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FACTORS ASSOCIATED WITH TERMINATION OF FIXED ORTHODONTIC TREATMENT BEFORE COMPLETION

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Abstract

Premature discontinuation of fixed orthodontic treatment may occur before the agreed clinical objectives have been achieved and may compromise treatment continuity. This narrative literature review examines factors potentially associated with discontinuation among patients treated in private dental clinics. Literature published primarily between 2021 and 2026 was considered, with emphasis on orthodontic adherence, appointment attendance, treatment duration, socioeconomic circumstances, patient experience, communication, and retention. The available evidence indicates that adherence is multidimensional and that the factors influencing it are measured inconsistently across studies. Financial affordability, motivation and expectations, discomfort, treatment duration, missed appointments, family support, communication, and access to care are relevant domains for further investigation; However, evidence directly linking each factor to premature discontinuation of fixed appliances remains limited. Findings from studies of removable appliances or retainers should not be generalized uncritically to fixed orthodontic treatment. Private clinics may consider structured pretreatment education, transparent cost information, appointment reminders, systematic follow-up after missed visits, and documentation of discontinuation reasons. These measures should be evaluated using clearly defined clinical and service indicators. A more rigorous review with a reproducible search strategy and primary studies from Indonesia is needed to establish the consistency and magnitude of associations.

Keywords: Adherence; Fixed Orthodontics; Patient Communication; Premature Discontinuation; Socioeconomic Factors

INTRODUCTION

Orthodontic treatment is a part of dental care that aims to improve tooth position and occlusal relationships while supporting masticatory function, oral hygiene, and dentofacial aesthetics. Fixed orthodontic treatment uses components attached to the teeth to control tooth movement through the activation of wires and orthodontic mechanics. This process is gradual and requires repeated evaluation. Its success depends not only on the dentist's clinical competence but also on the continuity of visits, oral hygiene, and patient engagement throughout the treatment (Nahajowski et al., 2022; van der Bie et al., 2024).

Continuity of treatment is important because appliance placement is not the final goal of therapy. Clinical goals may include malocclusion correction, space realignment, and achieving the planned occlusal relationship. If treatment is discontinued before clinical goals are achieved, outcomes may be suboptimal, and the patient may require further evaluation or treatment. Premature discontinuation should also be distinguished from planned appliance removal after clinical goals are achieved. The retention literature indicates that stability of outcomes after the active phase is a separate issue, so treatment completion should be understood as a planned clinical process (Jedliński et al., 2021).

Discontinuing treatment before completion is not synonymous with delayed follow-up or non-compliance with instructions. A patient who has been absent for several months does not necessarily have decided to discontinue treatment permanently. Instead, a patient may request device removal before clinical goals are achieved, change facilities, or be unable to continue due to specific constraints. This definitional distinction is important to avoid confounding actual discontinuation with process indicators such as missed visits (van der Bie et al., 2024).

Patient compliance is a frequently discussed construct in the orthodontic literature. Compliance can include attendance at scheduled check-ups, implementation of oral hygiene instructions, use of appliance attachments as directed , and willingness to undergo clinical evaluation. However, compliance does not always equate to treatment continuity. A systematic review by Nahajowski et al. (2022) and a scoping review by van der Bie et al. (2024)

demonstrated variation in the definition and measurement of compliance, as well as limited evidence to establish factors that consistently influence it.

In private dental clinics, patients may incur costs for visits, device activation, additional examinations, transportation, and indirect costs such as time spent in the clinic. Longer treatment times can also interact with changes in employment, education, residence, or family circumstances. These factors provide a rationale for considering affordability, service access, and schedule flexibility, but the extent of each factor's contribution to premature discontinuation needs to be demonstrated through research (Shi & Wu, 2023; van der Bie et al., 2024).

The patient's initial motivation and expectations can shape their assessment of the treatment process. Some patients focus on visible aesthetic changes, while clinical goals may include occlusal correction and tooth positioning. Differences in understanding can lead to dissatisfaction if the expected results are not yet apparent, or if the patient judges treatment to be adequate before clinical evaluation confirms that goals have been achieved. Therefore, initial education and ongoing communication should be considered an essential part of treatment management (van der Bie et al., 2024).

Experiences during treatment, including discomfort after activation, soft tissue irritation, difficulty maintaining hygiene, or interference with daily activities, are also worth assessing. Complaints do not automatically lead to discontinuation; their impact can vary depending on the intensity, ability to manage the symptoms, and clinical response. Research needs to distinguish the presence of symptoms from the patient's perception of the patient's treatment and their ultimate decision to discontinue treatment (van der Bie et al., 2024).

Dentist-patient communication can help align understanding regarding duration, stages, costs, risks, and clinical goals. Digital reminders and structured communication have been reported to improve some adherence indicators, such as follow-up attendance, but it is not yet clear that these interventions directly prevent premature discontinuation (European Journal of Orthodontics, 2023; van der Bie et al., 2024).

Based on this description, this article aims to examine factors potentially associated with premature discontinuation of fixed orthodontic treatment in private dental clinic patients. The study focuses on sociodemographic and economic factors, motivation and expectations, clinical characteristics and treatment duration, patient experience, visit compliance, communication, and service accessibility. This study is expected to establish a conceptual framework for further research and support the development of service continuity strategies.

LITERATURE REVIEW

Early discontinuation is an outcome that needs to be operationally defined. In the context of this article, early discontinuation refers to the end of fixed orthodontic treatment before the agreed-upon clinical goals are achieved, not planned discontinuation after a dentist's evaluation. This definition still needs to be adjusted for empirical research, including determining how to classify patients who change clinics or do not return after a certain period. Consistency in definition is a prerequisite for comparing research results across facilities (van der Bie et al., 2024).

The orthodontic compliance literature encompasses several different behaviors, such as appliance use, adherence to instructions, oral hygiene, and attendance at checkups. Nahajowski et al. (2022) reviewed compliance with orthodontic appliances and showed that observed patient behavior did not always align with the recommended duration of use. However, their focus primarily concerned appliance use, not premature discontinuation rates in patients using fixed appliances. Therefore, their results support the importance of assessing patient behavior, but they cannot be used to quantify the risk of premature discontinuation.

Van der Bie et al. (2024) mapped the literature on patient adherence during the active and retention phases. The review identified numerous studies but concluded that evidence regarding factors that consistently influence adherence remains inconclusive. These findings suggest that adherence is a multidimensional phenomenon and that research needs to accurately define the behaviors or outcomes being measured. Early discontinuation should be examined as a distinct outcome, rather than as a generalized nonadherence.

Economic factors can be understood as enabling factors influencing a patient's ability to maintain regular visits. Income, job stability, transportation costs, and time required for follow-up visits potentially interact. Studies on the duration of fixed orthodontic treatment, which examined socioeconomic factors and malocclusion characteristics, provide context that suggests that treatment duration is not solely related to clinical characteristics (Shi & Wu, 2023). However, treatment duration is not a direct measure of discontinuation, so this relationship needs to be tested using appropriate outcome measures.

Patient motivation and expectations are factors that can change throughout treatment. Initial motivation may be influenced by aesthetic or functional goals, while actual experience can alter perceptions of benefits and burdens. If treatment goals are not adequately explained, patients may compare actual progress with unrealistic expectations.

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However, such a relationship should not be considered causal without data demonstrating that the difference in expectations preceded the decision to discontinue treatment.

Clinical characteristics and treatment duration can influence patient experience. The complexity of the malocclusion, tooth movement requirements, biological responses, changes in mechanics, and missed visits can all influence completion time. The relationship between duration and discontinuation is also potentially bidirectional: longer treatment can increase patient burden, while absenteeism can prolong treatment. A good analysis should note the chronological order and consider the complexity of the case to avoid concluding that duration alone is the cause.

Discomfort and clinical experience need to be measured in more detail than simply the presence or absence of symptoms. Symptom intensity, duration, activity disruption, patient understanding, and clinical response can provide different insights. Education about potential symptoms and pathways for seeking help is a reasonable strategy, but its effectiveness in preventing premature cessation needs to be evaluated. Evidence addressing orthodontic compliance emphasizes the need to consider context and individual factors when explaining patient behavior (van der Bie et al., 2024).

Family support and living conditions can be relevant factors, especially in adolescent patients or those dependent on others for finances and transportation. Studies on removable retainer compliance can provide context for behavior during the retention phase, but cannot be directly generalized to patients with fixed appliances during the active phase (Fua et al., 2023). Research on early discontinuation needs to directly measure social support and changes in living conditions.

Digital communication, visit reminders, and remote monitoring are approaches that can help maintain continuity of care. A review of tele-orthodontic technology demonstrated benefits for several adherence indicators, including attendance at follow-up appointments, but the benefits for early termination are uncertain. Digital interventions should be part of a system that allows patients to confirm appointments, reschedule appointments, and report any issues, rather than simply sending automated reminders (European Journal of Orthodontics, 2023).

A major gap in the literature is the limited evidence specifically assessing early discontinuation of fixed orthodontic treatment, particularly among patients in private dental clinics in Indonesia. Some studies measure adherence to appliances or retainers, some assess treatment duration, and some evaluate assistive technology. These differences in outcomes limit comparisons and generalizations. Local research is needed to examine relevant factors within the context of financing, access, and service patterns in Indonesia.

METHODOLOGY

article is structured as a narrative literature review integrating research on orthodontic adherence, treatment discontinuation, treatment duration, socioeconomic factors, clinical experience, communication, and continuity of care. The publication window prioritized was January 1, 2021, to October 20, 2026. Preferred sources included systematic reviews, scoping reviews, observational studies, and interventional studies relevant to orthodontic patient behavior.

Recommended searches include PubMed, PubMed Central, Scopus, Web of Science, and Google Scholar. Relevant keywords include “premature discontinuation of orthodontic treatment,” “fixed orthodontic treatment abandonment,” “orthodontic treatment dropout,” “patient adherence in orthodontics,” “orthodontic appointment adherence,” “orthodontic treatment duration,” “patient satisfaction,” and “socioeconomic factors in orthodontics.” Keywords can be combined with AND and OR operators. In this manuscript, this strategy serves as the search framework; the complete search process, number of records, deduplication, and article selection have not been systematically documented.

Prioritized literature criteria included publications in Indonesian or English that discussed orthodontic patients and related to adherence, treatment discontinuation, duration, communication, social support, economic factors, or strategies for increasing patient engagement. Research on removable appliances and retainers was used only as supporting evidence and was not considered equivalent to research on early discontinuation of fixed appliances. Articles lacking verifiable bibliographic metadata should not be included in the final reference list.

The synthesis was conducted thematically by grouping factors into six domains: socioeconomic, motivation and expectations, clinical characteristics and duration, treatment experiences, visit adherence, and communication and access to services. Direct evidence on early discontinuation was distinguished from indirect evidence assessing adherence or related outcomes. Because the selection process and risk of bias assessment have not been fully reported, this review does not claim to be a PRISMA systematic review and does not present unverified article selection figures.

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RESULTS AND DISCUSSION

Overview of available evidence

A scoping review by van der Bie et al. (2024) mapped research on orthodontic patient compliance and showed that definitions and measures of compliance vary. The conclusion that the evidence is inconclusive is important for the topic of premature discontinuation, as factors related to the presence or use of appliances are not always determinants of actual discontinuation. Further research should distinguish the process of patient engagement from the ultimate outcome of discontinuation before clinical goals are achieved.

Nahajowski et al. (2022) examined orthodontic compliance, specifically appliance behavior, while Fua et al. (2023) addressed adherence to removable retainers. Both studies support the view that patient behavior is an important component of treatment outcomes, but their populations and treatment stages differ from those of patients who discontinue fixed appliances prematurely. Therefore, these sources are used for context, not as direct evidence regarding the prevalence or predictors of premature discontinuation.

Socioeconomic circumstances and affordability

Costs can impact the ability to maintain care if patients must allocate routine expenses over a long period. However, measuring costs is not sufficient simply to ask about monthly income. Research should differentiate between perceived affordability, late payments, transportation costs, lost work time, and changes in economic circumstances during treatment. These variables may be interrelated but are not identical, so they should be recorded separately.

The implication for private clinics is the need for written explanations of the costs included in the package, potential additional costs, and mechanisms for patients experiencing payment difficulties. Transparency does not necessarily mean predicting all costs with certainty, as clinical needs can change. The primary goal is to reduce explainable uncertainty and help patients make more realistic decisions. The effectiveness of this measure in reducing premature discontinuation still needs to be evaluated with clinical data.

Motivation, expectations, and perceived progress

Initial motivation can change when patients compare actual results with their expectations. Patients who prioritize aesthetics may be satisfied when changes begin to appear, but others may become frustrated if progress seems slow. Dentists need to explain that tooth positioning is gradual and that clinical goals do not always match the appearance at each stage. This explanation is part of the shared decision-making process, not a guarantee that the patient will not discontinue treatment.

For empirical research, motivation, expectations, satisfaction with progress, and understanding of treatment goals should be measured as separate constructs. General satisfaction scores may not capture dissatisfaction with duration or cost. The instrument used should be tested for content validity and reliability in the target population. Research should also distinguish between expectations measured before treatment and perceived outcomes measured after several visits to ensure a clear chronological order.

Clinical characteristics, duration, and discomfort

Treatment duration is influenced by case complexity and clinical factors, and can increase due to changes in plans or missed visits. Shi and Wu (2023) discussed socioeconomic factors and malocclusion characteristics in relation to the duration of fixed orthodontics. Findings on duration need to be interpreted in context, as patients who undergo longer treatment are not automatically more likely to discontinue treatment. A more robust analysis requires information on case complexity and visit history.

Complaints during treatment should be assessed based on intensity, duration, impact on activities, and clinic response. Patients who experience complaints but receive explanations and support may have a different experience than those who feel their complaints are not addressed. Clinics can provide written education and communication channels when equipment malfunctions or complaints arise. This step has the potential to improve the patient experience, but its impact on discontinuation rates must be measurably assessed.

Appointment adherence and communication

Regular visits allow for evaluation of tooth response, mechanical adjustments, and problem detection. Repeated absences can signal a patient's impairment, but should not be immediately categorized as permanent discontinuation. Clinics should establish operational rules, such as the period of absence and the number of contact attempts made

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before a patient is classified as discontinued. Consistent definitions will improve data quality and allow for comparisons between periods.

Digital reminders can help reduce forgetfulness and facilitate rescheduling. However, reminders don't address cost, transportation, or work schedule challenges. A more comprehensive system would allow patients to respond, cancel appointments, and explain any obstacles they encounter. A review of tele-orthodontic technology supports benefits on some adherence indicators, but not enough to definitively state that reminders prevent premature termination (European Journal of Orthodontics, 2023).

Family support, service access, and practical implications

Family support can help with financing, transportation, scheduling reminders, and decision-making, especially for patients who are not yet financially independent. Changes in residence, employment, or family responsibilities can alter a patient's ability to continue attending the clinic. Studies should document whether patients discontinue care completely or switch providers to prevent misclassification of facility changes as complete discontinuation.

Operationally, clinics can develop structured initial education, cost documentation, reminder systems, follow-up for patients who miss visits, and record reasons for discontinuation. Quality indicators can include the proportion of patients who do not return after a specified interval, the proportion of patients who complete treatment as planned, documented reasons for discontinuation, and successful follow-up. Each indicator must have a clear definition and denominator to be used in quality audits.

Research gaps and conceptual framework

A key gap is the lack of evidence directly measuring premature discontinuation of fixed orthodontic treatment, particularly in private dental clinics in Indonesia. Future research should compare patients who complete treatment with those who discontinue treatment before reaching clinical goals. Medical records can be used to verify dates of insertion, visits, plan changes, and final status, while interviews or questionnaires can elicit patient reasons.

The proposed conceptual model places patient factors—such as motivation and expectations—alongside enabling factors such as cost, time, transportation, and family support. Service factors include communication, scheduling access, and responsiveness to complaints; clinical factors include malocclusion complexity, duration, and discomfort experienced. The presence of control and satisfaction can be studied as intermediary processes, while the primary outcome is completion according to plan or early termination. This model is a framework that needs to be tested, not a validated model.

CONCLUSION

Premature discontinuation of fixed orthodontic treatment needs to be understood as an outcome potentially influenced by the interaction of patient factors, socioeconomic conditions, clinical characteristics, treatment experience, communication, and service accessibility. The literature on orthodontic compliance supports the importance of patient engagement, but evidence directly examining the association of each factor with premature discontinuation is limited and heterogeneous. Results from studies on removable appliances or retainers cannot be directly generalized to patients with fixed appliances.

Private dental clinics can consider pre-treatment education, cost transparency, explanations of duration and clinical goals, visit reminders, documentation of complaints, and follow-up of patients who miss appointments. These strategies need to be evaluated using consistent indicators. Research in Indonesia with clear outcome definitions, medical record data, and direct patient information is needed to determine the factors truly associated with early termination and to assess the effectiveness of continuity of care interventions.

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