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Retention Practices of Orthodontists in the Western Balkans

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Abstract

Background: Retention protocols vary widely across regions, yet limited data exist on practices in the Western Balkans. This study aimed to compare retention strategies among orthodontists in Croatia, North Macedonia, and Kosovo, evaluating influences such as clinician experience, malocclusion type, and patient factors.

Methods and Results: A questionnaire was distributed to 185 orthodontists in Croatia, 150 in North Macedonia, and 125 in Kosovo (representing 78%-100% practicing orthodontists) from December 2023 to May 2024, with response rates of 75%, 63%, and 58%, respectively. Data on appliance preferences, follow-up frequency, and retention protocol were analyzed using Chi-square and Kruskal-Wallis tests.

The most preferred appliance options were the following: vacuum-formed retainer in Croatia, a combination of fixed and removable in Kosovo, and an acrylic plate in North Macedonia. Retention choices were primarily experience-driven, though Kosovar orthodontists prioritized patient age/growth (88%), while Croatians and Macedonians emphasized malocclusion type (73%-78%). Countries also differed in patient care practices following a procedure. Written instructions were less common in Kosovo and North Macedonia than in Croatia (11% and 19% vs. 69%; $P<0.001$). Monitoring by an orthodontist beyond three years was higher in Kosovo and North Macedonia than in Croatia (92 and 99% vs. 75%; $P<0.001$).

Conclusion: Significant regional differences in retention practices reflect variations in training traditions, clinical habits, and socioeconomic factors. These findings underscore the need for clearer, evidence-based retention guidelines to support consistent and unified clinical practices across regions, ultimately improving long-term patient outcomes. (**International Journal of Biomedicine. 2025;15(3):552-558.**)

Keywords: orthodontic retention • orthodontic retainers • retention protocols • Balkans

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Abbreviations

FBR, fixed bonded retainer; **VFR**, vacuum-formed retainer.

Introduction

Retention is the final phase of orthodontic treatment, yet there is no consensus among orthodontists regarding the optimal shapes and materials for this stage.[1] The primary objective of retention is to preserve the stability of the treatment results.[2] Unstable results can lead to relapse, which is the reappearance of occlusal disorders that had been corrected through orthodontic treatment.[3] Research indicates that some degree of relapse is common among patients after completing orthodontic treatment.[4] The choice of retention method depends on various factors, including the type of malocclusion, growth patterns, extraction decisions, treatment duration, the clinician's experience, and their education, among others. Although

limited data support specific retention protocols, a review of the literature has provided valuable insights for both orthodontic patients and healthcare professionals.[5,6]

Current evidence categorizes retainers into two main groups: removable retainers and fixed bonded retainers (FBR). The most commonly used removable retainers are the Hawley retainer and the vacuum-formed retainer (VFR). Both FBRs and removable retainers are widely accepted within the orthodontic and dental community, each offering its own advantages and disadvantages. Numerous randomized clinical trials have examined the effectiveness of different retainers and retention strategies.[7-9]

Retention protocols vary by country. In the UK, private practices favor VFR alongside FBR.[10] In Australia and New Zealand, orthodontists typically use FBR for the lower arch and VFR for the upper, while in the Netherlands, fixed retainers are preferred for both arches.[11] In the USA, over 58% of orthodontists favor Hawley retainers for the upper arch, while 40% prefer FBR for the lower.[12] Another study analyzing trends from 1986 to 2008 found a growing preference for VFR and FBR, alongside a decline in Hawley retainer use. During this period, lifelong retention methods also became more common.[13]

The data from Croatia revealed that in 2013 orthodontists preferred VFR for the maxilla and a combination of fixed and removable retainers for the mandible.[14] Following Croatia's earlier survey, we expanded the study to North Macedonia and Kosovo to gain a broader understanding of regional retention practices and shared trends. These three Balkan countries share a common history through the former Yugoslav education system, which has shaped their orthodontic training and clinical approaches. Their geographical closeness and cultural similarities have also contributed to comparable practices in dental care. Our study aimed to highlight regional orthodontic preferences in the Western Balkans and how they compare to global practices, offering a broader perspective on retention strategies. Additionally, to identify predictive differences in retention protocols, the orthodontist's choices were analyzed based on factors such as sociodemographic characteristics, clinical experience, education, and sources of knowledge.

Materials and Methods

A cross-sectional survey was conducted over six months (from December, 2023 to May, 2024). Questionnaires were distributed via email or in person to 185 orthodontists in Croatia (representing 85% practicing orthodontists), 150 in North Macedonia (78%), and 125 in Kosovo (100%). The survey received responses from 138 orthodontists in Croatia, 95 in North Macedonia, and 73 in Kosovo, resulting in response rates of 75%, 63%, and 58%, respectively.

Statistical analysis was performed using the statistical software package SPSS version 20.0 (SPSS Inc, Armonk, NY: IBM Corp). Baseline characteristics were summarized as frequencies and percentages. Categorical variables were analyzed using the chi-square test and Kruskal-Wallis test. The Z-test for proportions was used as a post hoc test following a significant chi-square test to identify which specific groups or categories differ significantly. The probability value of $P<0.05$ was considered statistically significant.

Results

The ages of practicing orthodontists ranged from 30 to 73 years, with median ages of 46 for Croatian orthodontists, 45 for North Macedonian orthodontists, and 42 for Kosovar orthodontists. Years of experience were similar across groups, with a median of 14 years for Croatians, and 12 years for both North Macedonians and Kosovars. Most orthodontists obtained their specialist degree in their respective capitals: 90% in Prishtina (Kosovo), 92% in Skopje (North Macedonia), and 94% in Zagreb (Croatia). There were no significant differences in work experience between the countries, with both Kosovars and North Macedonians having a median of 12 years, while Croatians had a median of 14 years. Kosovars worked with patients more frequently than Macedonians and Croatians, with a median of 6 days per week compared to 5 days (P<0.001).

No significant association was found between the orthodontists' years of experience or the number of days worked per week and the duration of retention or the number of check-ups during the first and subsequent years, a finding consistent across all three countries.

Most Kosovar orthodontists provided oral information on retention both at the beginning and end of orthodontic treatment. Croatian orthodontists, in contrast, more frequently provided written information at both the start and end of treatment ($P \leq 0.004$). They also gave information more often on potential complications and precautions, while North Macedonian orthodontists more frequently recommended interdental brushes, and Kosovar orthodontists were more likely to advise the use of toothpicks (Table 1).

Table 1.

Comparison of sex and retention procedures across countries

Variable / Country	Croatia	Kosovo	NM	P^*
Ratio of female orthodontist responders	98 (71%)	45 (62%)	72 (76%)	0.134
Giving oral info at the beginning of ortho treatment about retention	121 (88%)[a]	73 (100%)[b]	86 (91%)[a]	0.009
Written info	44 (32%)[a]	8 (11%)[b]	23 (25%)[ab]	0.004
Retention type info	89 (65%)[a]	24 (33%)[b]	57 (60%)[a]	<0.001
Retention duration info	79 (57%)	32 (44%)	57 (60%)	0.086
Giving oral info at the end of ortho treatment about retention	131 (95%)	73 (100%)	89 (94%)	0.107
Written info	95 (69%)[a]	8 (11%)[b]	18 (19%)[b]	<0.001
Info on caution and problems	104 (75%)[a]	0[b]	47 (51%)[c]	<0.013
Info on interdental brush	52 (38%)[ab]	23 (32%)[b]	50 (53%)[a]	0.013
Info on toothpick	23 (17%)[a]	34 (47%)[b]	22 (23%)[a]	<0.001
Info on floss	41 (30%)	18 (25%)	32 (34%)	0.447
Info on electric brush	33 (24%)	23 (32%)	31 (33%)	0.280

*NM, North Macedonia. *- Chi-square test. Countries that share the same superscript letter do not differ significantly according to the Z-test for proportions.*

Choices of retention methods varied among the 3 countries. Removable VFR was the most preferred in Croatia in both jaws (P<0.001), a combination of fixed and removable retainers in Kosovo (P<0.001), while in Macedonia, VFR was followed by a removable acrylic plate. Monitoring after 3 years was less often done by an orthodontist in Croatia than in the other two countries (P<0.001). Patients monitored themselves more often in Croatia. Kosovar orthodontists more frequently checked their patients during retention than others (Table 2).

Table 2.

Comparison of retention appliances and monitoring practices across countries

Variable / Country	Croatia	Kosovo	NM	*P-value*
Maxilla acrylic plate retention	3 (2%)[a]	12 (16%)[b]	38 (40%)[c]	<0.001
Maxilla VFR	109 (79%)[a]	12 (16%)[b]	50 (53%)[c]	<0.001
Maxilla only fixed	2 (1%)[a]	0[a]	10 (11%)[b]	<0.001
Maxilla combination fixed+removable	23 (17%)[a]	49 (67%)[b]	18 (20%)[a]	<0.001
Mandible acrylic plate retention	2 (1%)[a]	0[a]	27 (28%)[b]	<0.001
Mandible VFR	91 (66%)[a]	0[b]	42 (44%)[c]	<0.001
Mandible only fixed	10 (7%)[a]	15 (21%)[b]	21 (22%)[b]	0.002
Mandible combination fixed+removable	45 (33%)[a]	58 (80%)[b]	16 (17%)[c]	<0.001
Retention >3 years – orthodontist monitor	104 (75%)[a]	67 (92%)[b]	94 (99%)[b]	<0.001
Retention >3 years – dentist monitor	10 (7%)	5 (7%)	1 (1%)	0.088
Retention >3 years – patient monitor	43 (31%)[a]	1 (1%)[b]	0[b]	<0.001
Check-ups in retention, fixed appliance during the first year (≥3)	80 (58%)[a]	73 (100%)[b]	53 (56%)[c]	<0.001
Check-ups in retention, removable appliance during the first year (≥3)	91 (66%)[a]	73 (100%)[b]	79 (83%)[a]	<0.001
Check-ups retention after first year (≥2)	43 (31%)[a]	55 (75%)[b]	40 (42%)[a]	<0.001
Class II div 1 check-up retention maxilla ≥3y	94 (68%)[a]	0[b]	80 (84%)[c]	<0.001
Class II div 1 check-up retention mandible ≥3y	92 (67%)[a]	0[b]	81 (85%)[c]	<0.001

The original malocclusion and treatment outcome were reported to be the most important factors influencing the choice of retention type in Macedonia and Croatia (P<0.001), while patients' wishes/motivation, and age/completion of growth were most important in Kosovo (P<0.001).

Personal experience was identified as the most important source of information on retention in all 3 countries. Croatian orthodontists changed their retention protocol less frequently than their colleagues from other countries (P<0.001). In contrast, Kosovar orthodontists most often adjusted both the type of appliance and the retention period (P<0.001) (Table 3).

Table 3.

Comparison of reasons for choosing retention protocols and changes across countries

Variable / Country	Croatia	Kosovo	NM	*P-value*
Retention choice – malocclusion	100 (73%)[a]	13 (18%)[b]	74 (78%)[a]	<0.001
Retention choice – treatment outcome	84 (61%)[a]	8 (11%)[b]	55 (58%)[a]	<0.001
Retention choice – oral hygiene	70 (51%)[a]	24 (33%)[b]	38 (40%)[ab]	0.034
Retention choice – periodontal health	67 (49%)	34 (47%)	38 (40%)	0.425
Retention choice – patient's wish and motivation	49 (36%)[a]	55 (75%)[b]	29 (31%)[a]	<0.001
Retention choice – age/completition of growth	62 (45%)[a]	64 (88%)[b]	40 (42%)[a]	<0.001
Retention choice – myofunctional status	41 (30%)[a]	0[b]	30 (32%)[a]	<0.001
Retention choice – tooth morphology	13 (9%)	3 (4%)	9 (10%)	0.349
Retention choice – wisdom teeth	13 (9%)[a]	23 (32%)[b]	22 (23%)[b]	<0.001
Retention choice – info from residency	36 (26%)[a]	2 (3%)[b]	55 (58%)[c]	<0.001
Retention choice – experience	85 (62%)	44 (60%)	72 (76%)	0.043
Retention choice – literature	24 (17%)[a]	0[b]	48 (51%)[c]	<0.001
Retention choice – courses	21 (15%)[a]	22 (30%)[b]	53 (56%)[c]	0.001
Retention choice – colleagues	18 (13%)[a]	3 (4%)[a]	38 (40%)[b]	<0.001
Changes made in any kind of retention protocol	14 (65%)[a]	61 (84%)[b]	77 (83%)[b]	<0.001
Change in appliance type	24 (17%)[a]	61 (84%)[b]	19 (20%)[a]	<0.001
Change in retention period	34 (32%)[a]	53 (73%)[b]	20 (21%)[a]	<0.001

Removable retainers are manufactured mainly by lab technicians and bonded directly by orthodontists in all 3 countries. Most orthodontists agree on the need for general guidelines on retention (Table 4).

Table 4.

Comparison of retainer manufacturing practices between countries.

Variable / Country	Croatia	Kosovo	NM	*P-value*
Removable retainers manufactured by orthodontists	23 (17%)[a]	12 (16%)[a]	1 (1%)[b]	<0.001
Removable retainers manufactured by assistants	25 (18%)[a]	23 (32%)[a]	0[b]	<0.001
Removable retainers manufactured by lab technicians	102 (74%)[a]	38 (52%)[b]	94 (99%)[ab]	<0.001
Fixed retainers manufactured by orthodontists	121 (88%)[a]	61 (84%)[a]	95 (100%)[b]	<0.001
Fixed retainers manufactured by assistants	2 (1%)	0	0	0.574
Fixed retainers manufactured by lab technicians	6 (4%)	0	0	0.183
General guidelines on retention required	122 (84%)	68 (93%)	90 (95%)	0.198

When considering specific malocclusions and orthodontic treatments, combined retention was the preferred approach for open bite, spacing, and rotation cases across all three countries. In extraction cases, Croatian orthodontists more often chose removable retainers for the maxilla and combined retention for the mandible, while their North Macedonian and Kosovar counterparts preferred a combined approach for both arches. For impaction cases, Croatians primarily used removable retainers for both arches, whereas orthodontists from North Macedonia and Kosovo favored a combination of fixed and removable retainers. In expansion cases, Croatians predominantly selected removable retainers, Kosovars leaned toward a combined approach, and North Macedonians showed an equal preference for both combined and removable retainers (Table 5).

Discussion

This study provides valuable insights into retention protocols among orthodontists in Croatia, North Macedonia, and Kosovo, highlighting regional similarities and differences in clinical practices. Personal experience was the primary source of information on retention across all three countries. Variations were observed in the choice of appliances, retention duration, and follow-up protocols. The findings revealed significant variations between the three countries, highlighting differences in clinical preferences, educational influences, and retention practices.

Surveys on retention practices from different countries have reported response rates ranging widely, from as low as 18%[15] to as high as 91%.[16] With a response rate of 75% for Croatia, 58% in Kosovo, and 63% in North Macedonia, the return rate in this study can be considered relatively high, minimizing the likelihood of non-responder bias.

Table 5.

Comparison of retainer use in specific malocclusions and treatment protocols across countries.

Variable / Country	Croatia	Kosovo	NM	*P-value*
Extraction maxilla				
Fixed retainer	11 (8%)[a]	5 (7%)[a]	21 (22%)[b]	0.001
Removable retainers	69 (50%)[a]	6 (8%)[b]	27 (28%)[c]	<0.001
Combination	58 (42%)	62 (85%)	47 (50%)	<0.001
Spacing maxilla				
Fixed retainer	18 (13%)[a]	0[b]	33 (35%)[c]	<0.001
Removable	29 (21%)	8 (11%)	20 (21%)	0.159
Combination	97 (70%)[a]	65 (89%)[b]	43 (45%)[c]	<0.001
Expansion maxilla				
Fixed retainer	10 (7%)	0	6 (6%)	0.068
Removable retainer	75 (54%)[a]	9 (12%)[b]	48 (51%)[a]	<0.001
Combined	55 (40%)[a]	64 (88%)[b]	41 (43%)[a]	<0.001
Lateral expansion maxilla				
Fixed retainer	7 (5%)	0	5 (5%)	0.141
Removable	91 (66%)[a]	9 (12%)[b]	49 (52%)[c]	<0.001
Combined	41 (30%)[a]	64 (88%)[b]	42 (44%)[c]	<0.001
Impacted canine				
Fixed	13 (9%)[a]	0[b]	29 (31%)[c]	<0.001
Removable	73 (53%)a	9 (12%)b	28 (30%)c	<0.001
Combined	53 (38%)[a]	64 (88%)[b]	39 (41%)[a]	<0.001
Rotated maxilla				
Fixed	14 (10%)[a]	0[b]	27 (28%)[c]	<0.001
Removable	54 (39%)	18 (25%)	27 (28%)	0.063
Combined	71 (51%)[a]	55 (75%)[b]	43 (45%)[a]	0.065
Open bite maxilla				
Fixed	22 (16%)[a]	0[b]	15 (16%)[a]	0.001
Removable	56 (41%)	32 (44%)	36 (38%)	0.739
Combined	66 (48%)	41 (56%)	45 (47%)	0.445
Extraction mandible				
Fixed	16 (12%)[a]	3 (4%)[a]	23 (24%)[b]	0.001
Removable	58 (42%)[a]	18 (25%)[b]	26 (27%)[b]	0.013
Combined	60 (44%)[a]	52 (71%)[b]	46 (48%)[a]	<0.001
Spacing mandible				
Fixed	19 (14%)[a]	1 (1%)[b]	35 (37%)[c]	<0.001
Removable	26 (19%)	23 (32%)	18 (19%)	0.075
Combined	92 (67%)	49 (67%)	42 (44%)	<0.001
Expansion frontal mandible				
Fixed retainer	13 (9%)[a]	0[b]	10 (11%)[a]	0.019
Removable	64 (46%)[a]	18 (25%)[b]	39 (41%)[a]	0.008
Combined	58 (42%)[a]	55 (75%)[b]	47 (50%)[a]	<0.001
Expansion lateral mandible				
Fixed	13 (9%)[a]	0[b]	9 (10%)[a]	0.024
Removable	77 (56%)[a]	18 (25%)[b]	41 (43%)[a]	<0.001
Combined	45 (33%)[a]	55 (75%)[b]	45 (48%)[c]	<0.001
Impacted canine mandible				
Fixed	15 (11%)[a]	0[b]	29 (31%)[c]	<0.001
Removable	67 (49%)[a]	18 (25%)[b]	22 (23%)[b]	<0.001
Combined	54 (39%)[a]	55 (75%)[b]	43 (45%)[a]	<0.001
Rotated teeth mandible				
Fixed	14 (10%)[a]	0[b]	34 (36%)[c]	<0.001
Removable	44 (32%)	18 (25%)	19 (20%)	0.229
Combined	73 (53%)[a]	55 (75%)[b]	41 (43%)[a]	0.001
Open bite mandible				
Fixed	24 (17%)[a]	0[b]	22 (23%)[a]	<0.001
Removable	55 (40%)	32 (44%)	34 (36%)	0.569
Combined	61 (44%)	41 (56%)	39 (41%)	0.126

Orthodontists in Kosovo demonstrated more working days with patients and a tendency for more frequent check-ups during both the first year and subsequent years of retention, compared to their Croatian and Macedonian counterparts. The higher frequency of patient visits and follow-ups among Kosovar orthodontists may reflect economic factors as well as differences in healthcare accessibility, patient compliance, and private practice dynamics, which influence retention protocols. While in North Macedonia orthodontists were more likely to rely exclusively on acrylic removable retainers, in Croatia the preferred choice was VFR; orthodontists in Kosovo predominantly opted for a combination of fixed and removable retainers in both arches. These differences suggest that education and clinical training, along with patient-specific factors, strongly influence the choice of retention appliances, as seen in similar surveys conducted in other countries. The findings of this study align with trends observed in previous surveys, highlighting differences in retention practices across various regions. While VFR remains the most commonly used choice for both jaws in Croatia and acrylic plate in North Macedonia, Kosovo orthodontists strongly support a combination of both fixed retainers and VFR. This variation in retainer preferences may stem from differences in educational training, clinical traditions, and patient compliance across the three countries. The strong preference for a combination of FBR and VFR among Kosovar orthodontists could indicate a more conservative approach to preventing relapse, possibly influenced by concerns over patient adherence to removable retainers alone. In contrast, Croatian orthodontists may favor VFR due to its ease of fabrication and patient acceptance, while the preference for acrylic plates in North Macedonia could reflect established national practices and training influences. Additionally, economic factors and the availability of orthodontic materials may also play a role in shaping these preferences. Studies in Australia and New Zealand have shown a preference for removable retainers in the maxilla, with FBRs used in less than 20% of cases.[11] In contrast, Dutch orthodontists report using fixed retention in the maxilla for approximately 62% of patients, sometimes in combination with removable retainers.[16] Similarly, about 50% of Norwegian orthodontists [17] apply FBR in the mandible, while in the maxilla, FBR is often supplemented with removable options. In the U.S., the use of FBR in the maxilla is even less common, reported in only 2.4%–11% of patients.[12,15]

Factors such as malocclusion and age also influenced retention decisions. In Croatia and North Macedonia, orthodontists reported that original malocclusion and treatment outcome were the primary determinants for selecting retention appliances, while in Kosovo, patient age and growth completion were more significant. This aligns with findings from other studies, where the pre-treatment situation, original malocclusion, and patient-specific characteristics often dictate retention choices.[17] Malocclusion, such as tooth rotations, is identified as the most likely to relapse after treatment and determines the retention protocol.[18]

The role of clinical experience also emerged as a notable factor, with 75% of Macedonian and 60% of Kosovar orthodontists citing it as the main guideline of their retention protocols. This was quite different from a study from Croatia, where the clinical experience of the orthodontist influenced the protocol in only 39%.[14] A similar study reveals that an increase in expertise was associated with more frequent recalls.[19] Fear of relapse influences several decisions, both for clinicians and patients. These concerns drive clinicians to decisions for prolonged or even lifetime retention. While in Kosovo and North Macedonia, 92% to 99% of orthodontists monitor the retention phase up to 3 years and rarely rely on general dentists or patients' self-awareness, in Croatia, orthodontists have less frequent visits than in the other two countries, but after 3 years, patients monitor themselves more than in Kosovo or North Macedonia. On the other hand, our findings revealed that very few orthodontists in the Balkan region support lifetime retention.[16,20] On the contrary, the majority of Swiss orthodontists promote lifetime retention. This gives rise to the concern of numerous follow-ups throughout the lifetime. Whether or not to favor lifetime retention might depend on each country's health regulations or financial agreements between orthodontists and patients, or general dentists and patients. Considering the complications related to stability and periodontal implications, the need for lifelong follow-up by a general dentist instead of an orthodontist could be a drawback. Side effects reported of bonded retainers include torque changes like the x effect, breakages, and bond failures, among others.[21-24] Further research on periodontal implications has identified multiple factors to consider when planning for longer retention and identifying responsible parties to address these issues.[25-27]

In our study, fixed retainers were usually produced directly by orthodontists and removable retainers by lab technicians, which was a similar finding in all countries. Combined retention was the preferred option in both maxilla and mandible in the majority of malocclusions and orthodontic treatments. However, Croatian orthodontists more often chose only a removable retainer for the maxilla in extraction cases and impaction, while a combination of both removable and fixed retainers was the choice of North Macedonian and Kosovar orthodontists. For expansion cases, Croatian and North Macedonian orthodontists more often chose removable retainers, while Kosovar orthodontists still preferred a combination of both. Similarly, in the Netherlands, the majority of orthodontists positioned bonded retainers in both the upper and lower arches, except for situations in which the upper arch had extraction cases or expansion was performed during treatment, in which case a removable retainer was used.[16]

Our findings indicate that written retention guidelines are rarely provided by orthodontists in Kosovo (11%), North Macedonia (25%), and Croatia (32%), despite the well-known challenges of ensuring long-term stability and patient compliance. This may be due to a preference for verbal explanations or the absence of standardized written retention guidelines across these regions. Additionally, the absence of standardized written retention protocols, time constraints in clinical practice, and cultural and educational differences may also play a role. In Kosovo, verbal communication is traditionally preferred over written documentation, particularly in healthcare settings, which could contribute

to this trend. Given that written instructions enhance patient recall and adherence, integrating them alongside verbal explanations could improve retention outcomes, warranting further research and standardized guidelines. Furthermore, studies have shown that written instructions can enhance patient adherence and serve as a useful reference for long-term follow-up.[28] Therefore, the results of this study emphasize the need for standardized guidelines for retention practices. High-quality randomized clinical trials could provide evidence-based insights, helping orthodontists adopt the most effective retention strategies for different clinical scenarios.

Such diversity in retention strategies underscores the importance of further research and the potential value of establishing evidence-based guidelines. By developing standardized recommendations, orthodontists can make more informed decisions that ensure long-term stability for their patients while addressing the variations currently observed in clinical practice.

Limitation

The study relies on self-reported survey data, which may introduce recall bias and limit the generalizability of findings due to potential variations in respondent interpretations and regional healthcare structures.

Clinical Significance

Understanding regional differences in retention practices highlights the need for standardized guidelines and improved patient education, ensuring long-term stability and adherence to retention protocols across different healthcare settings.

This study highlights how orthodontists in Croatia, North Macedonia, and Kosovo approach retention differently, with a mix of clinical habits, training backgrounds, and patient needs determining their choices. A combination of fixed and removable retainers was most common, especially in Kosovo, showing a cautious approach to preventing relapses. While experience plays a significant role in decision-making, the lack of written retention guidelines is a shared challenge. These findings point to a real need for clearer, evidence-based protocols that can help unify practices and improve long-term outcomes for patients. Furthermore, it would be beneficial for orthodontic societies and professional associations to provide practitioners with updated, research-based information on retention practices to ensure standardized and optimal patient care.

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Competing Interests

The authors declare that they have no competing interests.

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