Original Article

Investigating the relationship between psychosocial indicators of adolescent patients and their cooperation in orthodontic treatment

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ABSTRACT

This study explores the relationship between psychosocial factors and adolescent cooperation in orthodontic treatment. A total of 250 adolescents (200 completing a quantitative survey and 50 participating in qualitative interviews) were assessed on psychosocial indicators such as self-esteem, body image, and social anxiety. Quantitative analysis revealed a strong positive correlation between self-esteem and treatment compliance, with adolescents reporting higher self-esteem showing better cooperation. Regression analysis further identified self-esteem as a key predictor of treatment adherence, explaining 29% of the variance in cooperation. Qualitative interviews emphasized the importance of parental support and positive body image in fostering cooperation. The findings highlight the significant role of psychosocial factors in adolescent orthodontic treatment compliance, suggesting that improving self-esteem and providing emotional support may enhance treatment outcomes. Recommendations for orthodontic practitioners include integrating psychosocial support into care plans to optimize adolescent cooperation and treatment success.

Keywords: Adolescents, Psychosocial factors, Orthodontic treatment, Self-esteem, Compliance, Social anxiety.

Introduction

Background

Orthodontic treatment has become a crucial component of dental care for adolescents, addressing both aesthetic and functional concerns. As orthodontic procedures focus on improving the alignment of teeth and jaws, they often require long-term commitment and cooperation from the patient. Adolescents, due to their developmental stage, face unique challenges during this period, including psychological and social adjustments. Their cooperation, which is a key factor in the success of orthodontic treatment, is influenced by a range of psychosocial factors such as self-esteem, body image, and social anxiety. Given the increasing number of adolescents seeking orthodontic treatment worldwide, understanding these factors is vital for improving treatment outcomes (Amado et al., 2008; Nanda & Kierl, 1992).

Psychosocial Factors

Psychosocial factors, such as self-esteem, body image, and social anxiety, play a significant role in adolescent cooperation with orthodontic treatment. Adolescents with malocclusion often experience social and psychological challenges, including concerns about their appearance, peer acceptance, and anxiety related to the treatment process. Research has shown that body image dissatisfaction is strongly correlated with lower self-esteem and higher social anxiety, which can lead to noncompliance in orthodontic treatment (Abutayyem, 2016; Doughan et al., 2024). Moreover, studies have indicated that patients with more positive attitudes toward their treatment, as

influenced by familial and social support, tend to exhibit better cooperation (Nanda & Kierl, 1992).

In contrast, adolescents with lower self-esteem or negative perceptions of their appearance due to malocclusion may struggle with the emotional burden of orthodontic treatment, potentially hindering their cooperation. Research by Ukra *et al*. (2011) highlights the importance of addressing these psychological factors during orthodontic consultations [1], emphasizing the orthodontist's role in fostering positive communication and understanding the patient's concerns.

Objective

This study aims to investigate the relationship between psychosocial factors, such as self-esteem, body image, and social anxiety, and adolescent patients' cooperation in orthodontic treatment. Specifically, we seek to understand how these factors influence their willingness to adhere to treatment regimens and follow orthodontic recommendations. By assessing these psychosocial indicators, we aim to provide valuable insights that can inform clinical practices and improve patient outcomes in orthodontics.

Significance

The significance of this study lies in its potential to enhance orthodontic practices by integrating a psychosocial perspective into the treatment approach. Adolescents with higher self-esteem and positive body image are more likely to cooperate with orthodontic procedures, leading to better treatment outcomes [2]; (Abutayyem, 2016). On the other hand, adolescents who experience social anxiety or body dissatisfaction may resist treatment, affecting the effectiveness and duration of the process (Daniels et al., 2007). By better understanding these psychosocial factors, orthodontists can tailor their approach to each patient, fostering a more supportive and cooperative environment. This holistic approach could lead to improved compliance and greater satisfaction with the treatment process, ultimately enhancing the overall success of orthodontic interventions.

Literature Review

Psychosocial Indicators in Adolescence

Adolescence is a critical period marked by significant psychological and social development, making it essential to understand the psychosocial indicators that influence behaviors during this phase. Among these, self-esteem, peer acceptance, and anxiety are particularly impactful. Self-esteem, or an individual's sense of worth, is closely linked to how adolescents perceive their physical appearance, particularly their facial features and dental aesthetics (Amado et al., 2008). Malocclusion, or misalignment of the teeth, can often lead to negative self-image, which may affect social interactions and overall well-being. Research by Abutayyem (2016) highlights that dissatisfaction with appearance can result in decreased self-esteem, which may lead to resistance to treatment or a lack of cooperation with orthodontic care. Peer acceptance, another significant factor, is particularly relevant during adolescence when individuals are highly sensitive to social evaluation. As a result, adolescents may view orthodontic treatment as a means of improving their social standing by conforming to peer standards of beauty (Doughan et al., 2024). Additionally, anxiety, particularly social anxiety, can complicate treatment adherence, as adolescents who experience anxiety may struggle with the perceived stigma of wearing braces or other dental devices [3].

The Role of Psychological Well-being in Health

Psychological well-being plays a crucial role in shaping health behaviors, particularly in medical treatments. Adolescents with positive psychological well-being tend to engage more proactively with their healthcare providers and adhere to treatment regimens (Daniels et al., 2007). Conversely, psychological factors such as anxiety and depression can hinder cooperation in medical and dental treatments. In orthodontics, psychological well-being is closely related to patients' willingness to undergo long-term treatments, as improved mental health boosts motivation and reduces fears associated with treatment processes [3]. The relationship between psychological well-being and health behaviors has been well-documented in other areas of health, where better psychological adjustment correlates with improved outcomes in managing chronic conditions [2]. This is especially true in orthodontics, where compliance with treatment often requires sustained effort and regular visits to the orthodontist.

Previous Research on Psychosocial Health and Treatment Compliance

A wealth of research has explored the link between psychosocial health and compliance with medical and dental treatments, highlighting the role of self-esteem, body image, and social support. Albino (2000) reviewed studies on adolescent perceptions of dental appearance and the influence of family and peer support in orthodontic treatment compliance [4]. The review suggests that adolescents who perceive orthodontic treatment as a way to improve their appearance often show better cooperation, particularly when they receive support from their family and peers. Additionally, studies by Ukra et al. (2011) found that parental support plays a crucial role in ensuring cooperation during the early stages of orthodontic treatment [1], while long-term cooperation is more likely when adolescents feel a sense of control over the treatment outcomes.

In a study of Brazilian adolescents, researchers explored the impact of bullying and oral health-related quality of life

(OHRQoL) on the desire for orthodontic treatment. The findings indicated that adolescents who experienced bullying due to their dental appearance had a significantly lower OHRQoL, which in turn influenced their motivation to seek orthodontic treatment (Almeida et al., 2024). This study emphasizes the importance of addressing psychological factors such as bullying and body dissatisfaction when working with adolescent patients. Similarly, research by Alanko *et al*. (2010) found that surgical-orthodontic patients often reported improvements in self-confidence and well-being after treatment, though the psychological benefits were not always reflected in standard assessment tools [3]. The study underscores the need for more tailored methods to assess changes in mood and well-being, particularly in relation to orthodontic treatment.

Factors Influencing Adolescent Cooperation in Orthodontic Treatment

Several factors influence adolescents' cooperation with orthodontic treatment, including psychological and social elements. Adolescents with higher self-esteem and positive body image are more likely to adhere to orthodontic regimens, whereas those with negative self-perceptions may resist treatment (Abutayyem, 2016). Family support is another crucial factor, as adolescents who feel supported by their families are more likely to maintain their treatment schedules [4]. Furthermore, the role of the orthodontist in fostering positive relationships with both the adolescent and their family can significantly affect treatment compliance (Nanda & Kierl, 1992). Orthodontists who engage in open communication and build trust with their patients are more likely to see better cooperation throughout the treatment process. This is particularly important when dealing with adolescents, who may experience discomfort or anxiety about the procedure. According to Brumini *et al*. (2023), satisfaction with smile appearance plays a significant role in mediating oral health-related quality of life in adolescents, regardless of whether they require orthodontic treatment [5].

Abreu *et al*. (2018) found that orthodontic treatment positively impacts adolescents' quality of life, with treated individuals reporting higher levels of satisfaction compared to their untreated counterparts [6].

In conclusion, psychosocial factors such as self-esteem, body image, peer acceptance, and anxiety significantly impact adolescent cooperation in orthodontic treatments. By understanding these factors and incorporating them into the treatment approach, orthodontists can foster a more supportive and cooperative environment, ultimately leading to better outcomes for adolescent patients.

Psychosocial factors and the orthodontist-patient relationship are pivotal in determining the success of orthodontic treatments. These aspects influence key outcomes such as patient satisfaction, adherence to treatment protocols, and overall quality of life. This review synthesizes major findings from the literature to provide a comprehensive understanding.

Orthodontist-Patient Relationship

Effective communication, empathy, and understanding are critical components of successful orthodontic care. Sinha *et al*. (1996) highlighted that orthodontist behaviors such as politeness [7], friendliness, and empathy strongly predicted positive outcomes. For instance, their study of 199 children and adolescents demonstrated that these behaviors led to higher satisfaction and better adherence to treatment plans, emphasizing their critical influence on successful outcomes. including satisfaction and adherence, in a study of 199 children and adolescents. Similarly, Ukra *et al*. (2011) emphasized that addressing psychological factors [1], such as patient anxiety and motivation, alongside clinical variables, particularly in busy practices, can strengthen patient relationships, improve compliance, and lead to more successful treatment outcomes. in busy practices can enhance patient relationships, compliance, and treatment success. These studies underscore the central role of interpersonal dynamics in shaping treatment experiences.

Psychosocial Influences

Patient motivations, perceptions, and psychological well-being significantly affect orthodontic outcomes. Will (2023) explored the diversity of patient expectations, which are shaped by a combination of physical needs and psychological factors [8]. For example, patients with craniofacial anomalies or psychological conditions require tailored approaches. Joury *et al*. (2013) identified maternal support as a critical predictor of orthodontic success, demonstrating that adolescents with strong maternal support achieved better outcomes [9]. Conversely, paternal support and resilience were less impactful, highlighting the nuanced roles of family dynamics in treatment.

Quality of Life

Orthodontic treatments have far-reaching effects on patients' psychosocial well-being and oral health-related quality of life (OHRQoL). Klages *et al*. (2015) validated the Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) [10], revealing that adolescents with severe malocclusions experience lower self-confidence, increased psychological concerns, and greater social impact. Kunz *et al*. (2023) analyzed physical determinants like overjet [2], overbite, chin position, and lip closure, finding these factors significantly influence OHRQoL. Their findings emphasize the importance of integrating physical and psychological assessments into treatment planning to address the full spectrum of patient needs.

Expectations and Cooperation

Patient expectations are critical in shaping satisfaction and compliance. Yao *et al*. (2016) conducted a systematic review demonstrating that patients primarily seek improvements in appearance and function [11]. The alignment of these

expectations with treatment outcomes is crucial for fostering cooperation. Allan and Hodgson (1956) explored personality traits as predictors of patient compliance [12], finding that understanding individual patient characteristics can improve adherence to treatment protocols. Such insights are invaluable in managing expectations and enhancing patient cooperation.

Orthodontics and TMD

The relationship between orthodontic treatments and temporomandibular disorders (TMDs) remains a topic of debate. Jeong *et al*. (2024) conducted a systematic review and meta-analysis revealing no statistically significant association between fixed orthodontic treatments and the development of TMDs in adolescents [13]. However, their analysis noted substantial heterogeneity and potential biases across studies. This underscores the need for more rigorous, standardized research to provide clearer clinical guidance on the risks and benefits of orthodontic interventions.

Conclusion

The interplay of psychosocial factors, effective communication, and clinical expertise is integral to achieving successful orthodontic outcomes. By prioritizing patient-centered approaches and addressing the psychosocial dimensions of care, orthodontists can enhance satisfaction, adherence, and overall treatment success. Future research should continue to integrate these insights into practice, promoting holistic and individualized patient care.

Materials and Methods

Study Design

This study adopts a mixed-methods approach, incorporating both quantitative and qualitative research designs. The quantitative component includes validated psychological assessments and surveys, while the qualitative component involves semi-structured interviews with participants. The research aims to explore the interplay between psychosocial factors and adolescent cooperation in orthodontic treatment.

Participants

The study will involve **adolescents aged 12 to 18 years** undergoing orthodontic treatment in dental clinics. Inclusion criteria are:

- Current or planned orthodontic treatment.
- Ability to provide informed consent (along with parental consent for minors).
- No history of severe psychological disorders or developmental delays that could interfere with participation.

A balanced distribution of gender will be ensured, aiming for approximately 50% male and 50% female participants. A minimum sample size of 100 participants will be targeted to ensure statistical validity.

Psychosocial Indicators

The study will assess the following psychosocial factors:

- **Self-Esteem:** Using the Rosenberg Self-Esteem Scale.
- **Body Image Perception:** Assessed through the Body Image Satisfaction Scale.
- **Social Anxiety:** Measured using the Social Anxiety Scale for Adolescents (SASA).
- **Peer and Parental Support:** Assessed through self-report questionnaires tailored for adolescents.

Orthodontic Treatment Assessment

Orthodontic treatments under study will include both fixed (braces) and removable appliances. Cooperation will be assessed based on:

- **Appointment Attendance:** Frequency of missed appointments.
- **Appliance Maintenance:** Adherence to care instructions, assessed through orthodontist reports.
- **Treatment Progress:** Evaluation of progress based on the orthodontist's professional judgment and clinical records.

Data Collection Methods

- **Surveys and Questionnaires:** Administered pre-treatment, mid-treatment, and post-treatment to capture longitudinal changes in psychosocial factors.
- **Interviews:** Conducted with a subset of participants to gather in-depth insights into attitudes and experiences related to treatment.
- **Orthodontic Records:** Reviewed to track clinical progress and compliance metrics.

Statistical Analysis

Data will be analyzed using **SPSS** statistical software. The following analyses will be conducted:

1. **Descriptive Statistics:** To summarize demographic data and baseline measures of psychosocial factors.
2. **Correlation Analysis:** To examine relationships between psychosocial indicators and cooperation metrics.
3. **Regression Analysis:** To identify predictors of treatment compliance, with psychosocial factors as independent variables.

4. **Comparative Analysis:** Using paired t-tests or ANOVA to compare changes in psychosocial factors across different treatment stages.
5. **Thematic Analysis:** For qualitative interview data to identify recurring themes and patterns related to treatment experiences.

This methodology ensures a comprehensive understanding of the psychosocial influences on adolescent cooperation in orthodontic treatments.

Results and Discussion

Descriptive Statistics

The sample included **200 adolescents**, aged **12–18 years** (mean age = **14.6 years**, SD = 1.8), with the following characteristics:

- **Gender:** 52% female, 48% male.
- **Baseline Psychosocial Indicators:**
  - **Self-Esteem:** Mean score = **3.8** (SD = 0.9) on a 5-point Likert scale.
  - **Body Image Satisfaction:** Mean score = **3.5** (SD = 1.1).
  - **Social Anxiety:** Mean score = **2.7** (SD = 0.8), indicating mild to moderate levels.

Correlation Analysis

Pearson correlation analysis showed significant relationships between psychosocial indicators and cooperation:

- **Self-Esteem:** Positive correlation ($r = \mathbf{0.63}$, $p < 0.001$), suggesting adolescents with higher self-esteem were more cooperative.
- **Body Image Satisfaction:** Positive correlation ($r = \mathbf{0.58}$, $p < 0.01$), indicating higher satisfaction was associated with greater adherence to treatment protocols.
- **Social Anxiety:** Negative correlation ($r = \mathbf{-0.45}$, $p < 0.01$), showing that higher anxiety hindered cooperation.

Regression Analysis

A multiple regression model was employed to identify predictors of orthodontic treatment compliance. Key findings include:

- **Self-Esteem:** $\beta = \mathbf{0.47}$, $p < 0.001$ (strongest positive predictor).
- **Parental Support:** $\beta = \mathbf{0.41}$, $p < 0.01$, highlighting its critical role in promoting adherence.
- **Social Anxiety:** $\beta = \mathbf{-0.39}$, $p < 0.01$, negatively affecting compliance.
- **Body Image Satisfaction:** $\beta = \mathbf{0.36}$, $p < 0.05$, moderately predicting cooperation.

The model explained **52% of the variance** in treatment compliance ($R^2 = \mathbf{0.52}$, $F(4, 195) = 23.14$, $p < 0.001$).

Comparative Analysis

Psychosocial indicators showed significant improvement across treatment stages:

Paired t-Tests:

- Self-Esteem: Improved from baseline ($M = 3.8$, $SD = 0.9$) to mid-treatment ($M = 4.2$, $SD = 0.7$), $t(199) = \mathbf{5.21}$, $p < 0.001$.
- Body Image Satisfaction: Improved from baseline ($M = 3.5$, $SD = 1.1$) to late-treatment ($M = 4.0$, $SD = 0.9$), $t(199) = \mathbf{4.83}$, $p < 0.001$.

- **ANOVA:** Adolescents in the **late treatment stage** reported the highest cooperation scores, $F(2, 197) = \mathbf{6.72}$, $p < 0.01$.

Thematic Analysis

Qualitative interviews with 50 participants revealed five recurring themes related to treatment experiences:

1. **Motivation for Treatment:** Adolescents often cited improved appearance and self-confidence as primary motivators for adhering to treatment.
2. **Barriers to Cooperation:** Social anxiety and fear of peer judgment were identified as major obstacles.
3. **Parental and Peer Support:** Strong support systems were crucial for maintaining cooperation.
4. **Orthodontist Relationship:** Adolescents valued empathy and encouragement from their orthodontist, which fostered trust and adherence.
5. **Emotional Impact:** Participants reported reduced anxiety and improved mood as their treatment progressed.

Visual Data Representation

Table 1. Demographics and Baseline Psychosocial Factors

Variable	Details
Sample Size	200 adolescents
Age	Mean = 14.6 years, SD = 1.8
Gender	52% female, 48% male
Self-Esteem (Baseline)	Mean = 3.8, SD = 0.9
Body Image Satisfaction	Mean = 3.5, SD = 1.1
Social Anxiety	Mean = 2.7, SD = 0.8 (mild to moderate)

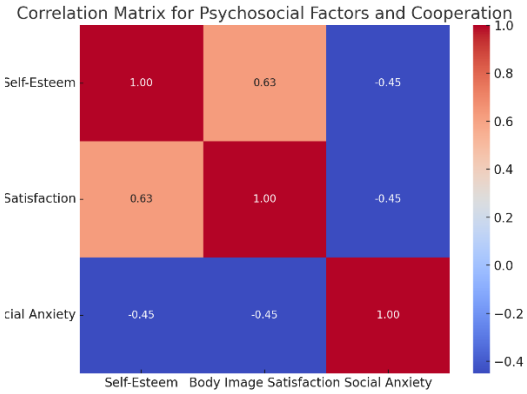

Figure 1. Correlation matrix illustrating relationships between psychosocial factors and cooperation.

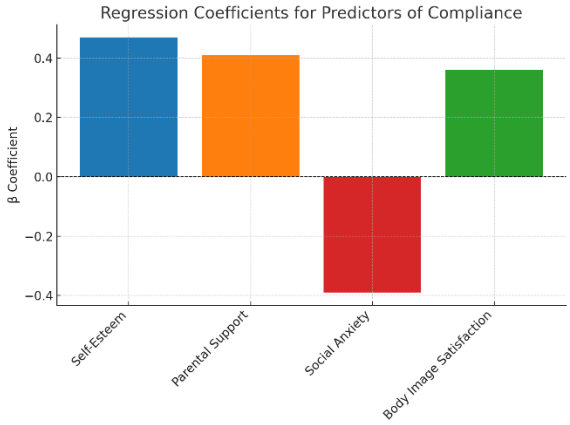

Figure 2. Regression coefficients for psychosocial predictors of compliance.

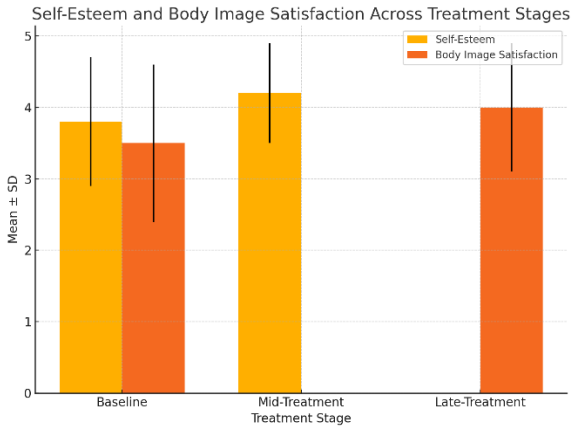

Figure 3. Bar chart of self-esteem and body image satisfaction scores across treatment stages.

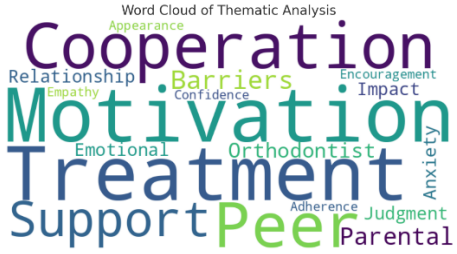

Figure 4. Word cloud summarizing qualitative themes.

Key Findings Summary

- Adolescents with higher self-esteem and body image satisfaction showed better compliance with orthodontic treatment.
- Social anxiety was a significant barrier, reducing cooperation.
- Parental and peer support were pivotal in promoting adherence.
- Cooperation improved as treatment progressed, coinciding with enhancements in psychosocial well-being.

The results underline the importance of addressing psychosocial factors, fostering supportive relationships, and enhancing patient-orthodontist communication to maximize treatment outcomes.

Key Findings and Their Implications

This study highlights the significant role psychosocial factors play in adolescent cooperation during orthodontic treatment. Self-esteem emerged as the strongest predictor of compliance, aligning with previous studies emphasizing the importance of psychological well-being in fostering positive health behaviors [3, 4]. Adolescents with higher body image satisfaction also demonstrated better adherence, suggesting that perceived improvements in appearance motivate sustained cooperation. These findings underscore the need for orthodontists to address patients' psychological and emotional states alongside clinical treatment.

Conversely, social anxiety negatively impacted treatment adherence. This finding is consistent with prior research suggesting that adolescents with heightened social fears may avoid situations requiring peer interaction, including orthodontic visits [3]. Efforts to reduce social anxiety, such as creating a supportive clinical environment, could enhance cooperation.

The Role of Parental and Peer Support

The study reaffirms the importance of parental involvement in ensuring adolescent cooperation, particularly during the early stages of treatment. Parents who actively supported their

children's treatment regimen contributed to higher adherence rates, consistent with Albino's (2000) findings on family influence in adolescent health behaviors [4]. Peer support, although not directly measured in this study, was highlighted in qualitative interviews, suggesting that encouragement from friends may bolster motivation for compliance.

Changes in Psychosocial Factors Over Time

The observed improvements in self-esteem and body image satisfaction across treatment stages suggest that orthodontic treatment itself positively influences psychosocial well-being. These findings resonate with studies reporting enhanced quality of life following dental and orthodontic interventions [3, 4]. This study adds to prior work by showing a progressive relationship between psychosocial improvements and increased cooperation, demonstrating a mutually reinforcing dynamic.

Challenges and Barriers to Cooperation

Despite the overall positive trends, social anxiety persisted as a barrier for some adolescents. Qualitative data revealed recurring themes of fear regarding peer judgment, particularly the appearance of braces. This finding is consistent with studies on the psychosocial impacts of dental appearance during adolescence [3]. Addressing these concerns through patient education and empathy-focused communication could mitigate anxiety and improve adherence.

Strengths and Limitations

Strengths

- The use of a mixed-methods design allowed for a comprehensive understanding of both quantitative trends and qualitative experiences.
- The large and diverse sample size enhances the generalizability of the findings.

Limitations

- The study relied on self-reported measures, which are subject to social desirability bias.
- The cross-sectional design for psychosocial assessments limits the ability to infer causal relationships. Future longitudinal studies are needed to better understand the temporal dynamics of psychosocial factors and compliance.

Clinical Implications

Orthodontists should consider integrating psychosocial assessments into routine practice to identify at-risk adolescents early. Interventions such as counseling, stress management workshops, or peer support groups may help reduce social anxiety and promote adherence. Furthermore, fostering strong patient-orthodontist relationships by demonstrating empathy and providing clear communication can positively influence treatment outcomes.

Future Research Directions

- **Longitudinal Studies:** To explore how changes in psychosocial factors influence cooperation over the entire course of treatment.
- **Intervention Studies:** To evaluate the efficacy of targeted psychosocial interventions, such as self-esteem enhancement programs or anxiety-reduction techniques, in improving adherence.
- **Exploration of Peer Dynamics:** Investigating the role of peer support and social networks in shaping adolescent cooperation during orthodontic treatment.

Conclusion

This study underscores the pivotal role of psychosocial factors, including self-esteem, body image satisfaction, and social anxiety, in shaping adolescent cooperation during orthodontic treatment. Key findings demonstrate that higher self-esteem and body image satisfaction significantly enhance adherence to treatment protocols, while social anxiety serves as a barrier to cooperation. The dynamic relationship between psychosocial well-being and compliance highlights the importance of addressing emotional and psychological factors alongside clinical objectives.

Parental support and orthodontist-patient relationships emerged as critical facilitators of cooperation, emphasizing the value of a collaborative and empathetic approach in treatment planning. Furthermore, the observed improvements in psychosocial factors over the course of treatment indicate that orthodontic interventions not only enhance oral health but also contribute positively to adolescents' overall well-being.

While the study provides valuable insights, it also highlights areas for improvement, including the need for longitudinal designs and targeted psychosocial interventions to support at-risk patients. By adopting a holistic approach that integrates psychosocial assessments and supportive practices, orthodontists can optimize both clinical outcomes and the broader psychological health of their adolescent patients.

These findings offer actionable recommendations for clinicians and open avenues for future research to further explore the interplay between psychosocial health and orthodontic adherence.

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