younger individuals may reflect differences in the context in which treatment decisions are made, as both clinical recommendations and the social environment typically influence this age group. In addition, adolescence is a period in which dental appearance and facial aesthetics play a particularly important role in self-perception and peer interactions. Previous studies have demonstrated that dental appearance may significantly affect social judgments and interpersonal relationships in younger individuals [9]. That malocclusion can negatively impact quality of life and psychosocial well-being [10]. Furthermore, aesthetic concerns have been identified as a primary motivation for seeking orthodontic treatment, particularly among younger patients [11]. As a result, orthodontic treatment may be more readily perceived as necessary and desirable at a younger age.

In older age groups, differences in treatment uptake may be associated with variations in motivation and expectations regarding orthodontic treatment. Previous studies suggest that adult patients frequently seek treatment to improve dental appearance, although their motivations and psychological characteristics may differ from those of younger individuals [12]. Taken together, these findings indicate that clinical factors do not solely determine age-related differences in treatment uptake, but also reflect differences in how treatment need is perceived and prioritised across the lifespan.

Dental crowding was the only occlusal characteristic, apart from age, that showed a statistically significant association with the decision to initiate orthodontic treatment in the present study. The strong impact of anterior crowding on dental aesthetics and patient self-perception may explain this finding. Previous studies have demonstrated that anterior crowding is associated with increased self-consciousness and a negative impact on oral health-related quality of life, particularly in domains related to appearance and social interaction [13]. Individuals with more severe irregularities report poorer perceptions of their dental appearance [14]. Furthermore, dental aesthetics have been identified as one of the primary determinants of satisfaction with oral appearance and a key driver for seeking orthodontic treatment [15]. More recent evidence indicates that anterior crowding may negatively affect emotional and social well-being, particularly in younger individuals, reinforcing its relevance in treatment decision-making [16]. Given that crowding is a readily visible feature, it may be more easily recognised and prioritised by patients compared to other occlusal characteristics that are less apparent.

The absence of statistically significant associations for other occlusal characteristics may reflect differences in how patients perceive various malocclusion traits. Evidence suggests that the impact of malocclusion on oral health-related quality of life is not uniform and may vary by occlusal feature type [17]. In particular, traits that do not directly affect dental appearance may have a limited influence on patient perception and treatment-seeking behaviour.

Moreover, the relationship between clinically assessed malocclusion and patient-reported outcomes is complex and influenced by factors such as individual perception and contextual characteristics [18]. Therefore, the lack of statistically significant associations observed in the present study should not be interpreted as a lack of clinical importance, but rather as an indication that their role in treatment decision-making may be less directly perceived by patients.

The findings of the present study may have practical relevance for orthodontic consultations, particularly during the initial patient assessment. The results suggest that treatment decisions are more closely associated with factors directly perceived by patients, such as dental appearance, than with all clinically identifiable occlusal characteristics. This highlights the importance of considering patient perception and expectations during the diagnostic process.

From a clinical perspective, awareness of these factors may support more effective communication with patients, enabling clinicians to address individual concerns better and align clinical recommendations with patient expectations. In particular, recognising which features are more likely to influence treatment acceptance may facilitate a more patient-centred approach to treatment planning.

Several limitations of this study should be considered when interpreting the results. The retrospective design and reliance on routinely collected clinical data may limit the level of detail available for assessing occlusal characteristics. In particular, the analysis was based on selected clinical variables and did not include a more detailed diagnostic evaluation, such as a comprehensive cephalometric analysis or additional skeletal and dental measurements.

Furthermore, certain occlusal features were assessed in a simplified categorical manner, which may not fully reflect the complexity and severity of individual malocclusions. Future studies may benefit from incorporating more detailed diagnostic records, including quantitative measurements and extended cephalometric parameters, to provide a more precise understanding of how specific characteristics influence treatment decision-making.

Nevertheless, the present study provides a clinically relevant overview of factors associated with treatment initiation and may serve as a foundation for further, more detailed investigations in this field.

Conclusions

Within the limitations of this study, age and dental crowding were identified as factors associa-

ted with the decision to initiate orthodontic treatment. Other analysed occlusal characteristics, including skeletal pattern and selected occlusal relationships, did not demonstrate a significant association with treatment uptake.

These findings indicate that the influence of individual variables on treatment initiation is not uniform and that different factors may contribute to decision-making to varying degrees. In particular, some occlusal features may play a less prominent role in this process, despite their clinical relevance.

The results of the present study contribute to a better understanding of factors associated with orthodontic treatment initiation and provide a basis for further research incorporating more detailed diagnostic parameters and broader analytical approaches.

Declarations

Conflict of interest statement
The authors declares no conflict of interest.

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Author contributions
Conceptualisation: AD, KN; Data curation: AD, KN; Formal analysis: KN; Investigation: AD, OK; Methodology: AD, KN; Visualisation: AD, KN; Writing - original draft: AD, FP; Writing - review & editing: MM, KN; Supervision: KN.

Data availability
Data will be made available by the corresponding author upon reasonable request.

Ethics approval and consent to participate
The study was conducted in accordance with the Declaration of Helsinki. The Bioethical Committee of the Poznan University of Medical Sciences approved this study and waived the requirement for informed consent due to the study's retrospective nature (Decision no. KB-775/25).

Declaration of generative AI and AI-assisted technologies in the manuscript preparation
Language-related support for this manuscript was provided using Grammarly and ChatGPT, an artificial intelligence-based conversational tool developed by OpenAI and powered by the GPT-5.2 language model. These tools were used solely for linguistic refinement, including grammar and stylistic consistency. No artificial intelligence tools were used to generate, modify, or interpret scientific content, data, or conclusions. The authors take full responsibility for the content of this paper.

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