

PSYCHOLOGICAL INTERVENTIONS TO IMPROVE ORTHODONTIC TREATMENT ADHERENCE AMONG ADOLESCENTS: A MINI REVIEW

Wang Yifei^{1*}, Li Ruonan¹, Wang Zhongxin¹, Mohammed Faez Baobaid²,
Haryati Anuar²

¹ School of Graduate Studies, Management and Science University, Selangor, Malaysia

² International Medical School, Management and Science University, Selangor, Malaysia

Corresponding author: 012024020156@sgs.msu.edu.my

ABSTRACT

Adolescent adherence to orthodontic treatment is often suboptimal, leading to longer treatment times, increased appliance failures, and poorer clinical outcomes. Compliance is influenced by developmental, motivational, cognitive–emotional, and family–social factors. This narrative mini-review summarizes recent evidence on psychological interventions designed to enhance adherence in children and adolescents using fixed or removable orthodontic devices. A targeted literature search of PubMed, Scopus, and Google Scholar was conducted to identify relevant studies published between 2010 and 2025. Studies related to adherence outcomes such as appliance wear time, oral hygiene, appointment attendance, motivation, and self-efficacy, as well as concepts related to orthodontic adherence with specific intervention strategies, including motivational interviewing (MI), cognitive behavioral therapy (CBT), digital reminders or telemonitoring, and family or social support, are reviewed. MI and CBT demonstrated promising improvements, strengthening intrinsic motivation, self-efficacy, and self-regulation. Digital supports provided modest, scalable gains, though engagement often declined over time, while family- and peer-focused interventions showed promise but remain under-evaluated. This review highlights gaps in standardized adherence outcome measures and limited evidence for combined or multi-tiered interventions. Its added value lies in synthesizing current psychological strategies, identifying research gaps, and providing practical guidance for optimizing adolescent orthodontic adherence. Overall, a stepped-care approach combining universal digital support with targeted psychological interventions and structured family involvement appears most practical. Future research should standardize outcome measures and evaluate combined, cost-effective strategies to optimize adolescent orthodontic adherence.

Keywords:

Orthodontic compliance, adolescent, psychological interventions, motivational interviewing, digital adherence support

INTRODUCTION

Adolescent Orthodontic Treatment and the Role of Psychological Interventions

Adolescence represents a critical period for tooth development, during which many malocclusions first become clinically apparent. It is estimated that 56% of children and adolescents worldwide have dental irregularities requiring orthodontic treatment (Lombardo et al., 2020). Orthodontic treatment is typically indicated to correct misalignments for improving occlusion, aesthetics, and oral function (Gavic et al., 2024). However, due to ongoing psychological and physiological development, adolescents often exhibit limited self-awareness and self-regulatory capacity, which can substantially reduce treatment compliance and compromise clinical outcomes (Doughan et al., 2024). Nearly 50% of adolescents fail to meet recommended wear-time guidelines, and in one study of fixed appliances, only 22.6% of patients achieved full compliance with all six treatment criteria (van Doornik et al., 2025; Arponen et al., 2020). Noncompliance contributes to prolonged treatment, reduced effectiveness, patient and clinician fatigue, and additional financial burdens for families and healthcare systems (Religioni et al., 2025).

Multiple factors are associated with poor orthodontic adherence. Low motivation and unclear understanding of treatment benefits can decrease compliance, while anxiety, low self-esteem, and pain act as cognitive and emotional barriers (Xu et al., 2025). Several studies examine psychosocial characteristics or body-image-related factors associated with orthodontic experiences, rather than directly measuring adherence behaviors such as appliance wear time or appointment attendance. These psychosocial variables are therefore interpreted as correlates that may influence adherence. Family and peer support are critical, with evidence showing that positive parental involvement enhances adherence (van der Bie et al., 2024). Practical challenges, including forgetfulness, discomfort, competing academic or social demands, and inconsistent definitions of adherence, further complicate management (van der Bie et al., 2024). Youth also associated with unhealthy dietary habits like frequent snacking (Chen et al., 2021), which might lead to poor oral hygiene.

Given these challenges, psychological interventions provide a promising approach to improving adherence by targeting motivation, beliefs, cognition, emotions, and social support. This mini-review focuses on four categories of interventions in adolescent orthodontic care: motivational interviewing (MI), cognitive behavioral therapy (CBT), digital and reminder-based strategies, and family- and social-

based approaches. The aim is to summarize current evidence, highlight research gaps, and provide guidance for future strategies to enhance treatment adherence and outcomes in adolescents.

METHODS

This mini-review was conducted as a narrative, non-systematic review of the literature to provide an overview of psychological interventions aimed at improving orthodontic treatment adherence among adolescents. A targeted search was performed using PubMed, Scopus, and Google Scholar to identify relevant peer-reviewed articles published between January 2010 and January 2025.

Search terms included combinations of keywords such as “orthodontic adherence,” “treatment compliance,” “adolescents,” “motivational interviewing,” “cognitive behavioral therapy,” “digital reminders,” “telemonitoring,” “family support,” and “psychological interventions.” Reference lists of key articles and relevant reviews were also manually screened to identify additional studies.

Studies were included if they: (1) involved children or adolescents undergoing orthodontic treatment with fixed or removable appliances; (2) examined psychological, behavioral, digital, or social interventions related to treatment adherence (e.g., appliance wear, oral hygiene, appointment attendance, motivation, or self-efficacy); and (3) were original research studies, systematic or narrative reviews, or pilot/intervention studies published in English.

Studies focusing exclusively on adults, surgical orthodontics, or purely technical appliance-related outcomes without a behavioral or psychological component were excluded. Due to the exploratory and integrative nature of a mini-review, formal quality appraisal and meta-analysis were not undertaken. Instead, evidence was synthesized narratively and grouped into thematic categories based on intervention type.

RESULTS

Psychological Interventions to Improve Adolescent Orthodontic Adherence

Motivational Interviewing

Motivational interviewing (MI) is a client-centered counseling approach that aims to strengthen personal motivation for change by resolving ambivalence (Miller & Moyers, 2017). The approach emphasizes empathy, supportive relationships, eliciting “change talk,” and enhancing confidence. In orthodontic care, MI can help adolescents recognize the relevance of compliance—such as wearing

braces or retainers and maintaining oral hygiene—by connecting these behaviors to personal goals, including improved aesthetics, peer acceptance, or shorter treatment duration. Adherence involves more than simply following instructions; it requires internal motivation and belief, which MI directly addresses. Its focus on autonomy, identity, intrinsic motivation, and peer influence aligns well with adolescent developmental psychology (Wu et al., 2017).

Although large-scale randomized trials remain limited, emerging evidence supports the efficacy of this approach. A recent randomized clinical trial of 45 patients using fixed appliances found that combining MI with conventional oral hygiene instructions resulted in higher oral hygiene levels, measured by the Simplified Oral Hygiene Index, at 3 and 6 months than conventional instructions alone (Adames-Vargas et al., 2024). Additionally, MI has been reported to reduce dental plaque more effectively than other motivational techniques in adolescents aged 10–12 years (Uguz et al., 2023). Systematic reviews indicate that MI and other incentive-based strategies show potential to improve oral hygiene in orthodontic patients, though effects are modest and results somewhat inconsistent (Rigau-Gay et al., 2020).

Cognitive Behavioral Therapy

Cognitive behavioral therapy (CBT) combines techniques such as identifying and modifying dysfunctional cognitive, emotional, and behavioral patterns, coping skills training, self-monitoring, goal setting, and behavioral practice (Fenn & Byrne, 2013). In orthodontics, CBT can target beliefs and behaviors that interfere with adherence, such as discomfort with braces, fear of peer judgment, or inconsistent oral hygiene. CBT encourages adolescents to set progressive goals, monitor compliance, manage discomfort, and develop strategies to overcome social or practical barriers.

Adolescents often struggle with self-regulation, low self-efficacy, and short-term focus; CBT addresses these difficulties by enhancing self-monitoring, problem-solving, and cognitive adjustment. However, current evidence supporting the use of CBT in orthodontic care is largely indirect. Much of the available literature focuses on improvements in pain management, psychological well-being, or general health behaviors rather than on direct orthodontic adherence outcomes, such as appliance wear time or appointment attendance.

While evidence specifically assessing CBT for adherence behaviors such as appliance wear or follow-up attendance remains limited, preliminary studies support its potential. A randomized trial involving approximately 70 orthodontic patients demonstrated that CBT, combined with psychological

interventions, improved mental health, health behaviors, and treatment outcomes compared with controls (Crerand et al., 2019). Additionally, CBT interventions for orthodontic pain have demonstrated efficacy, suggesting an indirect benefit for adherence by reducing discomfort-related barriers. Consequently, inferences regarding CBT's effectiveness for orthodontic adherence are often extrapolated from related behavioral outcomes, highlighting the need for well-designed, orthodontic-specific randomized controlled trials.

Digital and Reminder-Based Interventions

Digital and reminder-based interventions leverage technology—such as smartphones, apps, SMS, social media, wearable sensors, and image sharing—to prompt, monitor, and engage adolescents in adherence-related behaviors. Common strategies include scheduled reminders to wear appliances, notifications for oral hygiene, gamified feedback, peer interaction, and remote monitoring. Adolescents' frequent use of digital platforms makes these interventions highly appropriate, as they address forgetfulness, provide accountability, and harness peer influence. Digital interventions also allow scalable, routine delivery across populations.

Social media platforms, in particular, function as health communication tools, enabling peer support, progress sharing, social reinforcement of positive behaviors, and improvement in quality of life (Murugesappa et al., 2025; Chen et al., 2023). Through features such as group chats, story sharing, and gamified challenges, adolescents receive real-time feedback, peer encouragement, and modelling of adherence behaviors. These social mechanisms not only promote oral hygiene and toothbrush use but may also enhance adolescents' quality of life by reducing anxiety, increasing motivation, and improving self-efficacy (Murugesappa et al., 2025).

Evidence suggests beneficial outcomes, though effect sizes are generally small. A systematic review and meta-analysis reported that digital reminders significantly improved oral hygiene and appointment adherence in orthodontic patients (Mohammed et al., 2019). A pilot study of adolescents aged 16–19 found that participation in a WhatsApp group featuring weekly bite selfies, rankings, and friendly competition was associated with more consistent retainer use, follow-up attendance, and orthodontic stability (Zotti et al., 2019). Systematic mapping reviews on digital interventions in orthodontics are increasingly being published, highlighting the growing interest and potential of this approach.

Family and Social-Based Approaches

Family and social-based interventions recognize that adolescent behavior is embedded within social contexts, including parents or guardians, siblings, peers, schools, and broader social networks. These approaches aim to enhance treatment adherence by increasing parental involvement and support, promoting peer modelling, providing social reinforcement, facilitating effective family–clinician communication, and creating social systems that encourage compliance. For example, parents can be guided to provide reminders, supervise appliance use, reinforce positive behaviors, and offer praise. Peer support groups may establish normative behaviors around appliance use, while school-based programmes can incorporate incentives or recognition for adherence.

Despite adolescents' increasing autonomy, parents continue to exert significant influence on adolescents' health behaviors. Emotional support, consistent reminders, and home supervision have been positively associated with better oral hygiene and shorter orthodontic treatment durations (Tiwari et al., 2025). Peer attitudes toward braces or retainers also impact motivation and adherence, with social reinforcement and modelling serving as established determinants of behavior.

Although randomized controlled trials specifically targeting adherence are limited, observational evidence supports the effectiveness of family and social interventions. Adolescents receiving greater parental emotional support demonstrate shorter treatment durations and improved clinical outcomes (Tiwari et al., 2025). Systematic reviews and overviews highlight family and social factors—including parental support, communication, and socioeconomic context—as significant predictors of adherence (Crandall et al., 2019). Peer-based digital interventions, such as WhatsApp groups featuring progress sharing and social encouragement, further illustrate the potential of social mechanisms to improve adherence (Zotti et al., 2019).

Overall, family- and social-based strategies complement motivational, cognitive-behavioral, and digital approaches by reinforcing behavioral expectations within the adolescent's social environment, thereby enhancing both short-term compliance and long-term treatment success. Table 1 summarizes various psychological interventions to improve adolescent orthodontic adherence.

Table 1: Summary of psychological interventions to improve adolescent orthodontic adherence.

Intervention	Objectives	Limitations	Advantages	Reference & Strength of Evidence
Motivational Interviewing	Enhance adolescents' intrinsic motivation; resolve ambivalence toward orthodontic behaviors (e.g., appliance wear, oral hygiene); support autonomy and align personal goals with treatment adherence.	<ul style="list-style-type: none"> - Requires clinician training and strong communication skills - Time constraints during routine visits - Effectiveness may vary due to inconsistent delivery across practitioners 	<ul style="list-style-type: none"> - Strengthens internal motivation and self-efficacy - Improves patient–clinician rapport - Shown to significantly improve oral hygiene adherence 	Adames-Vargas et al., 2024; Uguz et al., 2023; Wu et al., 2017 (Moderate evidence; small RCTs focused on oral hygiene outcomes)
Cognitive Behavioral Therapy	Modify maladaptive thoughts and emotional responses; teach coping and self-regulation skills to reduce anxiety, pain avoidance, and peer pressure barriers.	<ul style="list-style-type: none"> - Requires qualified psychological expertise - Can be time- and resource-intensive - Limited orthodontic-specific RCTs 	<ul style="list-style-type: none"> - Improves pain tolerance and anxiety management - Enhances self-regulation and resilience - Effective for adolescents with low self-efficacy 	Yang & Li, 2023; Gao et al., 2022; Crerand et al., 2019 (Limited evidence; observational or mixed psychological intervention studies)
Digital & Reminder-Based Interventions	Use smartphones, apps, sensors, or social media to prompt and monitor adherence (e.g., wear time, hygiene reminders, gamification).	<ul style="list-style-type: none"> - Engagement may decline over time - Privacy and accessibility issues - Limited personalization and emotional support 	<ul style="list-style-type: none"> - Cost-effective and scalable - Provides real-time reminders and feedback - Appeals to tech-oriented adolescents; improves appointment attendance and hygiene 	Tan et al., 2024; Zotti et al., 2019; Mohammed et al., 2019 (Moderate evidence; systematic reviews, meta-analyses, and pilot interventional studies)

Family and Social-Based Approaches	Enhance parental support, peer influence, and clinician–family communication; encourage shared responsibility and social modelling.	<ul style="list-style-type: none"> - Effectiveness influenced by cultural and socioeconomic context - Risk of parental overcontrol or adolescent resistance - Limited standardization in clinical practice 	<ul style="list-style-type: none"> - Supports long-term adherence via emotional and environmental reinforcement - Promotes collaborative treatment environment - Aligns with collectivist cultural values 	Tiwari et al., 2025; van der Bie et al., 2024; Crerand et al., 2019 (Limited evidence; scoping reviews and observational studies, few intervention trials)
---	---	---	--	--

CONCLUSION

A review of the four main psychological interventions, such as motivational interviewing (MI), cognitive behavioral therapy (CBT), digital and reminder-based tools, and family and social interventions, reveals distinct patterns in efficacy and feasibility. MI and CBT appear promising for improving motivational and self-regulatory aspects of orthodontic adherence; however, the current evidence base remains limited, with many studies characterized by small sample sizes, short follow-up periods, or a primary focus on oral hygiene rather than appliance wear time or appointment adherence. In contrast, digital and reminder-based interventions, while generally less intensive, are cost-effective, simple to implement, and align well with adolescents’ daily technology use, making them the most widely employed in practice. Family and social interventions, although theoretically promising due to their focus on influential social dynamics, currently lack consistent evidence from clinical trials and remain underutilised. Overall, MI and CBT should be considered potentially beneficial rather than definitively superior, whereas digital reminders are the most practical and scalable.

A multistage approach is recommended to optimize adolescent adherence. This could involve universal digital reminders for all patients, early screening to identify those at risk of poor adherence, and targeted MI or CBT for high-risk individuals. Incorporating structured family and peer involvement, such as shared goal setting, parental support, and school-based reinforcement, may further enhance outcomes. Additionally, training orthodontic personnel in motivational communication and integrating digital monitoring systems into routine practice could improve intervention effectiveness.

However, comparisons across studies remain challenging due to substantial heterogeneity in how orthodontic adherence is defined and measured, including variations

Conflicts of Interest

The authors declare no conflicts of interest.

REFERENCES

- Adames-Vargas, H., Yunes-Fragoso, P., Ruiz-Matuk, C., & Feliz-Matos, L. (2024). The effect of motivational interviewing on oral hygiene behavior in patients with fixed orthodontic appliances: A randomized clinical trial. *International Journal of Odontostomatology*, *18*(2), 219–225.
- Arponen, H., Hirvensalo, R., Lindgren, V., & Kiukkonen, A. (2020). Treatment compliance of adolescent orthodontic patients with headgear activator and twin-block appliance assessed prospectively using microelectronic wear-time documentation. *European Journal of Orthodontics*, *42*(2), 180–186. <https://doi.org/10.1093/ejo/cjaa001>
- Chen, H. W. J., Marzo, R. R., Anton, H., Abdalqader, M. A., Rajasekharan, V., Baobaid, M. F., Hamzah, H., Tang, H. C., & Ads, H. O. (2022). Dietary Habits, Shopping Behavior and Weight Gain during Covid-19 Pandemic Lockdown among Students in a Private University in Selangor, Malaysia. *Journal of public health research*, *10*(2 Suppl), jphr.2021.2921. <https://doi.org/10.4081/jphr.2021.2921>
- Chen, H. W. J., Marzo, R. R., Sapa, N. H., Ahmad, A., Anuar, H., Baobaid, M. F., Jamaludin, N. A., Hamzah, H., Sarrafan, S., & Ads, H. O. (2023). Trends in health communication: Social media needs and quality of life among older adults in Malaysia. *Healthcare*, *11*(10), 1455. <https://doi.org/10.3390/healthcare11101455>
- Crerand, C. E., Kapa, H. M., Litteral, J., Da Silveira, A. C., & Markey, M. K. (2019). Adherence to orthodontic treatment in youth with craniofacial conditions: A survey of US orthodontists. *The Cleft Palate-Craniofacial Journal*, *56*(10), 1322–1332. <https://doi.org/10.1177/1055665619853132>
- Doughan, M. B., Khandakji, M., Khoury, B., Yousef, A., Al-Balbeesi, H. M., & Al-Sabbagh, R. (2024). Assessment of psychosocial parameters in adolescents seeking orthodontic treatment. *BMC Oral Health*, *24*, 1299. <https://doi.org/10.1186/s12903-024-04875-6>
- Fenn, K., & Byrne, M. (2013). The key principles of cognitive behavioural therapy. *InnovAiT*, *6*(9), 579–585. <https://doi.org/10.1177/1755738012471029>
- Gavic, L., Budimir, M., & Tadin, A. (2024). The association between self-esteem and aesthetic component of smile among adolescents. *Progress in Orthodontics*, *25*, Article 9. <https://doi.org/10.1186/s40510-023-00508-w>
- Lombardo, G., Vena, F., Negri, P., Pagano, S., Barilotti, C., Paglia, L., Colombo, S., Orso, M., & Cianetti, S. (2020). Worldwide prevalence of malocclusion in the different stages of dentition: A systematic review and meta-analysis. *European Journal of Paediatric Dentistry*, *21*(2), 115-122. <https://doi.org/10.23804/ejpd.2020.21.02.05>
- Miller, W. R., & Moyers, T. B. (2017). Motivational interviewing and the clinical science of Carl Rogers. *Journal of Consulting and Clinical Psychology*, *85*(8), 757–766. <https://doi.org/10.1037/ccp0000179>

- Mohammed, H., Rizk, M. Z., Wafaie, K., Ulhaq, A., & Almuzian, M. (2019). Reminders improve oral hygiene and adherence to appointments in orthodontic patients: A systematic review and meta-analysis. *European Journal of Orthodontics*, *41*(2), 204–213. <https://doi.org/10.1093/ejo/cjy045>
- Murugesappa, D., Dahlan, R., Perez, A., Gow, G., & Amin, M. (2025). Social media use and adolescent oral health: A scoping review. *Digital health*, *11*, 20552076251334734. <https://doi.org/10.1177/20552076251334734>
- Religioni, U., Barrios-Rodríguez, R., Requena, P., Borowska, M., & Ostrowski, J. (2025). Enhancing therapy adherence: Impact on clinical outcomes, healthcare costs, and patient quality of life. *Medicina*, *61*(1), 153. <https://doi.org/10.3390/medicina61010153>
- Rigau-Gay, M. M., Claver-Garrido, E., Benet, M., Lusilla-Palacios, P., & Ustrell-Torrent, J. M. (2020). Effectiveness of motivational interviewing to improve oral hygiene in orthodontic patients: A randomized controlled trial. *Journal of Health Psychology*, *25*(13-14), 2362–2373. <https://doi.org/10.1177/1359105318793719>
- Tiwari, A., Fagundes, N. C. F., Perez-Garcia, A., & Flores-Mir, C. (2025). Adolescents' adherence to intraoral removable appliances: a scoping review. *Progress in orthodontics*, *26*(1), 41. <https://doi.org/10.1186/s40510-025-00589-9>
- Uguz, H. N., Çiftçi, V., & Dogan, M. C. (2023). Effectiveness of motivational interviewing on oral healthcare in pediatric patients. *Journal of Clinical Pediatric Dentistry*, *47*(5), 43–50. <https://doi.org/10.22514/jocpd.2023.043>
- van der Bie, R. M., Bos, A., Bruers, J. J. M., & Jonkman, R. E. G. (2024). Patient adherence in orthodontics: a scoping review. *BDJ open*, *10*(1), 58. <https://doi.org/10.1038/s41405-024-00235-2>
- van Doornik, S. P., Lietmeijer, S., Ren, Y., Manton, D. J., Dijkstra, P. U., & Marie, A. (2025). Adherence to clinical practice guidelines amongst adolescents with buccal fixed orthodontic appliances in northeast Netherlands: A cross-sectional study. *European Journal of Orthodontics*, *47*(4). <https://doi.org/10.1093/ejo/cjaf041>
- Wu, L., Gao, X., Lo, E. C. M., Ho, S. M. Y., McGrath, C., & Wong, M. C. M. (2017). Motivational interviewing to promote oral health in adolescents. *Journal of Adolescent Health*, *61*(3), 378–384. <https://doi.org/10.1016/j.jadohealth.2017.03.010>
- Xu, C., Zhang, Y., Xiong, B., Wang, H., & Liang, M. (2025). Correlation between latent categories of body image and sleep quality in adolescent orthodontic patients. *BMC Oral Health*, *25*, 1190. <https://doi.org/10.1186/s12903-025-06571-5>
- Zotti, F., Zotti, R., Albanese, M., Nocini, P. F., & Paganelli, C. (2019). Implementing post-orthodontic compliance among adolescents wearing removable retainers through WhatsApp: A pilot study. *Patient Preference and Adherence*, *13*, 609–615. <https://doi.org/10.2147/PPA.S200822>