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Review Article

Patient-Reported Outcomes in Orthodontic–Periodontal Interdisciplinary Care

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ABSTRACT

The integration of orthodontic and periodontal care represents a critical interdisciplinary approach to managing complex dental conditions, where patient-reported outcomes (PROs) serve as essential indicators of treatment success beyond clinical metrics. This narrative review synthesizes evidence from peer-reviewed literature published on PROs in orthodontic–periodontal interdisciplinary care. Key themes include pain, discomfort, oral health-related quality of life (OHRQoL), treatment satisfaction, functional impairments, and periodontal health perceptions. The review highlights studies on combined therapies for conditions such as palatally impacted canines, stage IV periodontitis, tilted molars, intra-bony defects, and retention phases, emphasizing how interdisciplinary interventions influence patient experiences. For instance, accelerated orthodontic methods for impacted canines show variable impacts on treatment time and PROs, while alveolar ridge preservation post-extraction improves patient satisfaction alongside bone maintenance. Combined periodontal-orthodontic treatments for severely compromised teeth demonstrate high patient acceptance despite advanced disease, with low pain levels and improved self-perceived outcomes. Retention strategies, including CAD/CAM-based retainers, reveal favorable PROs related to stability and periodontal health. Mobile applications and social media interventions enhance behavioral changes, positively affecting PROs during orthodontic care with periodontal considerations. Overall, the findings underscore the value of PROs in optimizing interdisciplinary protocols, revealing gaps in long-term data and the need for standardized measures. This review aims to guide clinicians in incorporating patient perspectives to enhance care quality and outcomes in orthodontic–periodontal collaborations.

Keywords: Patient-reported outcomes, Orthodontic treatment, Periodontal health, Interdisciplinary care, Oral health-related quality of life, Treatment satisfaction

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Introduction

Orthodontic treatment often intersects with periodontal health, particularly in cases involving malocclusions that exacerbate periodontal issues or vice versa. Interdisciplinary care between orthodontists and periodontists is essential for addressing these complexities, ensuring not only clinical efficacy but also patient-centered results [1, 2]. Periodontal conditions, such as attachment loss, intra-bony defects, or furcation involvement, can complicate orthodontic tooth movement, potentially leading to further tissue damage if not managed collaboratively. Conversely, orthodontic interventions can support periodontal regeneration by realigning teeth to improve hygiene and reduce plaque accumulation [3, 4].

Patient-reported outcomes (PROs) have gained prominence in dental research as subjective measures that capture patients' experiences, including pain, discomfort, functional limitations, aesthetic satisfaction, and overall quality of life. Unlike objective clinical parameters like pocket depth or bone levels, PROs provide insights into how treatments affect daily life, adherence, and long-term satisfaction

[5, 6]. In orthodontic–periodontal care, PROs are particularly relevant due to the prolonged nature of treatments, potential for discomfort from appliances or surgeries, and the impact on oral function and aesthetics. For example, patients with stage IV periodontitis undergoing combined therapies report on aspects like chewing ability and self-perceived periodontal stability, which influence treatment compliance [7].

The objectives of this review are to: (1) examine the types of PROs assessed in orthodontic–periodontal interdisciplinary care; (2) synthesize findings on how these outcomes vary across specific interventions, such as surgical exposures, ridge preservation, and retention strategies; (3) identify factors influencing PROs, including treatment modalities and patient characteristics; and (4) highlight implications for clinical practice and future research. By focusing on literature, this narrative review provides an up-to-date synthesis to inform evidence-based interdisciplinary approaches.

The intersection of orthodontics and periodontics: clinical rationale and patient perspectives

The integration of orthodontics and periodontology is underpinned by the complex biomechanical and biological interactions between tooth movement and the surrounding periodontal tissues. Orthodontic forces stimulate alveolar bone and periodontal ligament remodeling, facilitating tooth alignment; however, in patients with compromised periodontal support, these forces may exacerbate inflammation, gingival recession, or alveolar bone loss if applied prematurely or without prior stabilization [3, 7, 8]. Interdisciplinary care mitigates these risks through carefully sequenced interventions, often beginning with periodontal therapy to control inflammation and promote tissue regeneration, followed by orthodontic alignment aimed at functional and aesthetic rehabilitation [4, 5, 9]. Such protocols not only optimize clinical outcomes but also preserve long-term periodontal health, underscoring the necessity of a patient-centered, evidence-based approach.

From the patient's perspective, PROs illuminate the lived experience of interdisciplinary treatment, capturing dimensions beyond measurable clinical indices. Patients frequently express concerns regarding treatment duration, aesthetic changes, and day-to-day impacts on eating, speech, or oral comfort. A systematic review of combined periodontal-orthodontic treatment for tilted molars and teeth with intra-bony or furcation defects in stage IV periodontitis highlighted the integration of PROs to assess overall treatment acceptability; however, specific metrics such as pain intensity or functional limitations were inconsistently reported, reflecting a gap in comprehensive patient-centered assessment [5, 10]. Retrospective analyses of patients with severely compromised teeth similarly emphasize that individuals value the preservation of natural dentition, often reporting enhanced self-confidence, improved comfort, and a sense of oral stability post-treatment [7, 11]. These findings highlight that while clinical outcomes such as pocket depth reduction or bone gain are critical, PROs including satisfaction with tooth retention, aesthetic improvement, and perceived functional restoration strongly influence patient motivation and adherence.

Interdisciplinary protocols also emphasize preventive strategies, with PROs serving as an important tool to evaluate adherence and behavioral engagement. Patients undergoing orthodontic treatment in the context of periodontal vulnerability report higher OHRQoL when interventions include structured education on plaque control, tailored oral hygiene instructions, and ongoing motivational support, demonstrating the interaction between behavioral compliance and subjective well-being [12, 13].

Types of patient-reported outcomes in interdisciplinary care

PROs in orthodontic-periodontal care span multiple domains, often standardized using validated instruments such as the Oral Health Impact Profile (OHIP), visual analog scales for pain, or specific functional and aesthetic questionnaires [3, 6, 14, 15]. These domains include pain and discomfort, functional limitations, psychological well-being, and overall treatment satisfaction.

Pain and discomfort are most pronounced during initial treatment phases, including surgical exposures or orthodontic appliance activation. A multicenter randomized controlled trial comparing open versus closed surgical exposure of palatally displaced canines found that the closed technique was associated with higher reported pain levels and temporary impairment in daily activities, as documented in patient diaries [6, 16]. Conversely, accelerated traction methods for impacted canines, reviewed systematically, demonstrated shorter overall treatment durations, which in some patients reduced cumulative discomfort despite transient procedural pain [1, 17].

Table 1. Summary of PRO Domains in Orthodontic–Periodontal Interdisciplinary Care

PRO Domain	Measurement Tools	Typical Findings	Influencing Factors	Clinical Implications

Pain & Discomfort	Visual analog scales, patient diaries	Moderate during initial phases; resolves quickly	Surgical technique, appliance type, acceleration methods	Preoperative counseling and analgesics improve patient experience
Functional Outcomes	Chewing efficiency, speech, sensitivity questionnaires	Improved mastication and oral function post-intervention	Periodontal status, regenerative procedures	Enhances treatment adherence and OHRQoL
Psychological & Aesthetic Outcomes	OHIP, self-perception scales	High satisfaction with aesthetics, improved confidence	Visibility of teeth, retention strategy	Guides selection of aesthetic-conscious protocols
Oral Health-Related Quality of Life (OHRQoL)	OHIP-14, OHIP-49	Significant improvement post-interdisciplinary care	Disease severity, treatment duration, behavioral support	Supports integration of PROs in treatment planning
Treatment Satisfaction	Custom questionnaires, interviews	High acceptance of retention devices, regenerative interventions	Pain management, functional recovery, engagement with digital tools	Informs patient-centered decision-making and retention choices
Behavioral & Digital Engagement	App usage logs, adherence reports	Improved hygiene, reduced periodontal complications	Age, motivation, technology adoption	Encourages use of digital interventions to sustain long-term PROs

Functional outcomes—including chewing efficiency, speech articulation, and sensitivity—are particularly relevant in patients with pre-existing periodontal compromise. Buccal bone regeneration procedures combined with piezocision in adult orthodontic patients yielded positive functional PROs, with patients reporting improved mastication and reduced tooth sensitivity, corroborated by 3D radiographic evidence of bone gain [4, 18]. Similarly, alveolar ridge preservation studies reported enhanced satisfaction with subsequent prosthetic or implant rehabilitation, attributable to maintained ridge contours and favorable aesthetics [2, 19].

Psychological and aesthetic PROs, encompassing self-esteem, social confidence, and perceived appearance, are particularly salient in visible areas of the dentition. During retention phases, where periodontal stability is closely monitored, patients consistently report high satisfaction when outcomes prevent relapse while preserving gingival health and smile aesthetics [14, 20, 21]. Collectively, these findings underscore the multidimensional value of integrating PROs into interdisciplinary treatment planning, allowing clinicians to balance objective clinical success with patient-centered experiences that drive engagement, adherence, and overall quality of life.

Impact on oral health-related quality of life

Oral health-related quality of life (OHRQoL) encompasses physical, psychological, and social dimensions of oral health, offering a comprehensive patient-reported outcome measure in interdisciplinary dental care. Unlike traditional clinical indices, OHRQoL captures the broader effects of treatment on daily functioning, self-esteem, and social interactions, providing insights into patient well-being that extend beyond structural or aesthetic outcomes. Evidence indicates that combined periodontal and orthodontic treatments can substantially enhance OHRQoL by simultaneously addressing alignment, periodontal stability, and overall oral function [7, 12, 20].

In patients with stage IV periodontitis and severely compromised teeth, interdisciplinary interventions integrating periodontal therapy with orthodontic alignment resulted in high OHRQoL scores. Patients reported fewer limitations in social interactions and improved confidence post-treatment, reflecting the psychosocial benefits of preserving natural dentition and restoring functional occlusion [7, 22]. These findings are consistent with systematic reviews examining retention adjuncts, where alternatives to conventional retainers—such as customized CAD/CAM devices—were associated with improved perceived stability and reduced anxiety about relapse, further enhancing OHRQoL [14, 23].

Specific clinical interventions also demonstrate notable effects on OHRQoL. For impacted canines, faster alignment protocols correlate with quicker restoration of normal oral function and social comfort, highlighting the importance of treatment efficiency in patient-centered care [1, 24]. Temporary skeletal anchorage devices, while effective, may induce soft-tissue irritation that transiently diminishes OHRQoL; however, overall patient satisfaction remains high due to successful treatment outcomes [3, 25]. Digital interventions, including mobile applications for patients with periodontal concerns, have been shown to improve OHRQoL by promoting adherence to oral hygiene regimens, reducing complications, and fostering patient engagement in care [12, 26].

Pain, discomfort, and functional impairments in specific interventions

Pain and functional discomfort are critical determinants of patient experience, as unmanaged discomfort can compromise compliance and negatively affect OHRQoL. Systematic evaluations of mini-implants demonstrate moderate initial pain, typically managed effectively with over-the-counter analgesics, with minimal long-term functional impairment [3]. Similarly, for palatally impacted canines, surgical technique significantly influences PROs; closed exposure procedures are associated with temporary postoperative discomfort affecting eating and oral hygiene for up to one week, whereas accelerated alignment techniques may reduce cumulative pain by shortening overall treatment duration [1, 6].

In regenerative interventions, such as buccal bone augmentation combined with piezocision, patients report mild, localized discomfort that resolves rapidly without significant disruption to function [4]. Combined interdisciplinary treatments for periodontal defects similarly result in low pain levels, likely due to phased approaches that allow adequate healing before the application of orthodontic forces [5].

Retention phases present distinct challenges in patient comfort and functional performance. Fixed retainers can lead to tongue irritation and hygiene difficulties, whereas customized CAD/CAM-designed retainers provide superior comfort, reduced failure rates, and improved patient satisfaction [21]. Such findings underscore the importance of integrating patient-centered design and proactive pain management strategies across all stages of interdisciplinary dental care to optimize both clinical outcomes and OHRQoL.

Table 2. Patient-Reported Outcomes (PROs) Across Orthodontic–Periodontal Interventions

Intervention Type	Study/Reference	Sample Characteristics	PROs Assessed	Key Findings
Impacted Canines – Surgical Exposure	[1, 6]	Adolescents and adults with palatally displaced canines	Pain, discomfort, functional limitation	Closed exposure: higher pain, temporary impairment in daily activities; accelerated traction reduces cumulative discomfort
Accelerated Orthodontic Methods	[1]	Patients with impacted canines	Treatment duration, pain, OHRQoL	Shorter treatment time improves patient satisfaction; transient procedural discomfort reported
Buccal Bone Regeneration + Piezocision	[4]	Adult patients with periodontal compromise	Functional outcomes, chewing efficiency, sensitivity	Improved mastication and reduced tooth sensitivity; positive patient feedback corroborated by 3D imaging
Alveolar Ridge Preservation	[2]	Post-extraction patients	Aesthetic satisfaction, functional outcomes	Maintained ridge contours, higher satisfaction with prosthetic rehabilitation
Stage IV Periodontitis – Combined Therapy	[5, 7]	Patients with severely compromised teeth	Pain, OHRQoL, treatment satisfaction	Low pain, high patient acceptance, improved self-perceived outcomes
Retention (CAD/CAM retainers)	[14, 21]	Post-orthodontic patients	Comfort, periodontal health, satisfaction	Superior comfort, reduced failure rates, positive impact on periodontal indices
Digital Interventions (Apps, social media)	[12, 27]	Adolescents and adults	Adherence, OHRQoL, hygiene behavior	Enhanced patient engagement, improved plaque control, reduced complications

Patient perceptions of periodontal health and treatment satisfaction

Patients' self-assessment of their periodontal status frequently demonstrates a meaningful correlation with objective clinical indices, yet it also provides additional nuance that clinical measures alone may overlook. Patient-reported outcomes (PROs) capture subjective experiences such as comfort, aesthetic satisfaction, and functional perceptions, which are increasingly recognized as essential components of comprehensive periodontal care. In the context of orthodontic retention, PROs indicate that patients perceive minimal gingival changes over time, and report high satisfaction when treatment outcomes maintain stability and prevent relapse [14]. This suggests that patient perceptions align with clinical objectives, reinforcing the value of integrating subjective evaluations alongside traditional periodontal indices.

For patients with severely compromised periodontal teeth, interdisciplinary salvage interventions—including periodontics, restorative dentistry, and orthodontics—are often associated with high patient satisfaction. Despite initial apprehension regarding the prognosis of compromised teeth, many patients prefer retention and preservation strategies over extraction, highlighting the importance of patient-centered decision-making in complex periodontal cases [7]. Similarly, studies on alveolar ridge preservation reveal that patients value preserved ridge contours, reporting superior aesthetic and functional satisfaction compared with scenarios involving significant resorption or implant placement [2]. Such findings emphasize that PROs extend beyond mere oral health metrics to encompass psychosocial dimensions, including confidence, appearance, and perceived quality of life.

Digital interventions have further contributed to positive patient perceptions by enhancing engagement and autonomy in oral hygiene practices. Mobile applications, intraoral scanners, and telemonitoring platforms empower patients to track their periodontal health, leading to improved self-reported oral hygiene behaviors and a perceived reduction in periodontal risk during orthodontic treatment [12, 28]. These technological solutions demonstrate the potential for digital tools to not only support clinical outcomes but also foster patient satisfaction through increased involvement in care processes.

Challenges in assessing PROs and emerging trends

Despite their recognized importance, the assessment of PROs faces several challenges. Heterogeneity in measurement instruments—ranging from validated questionnaires to ad hoc surveys—limits comparability across studies and may undermine the reliability of reported outcomes [1, 3, 29]. Standardization in PRO instruments is therefore essential to facilitate robust evaluation and meaningful interpretation. Emerging trends aim to integrate advanced imaging modalities, such as three-dimensional bone imaging, with PRO data to provide a more comprehensive understanding of treatment outcomes, particularly in contexts such as bone regeneration and complex periodontal therapy [4].

Long-term evaluation of PROs remains notably underexplored, especially in orthodontic retention, where ongoing periodontal monitoring is critical to ensure both structural stability and patient satisfaction over time [14, 21, 30]. Interdisciplinary treatment teams must prioritize consistent and standardized PRO capture, as these data can inform refinements in clinical protocols, support shared decision-making, and ultimately enhance patient-centered care. By systematically incorporating PROs into both clinical trials and routine practice, clinicians can achieve a more holistic understanding of periodontal treatment success that integrates objective clinical outcomes with subjective patient experiences.

Figure 1. Conceptual Summary of Interventions and PROs

Results and Discussion

The synthesis of recent literature on patient-reported outcomes (PROs) in orthodontic–periodontal interdisciplinary care reveals a multifaceted landscape where clinical efficacy is complemented by subjective patient experiences. While objective metrics such as bone regeneration, pocket depth reduction, and

alignment stability remain foundational, PROs provide critical insights into the real-world impact of these treatments on daily life, adherence, and overall satisfaction [3, 5, 31, 32]. This discussion integrates the thematic findings from the main text, highlighting strengths, limitations, and clinical implications, while identifying gaps that warrant further investigation.

One key theme is the management of impacted canines, where interdisciplinary approaches involving surgical exposure and orthodontic traction are common. Accelerated methods, such as corticotomy-assisted traction, have been shown to shorten treatment duration, which indirectly benefits PROs by reducing the overall period of discomfort and functional impairment [1]. However, patient-centered evaluations indicate that the choice of surgical technique—open versus closed exposure—plays a pivotal role in immediate postoperative experiences. Patients undergoing closed exposure report higher levels of pain and disruptions to daily activities, including eating and oral hygiene, as evidenced by randomized controlled trials [6, 33]. These findings suggest that while accelerated protocols may optimize efficiency, they must be balanced against potential increases in short-term discomfort. Clinicians should prioritize shared decision-making, incorporating patient preferences and pain tolerance to mitigate negative PROs. Furthermore, the integration of PROs in these studies underscores the need for comprehensive assessment tools that capture not only pain but also anxiety and aesthetic concerns during the active treatment phase [34, 35].

In the context of alveolar ridge preservation and regenerative procedures, PROs emphasize the aesthetic and functional advantages of interdisciplinary interventions. Techniques such as bone augmentation post-extraction preserve ridge dimensions, leading to improved patient satisfaction with subsequent implants or prosthetics [2, 36, 37]. Studies report high levels of satisfaction attributed to maintained facial contours and enhanced masticatory function, particularly in the esthetic zone [38]. For instance, immediate implant placement with simultaneous augmentation yields favorable PROs, including reduced sensitivity and better self-perceived aesthetics, compared to delayed approaches [36]. Similarly, buccal bone regeneration combined with piezocision in adult orthodontic patients demonstrates rapid resolution of discomfort and significant improvements in chewing efficiency, as confirmed by 3D radiographic evaluations and patient feedback [4, 39]. These outcomes highlight how periodontal stabilization enhances orthodontic predictability, fostering positive PROs. However, variability in patient responses may stem from individual factors such as age, smoking status, or baseline periodontal health, which are not consistently controlled in the reviewed literature [40].

For patients with advanced periodontal disease, such as stage IV periodontitis, combined periodontal-orthodontic therapies offer a viable alternative to extraction, with notable improvements in PROs [7, 41]. Retrospective and prospective studies indicate that regenerative surgery followed by orthodontic movement results in enhanced OHRQoL, reduced functional limitations, and increased self-confidence due to tooth retention [7, 42, 43]. Multicenter trials further corroborate these benefits, showing significant QoL gains at 24 months post-treatment, attributed to the synergy of wound healing stimulation and tooth realignment [41]. In cases involving tilted molars or intra-bony defects, systematic reviews note that while clinical parameters improve, PROs like pain during movement are generally low, promoting high acceptance rates [5]. Long-term data, extending up to 10 years, affirm the stability of these outcomes, with patients reporting sustained satisfaction and minimal relapse [42]. Nonetheless, the complexity of these cases necessitates careful sequencing—periodontal therapy preceding orthodontics—to avoid exacerbating inflammation, which could adversely affect PROs [3, 31]. The reviewed evidence suggests that interdisciplinary planning not only salvages compromised teeth but also empowers patients by aligning treatments with their values, such as preserving natural dentition over prosthetics [7, 43].

Retention phases represent a critical juncture where PROs intersect with long-term periodontal health. Alternatives to traditional bonded retainers, including CAD/CAM-fabricated options, exhibit superior comfort, fewer failures, and better periodontal indices, leading to higher patient satisfaction [21, 44]. Systematic reviews and meta-analyses indicate that clear plastic retainers may offer advantages in gingival health, though at the potential cost of increased relapse risk [14]. Cross-sectional studies of long-term retention patients (up to 10 years post-treatment) reveal overall satisfaction with oral hygiene capabilities and minimal perceived periodontal changes, reinforcing the importance of patient education on retainer maintenance [45]. However, challenges such as tongue irritation or hygiene difficulties persist with fixed appliances, underscoring the need for personalized retention strategies [44]. PROs in this domain also highlight psychological benefits, such as reduced anxiety about alignment relapse, which contribute to overall treatment success [14, 35, 46].

Emerging digital interventions, including mobile applications and teledentistry, are transforming PROs

by promoting behavioral changes essential for periodontal health during orthodontic care [12, 27]. Apps designed for oral hygiene reminders and progress tracking have demonstrated short-term improvements in plaque indices and patient adherence, translating to better self-reported outcomes like reduced gingival bleeding and enhanced confidence [12]. Pilot studies on tailored apps show potential in adolescent populations, where compliance is often challenging, by making hygiene routines engaging and accessible [27]. These tools address gaps in traditional education, particularly in periodontal-risk patients, and could be integrated into interdisciplinary protocols to sustain long-term PROs [31].

Despite these advancements, several limitations in the current literature must be acknowledged. Heterogeneity in PRO measurement tools—ranging from validated scales like OHIP to ad-hoc questionnaires—hampers comparability across studies [1, 5]. Many investigations focus on short-term outcomes, with scant long-term data beyond 2-5 years, potentially underestimating chronic issues like relapse or periodontal deterioration [42, 45, 47]. Additionally, patient demographics are often skewed toward adults or specific conditions, limiting insights into pediatric or diverse populations [4, 38]. Selection bias in retrospective designs and small sample sizes further constrain generalizability [7, 40].

Clinical implications

Clinically, these findings support the routine integration of patient-reported outcomes (PROs) into interdisciplinary orthodontic-periodontal care. Incorporating PROs during treatment planning allows clinicians to anticipate and address patient concerns proactively, thereby enhancing adherence, satisfaction, and overall treatment success. For instance, preoperative discussions regarding pain management for surgical exposures, combined with app-based interventions to support oral hygiene, can reduce patient anxiety and minimize negative experiences, ultimately improving both subjective and objective outcomes [6, 12]. By systematically capturing patient perspectives, clinicians can refine individualized protocols that align clinical efficacy with patient comfort and psychosocial well-being.

Conclusion

In conclusion, PROs provide essential insights into the effectiveness of interdisciplinary orthodontic-periodontal care. Evidence indicates that combined approaches enhance pain management, functional restoration, oral health-related quality of life (OHRQoL), and overall treatment satisfaction across a range of conditions, from impacted canines to advanced periodontitis and retention phases. Patient perspectives underscore the holistic benefits of collaborative treatment, with tooth preservation and behavioral support emerging as critical drivers of perceived success and long-term adherence [31, 41].

Future research should prioritize the development and implementation of standardized PRO frameworks, such as core outcome sets, to facilitate comparability across studies and enable robust evidence synthesis. Longitudinal investigations involving diverse patient populations are particularly needed to evaluate long-term outcomes, identify potential disparities, and inform inclusive care strategies. Furthermore, the integration of advanced technologies—including AI-driven applications for patient engagement and 3D-printed, customized retainers—has the potential to further enhance PROs and support personalized, patient-centered care [27, 44].

Ultimately, embedding the patient voice into both research and clinical practice is essential to advancing interdisciplinary care. By systematically aligning clinical interventions with patient experiences and expectations, clinicians can not only optimize health outcomes but also foster greater satisfaction, confidence, and quality of life in individuals undergoing complex orthodontic-periodontal treatment.

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