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ORTHODONTIC AND PSYCHOLOGICAL INTERSECTIONS: ASSESSING THE PSYCHIATRIC RELEVANCE OF MALOCCLUSION – A SYSTEMATIC REVIEW

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ABSTRACT

Introduction. Currently, mental health is one of the major social concerns. The etiology of psychiatric disorders is complex and multifactorial. Reduced self-esteem can be considered one of the contributing factors.
The aim of this review is to analyze available literature in order to identify a potential relationship between malocclusion and psychological disorders. It is postulated that dentofacial deformities may contribute to a reduced quality of life and, consequently, to the development of depression and other psychiatric conditions.
Materials and methods. A review of the literature available in the "PubMed" and „Google Scholar" databases was conducted. The search was performed using the following keywords: malocclusion, or-thognathic surgery, mental health, depression, anxiety, eating disorder
Results. According to most authors in available literature, malocclusion has an impact on mental health. It may increase the risk of depression or anxiety disorders and significantly reduce quality of life. Any delays in initiating treatment may also affect mental well-being, particularly in adolescents. A correlation was also found between malocclusion and poorer academic performance in children. Furthermore, attempts were made to examine the relationship between eating disorders (ED) and malocclusion. However, the findings remained unconclusive - study groups were to small and lacked diversity. Nevertheless, it can be noted that oral health issues, both orthodontic and carious, may increase discomfort during eating and in consequence negatively influence dietary habits.
Conclusions. Based on findings from available literature, a correlation between malocclusion and mental health can be inferred. However, the data remain inconsistent; therefore, more research is necessary to clarify this correlation.

KEYWORDS

Malocclusion, Orthognathic Surgery, Mental Health, Depression, Anxiety, Eating Disorder

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Introduction.

Appearance is an integral part of an individual's self-image. During first social encounters, face is the primary aspect we focus on. It attracts attention, serving as a medium for both verbal and nonverbal communication. The face depicts emotions, affects self-confidence, allows for social acceptance. Deviations from normative facial aesthetics may influence how individuals are perceived and treated by others, as well as impact their quality of life and mental health.

According to some studies, as many as 63% of patients believe that their apparel reflects negatively on their personal life, and 44% - on socialization with others. Therefore aesthetic concerns are often the main motivation for seeking treatment, orthodontic or orthognathic. The inability to access dental care - whether caused by financial restrains or other factors - may lead to long-term psychological consequences (11).

Indeed, it is not clear how large a number of orthodontic patients face psychological problems. In numerous cases, underlying psychological disorder may discourage patients from medical care. Moreover, such conditions could potentially interfere with treatment and diminish satisfaction from its completion.

Physiognomy by definition maintains that the characteristics of a person's appearance determine their fate and even character. The reaction of others to a given image, as well as childhood experiences, can direct people's conciousness. This phenomen is especially evident in children. It has been studied that adolescents with anatomically correct occlusion tend to perform better academically, exhibit greater confidence and overall happiness than children with malocclusion (protrusion of incisors, crowding) (2, 19). Additonally, it has been noted that young patients often judge morality and personality traits on specific elements of appearance (2). Although orthodontists evaluate patients only in terms of degree of maloclussion, the rest of society scale attractiveness based on the same dentofacial features.

Various authors report that severe malocclusion occurs in more than 20, even 29% of population (9). Among adolescents, the prevalence of malocclusion oscillates from about 45 to 75%. These dentofacial defects have numerous negative implications on patients' health, general or mental. Some of the side-effects include headaches, insomnia or sleep apnea, speech and mastication difficulties. Maloclussions could also exacerbate systemic and psychiatric disorders, including eating disorders (5, 6, 9). Moreover, they have been shown to negatively impact quality of life (1,7). Some of the frequently reported consequences include appearance-related bullying and body-dysmorphia. Several studies have identified ortodontic anomalies as potential etiological factors for depression and anxiety (1,3,5).

Malocclusion is a multifactorial dentofacial disorder, affecting the majority of population. Although it is not classified as a disease, it can have a significant effect on facial aesthetics, oral health and even general health. Malocclusions can be divided into dental and skeletal categories. In the first group, irregularities - such as crowding, spacing (diastema), deviations in overjet and overbite - are not noticeable in the facial profile. On the other hand, skeletal malocclusions, categorized as class II or class III, are typically more discernible both to dental clinicians and nonprofessionals. They could be additionally classified as morphological or functional, with convex or concave profile. Class II (distoclussion, retrogenia, mandibular rethrognatism) is the most prevalent, characterized by a posterior position of the mandible and often retruded chin (1). Despite rarer occurrence, class III malocclusion (mandibular prognathism, progenia) is more frequently affiliated with social exclusion and other appearance-related negative implications. Therefore, a notable improvement in quality of life of class III patients was noted after orthognathic surgery (1,15). Another factor that may worsen QoL and heighten the risk of depression is temporomandibular joint disorder.

The aim of this work is to explore, through a review of available literature, the potential causal relationship between malocclusion - whether dental or skeletal - and psychological disorders. Despite high prevalence of malocclusion and mental health problems, the number of studies addressing this link is still very limited. In the following sections we will discuss the likely bi-directional association between occlusal anomalies and conditions such as depression, anxiety, body-dysmorphia, anorexia, bulimia.

Materials and Methods

Relevant scientific publications were identified using the „PubMed" and „Google Scholar" databases. The literature search was conducted using following keywords and phrases: malocclusion, orthognathic surgery, mental health, depression, anxiety, eating disorder. Publications were selected after careful evaluation of their relevance and the link between malocclusion and psychological disorders. Articles in languages other than English were excluded. The search and review were conducted between March and June 2025.

Results

Depression

This complex condition consists of many psychological disorders, mostly manifested by persistent low mood, emotional instability, lowered self-esteem, pessimism. Other symptoms may include decreased appetite, disturbed circadian rhythm, apathy, and in the worst cases, suicidal thoughts and attempts. According to World Health Organization, even up to 5% of adults worldwide suffer from depression. The risk is heightened among women and the elderly (1). Chronic stress could also be the onset factor of depressive disorders.

Malocclusion, aside from its aesthetic implications, can be the cause of pathological tooth wear, dental caries, trauma to the teeth, periodontal disease and impaired mastication (4). According to Kovalenko et al., about 20% of patients suffering from orthognathic deformities exhibit higher levels of neuroticism, which is associated with emotional instability, anxiety and sometimes aggression (12). Li et al. found that up to 32% of adolescent patients, undergoing orthodontic treatment, presented with depressive symptoms (13,16). Correspondingly, Rafiei documented a prevalence of 28, 3% within a similar study group. Unfortunately, dentists more often than not dismiss psychological state of the patient, attributing emotional distress to pain and discomfort caused by malocclusion. As a result, depressive symptoms are frequently overlooked, assuming that they will be resolved after completion of the treatment. However, often it is the mental state of an individual that impacts dental care negatively. The relationship between malocclusion and depression could therefore be bidirectional, where each condition may contribute to the triggering or exacerbation of the other.

In „Mental Health and Malocclusion: A Comprehensive Review", Alsulaiman and authors argue, that despite some inconsistencies in the literature, there is evidence of a negative impact of malocclusion on mental health, increasing the risk of depression and anxiety disorders. This can lead to antisocial behaviors, decreased self-esteem, reduced quality of life, and reluctance to pursue treatment. Particularly high levels of appearance-related depressive and anxiety disorders were found in skeletal class II/III subjects (1).

Some studies suggest gender-based differences in the levels of anxiety and depressive symptoms. According to Avramut et al., women demonstrated poorer mental health outcomes as assessed by PHQ-9 and GAD-7 tests, showing significantly higher levels of both depression and anxiety. Similar conclusions were made by Li (13). Coping strategies also differed by gender. In men, it was usually based on disengagement, while women were more likely to utilize emotion-focused coping mechanisms (3).

Both de Avila (8) and Kettunen (9) confirm the link between dentofacial deformities and reduced self-esteem as well as depressive symptoms. Kettunen marks the importance of cooperation with psychiatrists in order to properly evaluate and prepare the patient for orthodontic treatment. Author also speculated on an increased psychiatric morbidity associated with administration of high-dose dexamethasone during orthognathic surgery (9).

A comparative analysis was conducted between patients requiring orthodontic treatment and those in the need of orthognathic surgery (20). Quality of life was researched using two questionnaires: general-health SF-36 and disease-specific Orthognathic Quality of Life Questionnaire. In conclusion, orthodontic patients without the need for orthognathic surgery presented much lower scores, which indicated better overall quality of life.

In patients with dento-skeletal deformities, emotional distress and physical discomfort occurred particularly more often. Furthermore, the risk of severe depression was 5 times higher in individuals requiring orthognathic surgery. This group also presented other notable symptoms, such as higher prevalence of chronic pain, compulsive-obsessive disorders, higher anxiety, and even paranoia. The likeliness of developing myofascial pain was seven times greater, compared to the control group (17). Although it has not been definitively proven due to the lack of appropriate research, numerous hypotheses continue to explore the pathophysiological link between chronic pain and depression.

Several scientific articles emphasize the need of psychiatric evaluation of the patient prior to the start of the orthodontic treatment (12, 14). Patients should be adequately prepared for anticipated changes in their appearance, to prevent postoperative body-dysmorphia, especially considering individuals with severe malocclusion. This group is more likely to present with introvertion, social withdrawal, emotional instability and anxiety. Kovalenko et ai., however, did not find an increased prevalence of such traits in patients with mild to moderate malocclusion (12).

The exacerbation of depressive disorders could also be linked to the delays in the initiation of orthodontic treatment. The study conducted among adolescents of Chinese population showed that patients whose therapy was postponed by 181-360 days - and especially those delayed by over 360 days - presented significant increase in the risk of developing depressive symptoms (13). This poses a considerable problem, as over 80% of adolescents report being self-conscious about the appearance of their teeth, avoiding smiling or participating in social activities. Such concerns are more prevalent in girls.

In consequence, 42% of children with severe malocclusion scored below average in academic evaluation, compared to 32% of children in the control group - this difference was statistically significant (4). Adolescents with malocclusion in the permanent dentition exhibit harmful oral habits more often (77%) than individuals in control group with normal occlusion (55%). These habits include thumb sucking, onychophagia (nail-biting), lip-biting, sluggish mastication, infantile swallowing patterns. The most common among the children aged 6-14 years was nail-biting, while thumb-sucking dominated among those with deciduous dentition. In this study, neither harmful oral habits nor malocclusion had any correlation to anxiety - its prevalence was similar in both study and control groups, and reached about 20% (18).

One of the frequently co-occuring conditions in individuals with malocclusion is temporomandibular joint disorder (TMD). It presents clinically as pain, clicking, or crepitus in the periauricular region. TMD has been shown to be significantly associated with psychological disorders, including depression (14, 17). In a study by Miyachi et al., efforts were made to identify practical markers to facilitate the detection of psychological disturbances in patients undergoing dental treatment. Within their study population, about 66% of patients tested positively for DSM-IV Axis I disorders. A correlation was made, connecting multiple visits to different clinics, or elevated scores in anxiety and insomnia sub scale of the General Health Questionnaire (GHQ), to the presence of mental illness (14). According to other studies, prevalence of depression is higher

in patients requiring orthognathic surgery who also suffer from TMD. Therefore, the intricate link between skeletal deformities, orofacial pain and mental health disturbances was further highlighted.

Class III Malocclusion

One factor, repeatedly highlighted across literature, is skeletal Class III maloclussion. Patients with this type of dentofacial deformity are statistically more likely to present depressive symptoms - 39,6%, in contrast with 22,4% in Class I and 32,7% in Class II malocclusions (1,16). These results indicate a significantly lower quality of life in the Class III group.

In the study conducted by Nicodemo et al. self-esteem and depression were evaluated in patients with Class III malocclusion before and after orthognathic surgery. Women exhibited a significant improvement in self-esteem and disappearance of depressive symptoms after surgical intervention, in comparison to pre-operative state. Interestingly, this correlation was not observed in male patients - no significant changes reported. This discrepancy may be attributed to the underlying motivation for seeking medical attention, with women more frequently undergoing surgical treatment in pursuit of improved self-image.

Intriguing observations were also presented in the study titled „ Facial features of cartoon characters and their perceived attributes". The researchers analyzed facial profiles of protagonists and antagonists of 50 most popular animated movies produced after the year 2000. The findings revealed that specific facial characteristics were used to symbolize moral alignment - „good" or „evil". For instance, antagonists were commonly depicted with prominent, hooked noses, large chins, and an elongated upper 1/3 of the face compared to the lower third. In contrast, „good" characters were characterized by softer, more harmonious features.

Further analysis revealed that female antagonists were significantly more likely to have facial profiles corresponding to Class III malocclusion. Strikingly, there were no female protagonists depicting similar orthognathic condition (2). These findings suggest the presence of harmful stereotype, in which certain facial features are subconsciously associated with negative traits. This stereotype may be the underlying cause of the results observed by Nicodemo et al., where female patients experienced improved self-perception after orthognathic surgery.

Eating Disorders

According to current scientific knowledge, eating disorders (EDs) are defined as unhealthy eating habits, correlated with psychiatric conditions. These disorders often involve abnormal food-related behaviors, as well as reduced self-esteem, and body-dysmorphia. EDs are more prevalent among woman and adolescents, and can result in mortality in up to 25% of cases (11). The most common types of eating disorders are anorexia nervosa (AN) and bulimia nervosa (BN). AN is characterized by food restriction due to constant fear of gaining weight, or even obesity, despite the individual often being underweight. Bulimia on the other hand involves current episodes of binge-eating, followed by self-induced vomiting, all with the aim of reducing body weight in mind.

Some of the characteristic oral symptoms present in ED patients include: enamel erosion, caries, teeth hypersensitivity, xerostomia, gingival bleeding and malocclusion (7,11). The most common one is erosion. All of these symptoms together place considerable strain on the masticatory system, weakening its overall function. Preexisting malocclusion may further exacerbate these complications.

Chiba et al. (7) Conducted research involving female orthodontic patients suffering from AN or BN, comparing them to a control group of women without preexisting EDs. Majority of patients with ED rated their orthodontic treatment needs as high or indispensable. Approximately half of the patients suffering from AN/BN exhibited severe or even disabling malocclusion, while most participants in the control group displayed no or only minor occlusal irregularities. The ED group also presented more often with missing upper or lower teeth, anterior teeth misalignment and spacing between incisors. These individuals scored significantly higher in the evaluation related to masticatory function limitations, pain, psychological and social discomfort. However, no direct correlation was found between self -induced vomiting or finger pressure and specific types of malocclusion, such as incisor protrusion.

Another study explored whether orthodontic treatment - specifically fixed appliances - may serve as an etiological factor in the development of eating disorders. Koukou (11), in a review of available literature, examined four case reports. In three of them, female patients developed an eating disorder after the initiation of orthodontic therapy. These patients experienced sore mouth associated with protruding elements of the orthodontic appliance. As a result, their eating habits changed - including reduced food intake and alterations in meal timing. These changes also occurred due to the fear of damaging the appliance, dietary advice given by their orthodontist, change in taste perception and also social embarrassment. All of these factors could have

contributed to the onset of an ED. This suggests that orthodontic treatment could potentially trigger an eating disorder in susceptible individuals. However, due to the limited number of cases - only four case reports - this association remains uncertain and warrants further investigation.

Patients with anorexia and bulimia nervosa often follow inadequate diets, may interrupt meals due to masticatory discomfort, and frequently report impaired taste perception. Chiba et al. suggest that abnormal occlusal conditions may further impair eating habits in patients with EDs and may also hinder treatment efforts for these disorders.

Moreover, even with the absence of ED diagnosis, patients with severe malocclusion have been found to exhibit significantly lower body mass index (BMI) compared to individuals with normal occlusion. Malnutrition is particularly prevalent in cases of maxillary retrognathia (10).

Discussion

The impact of malocclusion on mental health remains an insufficiently explored topic. The number of scientific publications directly comparing these issues and investigating their correlation is still relatively limited. Variations in study design, population characteristics, assessment methods and lack of follow up studies prevent drawing definitive conclusions. Nevertheless, existing data suggest a positive association between the presence of malocclusion and the occurrence of depression, anxiety, and eating disorders. Further research using standardized methodologies and larger study groups is necessary to definitively establish and explain the nature of these relationships.

What has been consistently demonstrated, however, is the lower self-esteem and reduced quality of life in individuals with occlusal disorders - especially skeletal malocclusion - compared to those with normal occlusion.

A recurring recommendation across many studies emphasizes the importance of conducting psychiatric evaluations prior to initiating orthodontic or orthognathic treatment. Such assessments can not only help prepare patients for upcoming changes in their appearance , but also facilitate more efficient and personalized treatment processes. Special attention should be paid to symptoms of depression, anxiety, and aggression, especially in adolescents.

Efforts should be made to raise awareness of potential psychological symptoms in dental patients. Close cooperation between dentists and psychotherapists may significantly improve patients' quality of life and enhance the early detection of psychological disorders.

Conclusions

Facial appearance is an internal part of our lives, especially considering the advancement of social media. As of now, the body of literature suggests a positive correlation between mental health and maloclussion. Although, overall results are still unclear. Therefore, further research is needed, as it would be an immense help to clinicians, who are trying to help individuals struggling with self-image because of orthodontic or orthognathic maloclussion. Moreover, dentists should consider psychiatric evaluation of a patient before the start of orthodontic treatment.

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Author's contribution.

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