Psychosocial Factors Associated With Orthodontic and Orthognathic Surgical Treatment

Semilla M. Rivera, John P. Hatch, and John D. Rugh

Recognition of the potential repercussions associated with malocclusion has encouraged investigations aimed at understanding the psychosocial outcomes associated with orthodontics and orthognathic surgery. Of particular interest are the benefits of treatment on judgements of self-image and interpersonal relationships. This article examines patients' adjustment to dentofacial malrelations in an attempt to assess their psychologic well-being before treatment. This discussion is followed by a review of the psychosocial benefits and negative effects associated with orthodontics and orthognathic surgery. Although dentofacial deviations can have some social disadvantages, candidates for corrective treatment appear to be well-adjusted before treatment. Long-term benefits in self-concept, body image, and interpersonal relations after treatment are variable, with larger psychosocial changes generally reported by orthognathic surgery patients than by patients who receive orthodontic treatment alone. (Semin Orthod 2000;6:259-269.)

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As the number of orthodontic and surgical procedures performed to correct dentofacial malrelations rises, there is a growing need to assess the psychologic well-being of patients after treatment. Changes in function and facial esthetics may be accompanied by improvements in self-image and social relations. Much of the past literature has focused on the functional and structural problems inherent in malocclusion. More recently, researchers have recognized the need to understand the social and psychologic implications associated with malocclusion and corrective treatment. A flourishing body of literature has emerged in this area. However, study results are often questionable due to their retrospective nature, lack of proper comparison groups, or failure to use standardized measures. Furthermore, many studies focus on patient satisfaction without providing information on changes in specific areas of personality and social relations.

Previous reviews have discussed the psychologic aspects of craniofacial disfigurement, malocclusion in particular. Other reviews have examined the psychologic changes experienced by patients who receive orthodontic treatment and orthognathic surgery. However, the specific effects of treatment are often difficult to assess due to the scarcity of systematic, controlled, prospective studies that examine the changes of treatment over time. With these points in mind, the first part of this article seeks to identify the effects of dentofacial malrelation on patients' psychologic well-being and interpersonal relations. This first section establishes a foundation by which to compare the psychologic changes and benefits associated with orthodontic and surgical treatment, which is the focus of the second part of this article. Given the limitation of case reports, this review focuses primarily on longitudinal prospective and when available,
controlled studies that permit assessment of treatment effects.

**Psychosocial Impact of Malocclusion**

Malocclusion has been broadly defined as physical deviations from ideal occlusal relations. Malocclusions are often differentiated from more severe forms of dentofacial malrelations such as cleft lip and palate or severe facial injury. Approximately 70% to 75% of the population is affected by some form of malocclusion. However, the psychologic and social repercussions of these conditions are diverse and vary across individuals and their culture. The impact of malocclusion on psychosocial factors can be understood in the context of 2 interrelated processes.

The first deals with social judgement and responses of others to malocclusion. The second process involves patients' self-adjustment to malocclusion. These 2 components are discussed in turn.

**Social Judgements of Malocclusion**

Dental characteristics are fundamental determinants of facial appearance, an important factor in personal identification and nonverbal communication. Numerous studies have examined the effects of physical attractiveness on social judgement and social relations. Unattractive individuals are perceived to be less likely, less friendly, less intelligent, less successful, and less competent as dates and marriage partners. Some studies have found physical attractiveness to be significantly associated with teachers' expectations about intelligence, popularity, and success. Many of these studies focus on what Shaw terms "background attractiveness" whereby judgement of attractiveness is based on total facial appearance.

There is reason to believe that specific facial deviations, including malocclusion, give rise to similar social stereotypes. Normal incisor relationships are associated with higher levels of friendliness, social class, popularity, attractiveness, and lower levels of aggressiveness when compared with prominent incisors, crowded incisors, and absence of lateral incisor.

**Self-Adjustment to Malocclusion**

It is suggested that patients with severe forms of craniofacial deformities, such as cleft lip and cleft palate are likely to internalize the negative reaction of others. However, findings across studies are mixed as to the impact of these negative responses on self-concept. Some studies show that craniofacial patients score significantly lower on self-concept and body image when compared with a control group. Pertschuk found that although craniofacial patients scored significantly lower on self-concept when compared with a control group, scores remained within the normative range. Furthermore, Pope and Ward reported that craniofacial patients scored low on global self-esteem but had no problems in other areas of self-concept. Of particular concern is whether the social stigma attached to less extreme conditions such as malocclusion yields similar effects on individuals' self-image.

Self-image relates to the implications and problems associated with self-concept and body image. Several investigators have examined the relationship between malocclusion and self-image. Most studies show that patients with malocclusions have a positive self-concept and self-esteem. With few exceptions, studies also reveal that patients with malocclusion typically report a positive body image that is comparable with the general population.

Several investigators have also studied the relationship between malocclusion and personality characteristics in an attempt to determine if patients seeking treatment show personality disturbances. In contrast to an earlier study in which patients reported several psychosocial problems, more recent research indicates that patients have well adjusted personalities. Patients are comparable to the general population on several personality characteristics including neuroticism, locus of control, introversion and extroversion. Similarly, presurgical scores on the symptom checklist 90 (SCL-90), the revised SCL-90 (SCL-90-R), and the general health questionnaire indicate that patients score near general population norms on several dimensions of psychopathology. The extent of psychosocial problems reported in the earlier study may reflect a time.
when malocclusion and treatment were less accepted. Today, there is greater acceptance of a wider variety of occlusal derangements and less stigma placed on corrective treatment. Although recent studies show that some individuals score outside of the normative range on several personality characteristics, an examination of the range of these outlying scores reveals that these subgroups are only slightly worse off than the general population.

In general, these studies offer several conclusions. First, deviations from the ideal occlusion can present some disadvantages in social interactions and interpersonal relationships. Among young adults and children, individuals with dental anomalies are attributed less socially desirable personality traits. Some individuals report being teased or nicknamed and report feelings of distress and agitation. Interestingly, social response to malocclusion does not appear to significantly affect an individual's self-image. The majority of patients seeking orthodontic treatment and orthognathic surgery are well adjusted. Individuals with malocclusion report levels of self-concept, body image, and personality characteristics that are comparable with the general population. Other investigators have drawn similar conclusions.

One explanation for the lack of a strong relationship between malocclusion and psychosocial problems is that people are motivated to protect and enhance the self. Patients with malocclusion may develop different coping mechanisms as a defense against negative social judgment. An effort might be made to overcome social stigma by dismissing those who are critical, or patients may accommodate for the deviation by emphasizing other strengths. A second possibility is that the perceived severity of malocclusion is subjective. An individual with a mild facial disfigurement may be affected more profoundly than someone with a more severe deviation. Furthermore, many patients with malocclusion seek treatment for congenital deviations rather than those that are acquired by injury. For the majority of patients with malocclusion, physical appearance becomes an integral part of self-image at a very young age, lessening the impact of these deviations on judgement of self-worth. This does not exclude the possibility that some individuals experience personal adjustment problems. However, more severe forms of facial malformation may have greater adverse effects on self-image than does malocclusion.

**Severity of Malocclusion**

The relationship between the objective severity of a malocclusion and patients' psychologic adjustment to the deviation remains unclear. More severe cases of malocclusion might be expected to present the greatest psychologic distress. Research, however, suggests that it is the perceived degree of disfigurement and not the objective severity of malocclusion that provides the greatest information about presurgical levels of self-concept, and more specifically, self-esteem.

The severity of malocclusion is associated with a lower judgement of physical attractiveness. For example, overjet in excess of 9 mm lowered children's general attractiveness as judged by others and by themselves, but did not affect self-esteem or teacher perceptions. Research also shows no significant relationship between the type or objective severity of malocclusion and body image or psychosocial discomfort. As suggested by Albino and Tedesco, these studies indicate the importance of evaluating not only objective clinical dimensions but also the subjective perceptions and the meaning of the disfigurement to the patient. This will enable a more comprehensive assessment of the patient's psychologic adjustment to malocclusion.

**Summary**

There is little direct evidence that unfavorable stereotyping operates against individuals with visible dentofacial malocclusions or that it interferes with personality development. Although individuals with malocclusion may report feeling negatively impacted and socially disadvantaged, these circumstances do not have large negative repercussions on patients' psychologic well-being. For the most part, individuals with malocclusion report a positive self-concept and body image that is comparable with the general population. In addition, few patients show personality disturbances. Also, the objective severity of the malocclusion does not seem to be associated with self-judgments of self-esteem or body image. Perhaps, as Klima et al suggest, the psychologic impact of malocclusion has been overestimated. Given that patients are well ad-
justed before treatment, it is important to examine the influences of treatment on psychosocial characteristics.

**Psychosocial Effects of Treatment**

**Patient Expectations**

Research shows that patients with malocclusion are motivated to undergo corrective treatment primarily for esthetic and functional reasons. There is also evidence that patients expect certain psychosocial benefits after treatment. For example, patients hope that treatment will positively influence interpersonal relationships and psychologic well-being as well as improve self-confidence and self-image. In addition, patients expect that their life will improve in some way because of treatment. In an aforementioned study, Wictorin et al report that 60% of patients believed that self-confidence would increase in relation to the opposite sex, and 54% believed they would be happier if their malocclusion was corrected. It is unclear the extent to which corrective treatment contributes to increased levels of self-concept and social interactions. The physical results of treatment are usually favorable, producing improvements in occlusion, function, and facial appearance. The psychologic implications of these changes are less apparent but of equal importance in assessing the impact of treatment. The following sections characterize the psychologic changes that follow orthodontic and orthognathic treatment. The issues are discussed separately for orthodontic treatment and orthognathic surgery.

**Orthodontic Treatment**

**Self-concept.** Self-concept is composed of self-impressions and personal evaluations of one’s self-adequacy. Self-concept is multidimensional in nature. These dimensions include self-efficacy (ie, one’s perceived ability to achieve goals through one’s own efforts), self-evaluation of intelligence, strengths and weaknesses, self-esteem, and self-perceptions of physical appearance (ie, body image).

Orthodontic treatment, which often produces positive changes in facial appearance, is assumed to improve self-concept. A review of the literature, however, provides little evidence to suggest that self-concept is enhanced after orthodontic treatment. For instance, adult patients with mild-to-severe degrees of malocclusion, undergoing fixed-appliance orthodontic treatment, show no significant differences in self-concept from pretreatment to 6 months after the start of treatment or 1 to 4 weeks after the end of treatment. Similarly, a comparison of orthodontic patients 15 months after the start of treatment and 1 year after the completion of active treatment indicates that self-concept is comparable with that of a group receiving no treatment. Furthermore, self-concept is not significantly different in those patients who present for treatment, those who are still in retainers, or those who have completed treatment. Thus, the literature suggests that self-concept undergoes little change over the course of orthodontic treatment and remains stable after active treatment is completed.

Several explanations can be offered for these findings. First, because the research shows that patients are comparable with the general population in regard to self-concept before orthodontic treatment, self-concept scores after treatment may not show large subsequent improvement. Secondly, orthodontic treatment may not produce sufficient changes in total facial appearance to significantly impact the physical appearance dimension of self-concept. Furthermore, orthodontics requires that patients wear appliances throughout the course of treatment. Patients may perceive the appliances as unattractive. Therefore, self-concept may not have a chance to change very much during treatment. Last, even with improvements in dentofacial appearance, other dimensions of self-concept may have a greater influence on judgements and perceptions of self-worth than does the physical attractiveness dimension. It appears that improvements in dental appearance following orthodontic treatment do not necessarily translate to changes in self-concept.

**Body image.** Body image is the degree to which one feels satisfied or dissatisfied with various parts or processes of the body. This term is distinguishable from general self-concept in that it concerns perceptions specifically related to physical aspects of the body. Few longitudinal studies have considered the changes in patients' body image after orthodontic treatment. Studies that have examined this relationship have pro-
duced limited support for sustainable long-term benefits in general body image. For instance, one study showed that general body and facial image significantly increased from pretreatment levels when assessed 4 weeks following the completion of active treatment. At 1 year following the completion of active treatment, self-evaluations of dentofacial attractiveness in adolescents significantly improved when compared with pretreatment levels. However, these improvements did not generalize to other facial characteristics or general perceptions of the face.

Based on these studies, it can be inferred that at the early stages following removal of orthodontic appliances, patients experience a heightened perception of overall body and facial image. Although patients continue to maintain positive perceptions of their dentofacial appearance 1 year after completion of active treatment, heightened perceptions related to other body parts or general body image diminish. One explanation is that improvements to any physical characteristics may produce a false perception that other aspects of the body have enhanced, similar to the feeling one gets after a makeover. However, over time, the specific changes to dental features become incorporated into one’s self-concept and the enthusiasm associated with a “new look” decreases. Patients may continue to be satisfied with the esthetic changes produced in dentofacial features. However, attention may be refocused on imperfections of other body parts, lowering previously held self-perceptions of general body image.

Social interpersonal relations. A common assumption of patients with malocclusion is that improvements in dentofacial attractiveness will evoke more favorable social response and, in turn, facilitate social behavior. Very few prospective studies have examined the changes to specific attitudes and behaviors of social functioning after orthodontic treatment. Albino and Tedesco examined judgments of dental attractiveness in adolescents receiving orthodontic treatment. Parent and peer posttreatment ratings of these adolescents were significantly higher than pretreatment ratings and higher than ratings of a delayed treatment control group. However, parent and self-evaluations of social goals and social competency did not differ 1 year after treatment. Patients who undergo orthodontic treatment do not report major problems socializing before treatment. Therefore, detection of large changes in social function after treatment may be difficult. Patients who experience social stigma related either to their malocclusion or to their orthodontic appliances may compensate by emphasizing other personality characteristics. Thus, social competency does not become problematic. The research examining social interaction following orthodontic treatment is limited. However, based on the few changes observed in self-concept and body image after treatment, one can infer that social behavior and social goals will generally remain stable following orthodontic treatment. However, further investigation into this issue is warranted.

Adverse effects. Few psychologically adverse effects are reported following orthodontic treatment. Most discomfort is physical and is experienced during the initial 4 weeks of treatment and during appliance adjustment visits. However, these problems appear to be short lived and do not cause a large amount of distress. Several studies have reported on minor psychosocial discomforts associated with orthodontic treatment that are worth noting. For instance, individuals wearing braces have been targets of nicknaming; however, patients do not generally report being seriously upset. Teasing about dental appliances, however, causes anxiety in some patients. Furthermore, one study found that patients who initially considered surgery but chose orthodontic treatment only, experienced greater levels of depression, tension, and anger after treatment than did surgical patients. This suggests that those who anticipated large esthetic changes after surgery may be disappointed by the less dramatic facial changes produced by orthodontic-only treatment. Other problems expressed include fear and worry over being excluded from social groups and stress related to treatment. In general, however, orthodontic treatment produces few adverse reactions. Any adversities experienced by patients are temporary and do not pose a great threat to patients’ psychologic well-being.

Summary. Orthodontic treatment does not significantly increase or decrease self-concept. Heightened perceptions of overall body and facial image emerge at the early stages following active treatment. Although dentofacial image remains high, initial improvements in overall body
image decline over time. This implies that orthognathic treatment is able to improve self-perceptions of the specific area troubling the patient but may not have a lasting impact on general body image. The limited data concerning social behavior following treatment suggest that few changes occur in social goals or social competency. Finally, the psychosocial problems experienced during and after treatment are minor and generally decline over the course of treatment.

Orthognathic Surgery

Self-concept. Orthognathic surgery involves the use of preoperative orthodontic appliances to position the teeth and surgical procedures to manipulate the upper and/or lower jaws. The outcomes of treatment are often manifested by improvements in occlusion, esthetics, and functional ability. Less discernable are the psychologic benefits associated with orthognathic surgery, particularly the changes that emerge in self-concept. Research shows that following surgery, dimensions of self-concept significantly increase from presurgical levels and remain high at 1 year and 2 years after surgery. Patients often report positive personal benefits, increased facial self-judgement, self-esteem, self-confidence, and lower levels of self-consciousness. Finlay et al. also found a trend toward increased levels of self-esteem at 6 months and 1 year after surgery when compared with baseline, however these differences were not significant.

In contrast, other studies show that levels of self-concept undergo periods of vacillation after surgery. In these latter studies, patients’ overall self-concept showed some improvement 4 months after surgery. However, all dimensions of self-concept significantly declined at 9 months to levels below baseline. Two years after surgery, self-concept scores significantly increased from scores at 9 months, but remained at or significantly below presurgical levels. The authors attributed the decline at 9 months to feelings of disappointment experienced by patients who may have overestimated the physical, psychologic, and social benefits of surgery or to patients whose orthodontic bands were still in place. The subsequent increase at 2 years post-surgery was attributed to a stabilization of self-concept once active treatment was completed.

Kiyak et al. reported similar fluctuations in a later study such that overall self-esteem and in particular, personal self-esteem significantly improved from presurgical levels at fixation removal (6 weeks postsurgery) but declined at 6 months to levels slightly below baseline.

Unlike orthodontic treatment, which produces primarily dental changes, orthognathic surgery is generally associated with significant improvements in self-concept and personal well-being. However, as some studies suggest, patients who perceive that the outcomes of surgery fall short of their presurgical expectations may experience a period of disappointment. As a result, levels of self-concept may not manifest large long-term gains.

Body image. The esthetic changes associated with orthognathic surgery can have a major impact on body image. Investigators have been particularly interested in the degree to which changes in dentofacial composition lead to improved levels of general body image. It is suggested that following surgery, patients experience a “halo effect” such that improvements in one area of the body are generalized to other parts of the body. Some studies show support for this notion. Kiyak et al. found a large improvement in all measures of body image beginning immediately after surgery and continuing up to 6 months after surgery. In addition, the importance attributed to facial and other physical features increased over 6 months. Similar improvements in dental, facial, and general appearance were reported 1 year and 2 years following surgery.

Other studies show that the primary gains in body image relate specifically to judgements of the face and do not necessarily generalize to other body features when assessed 6 months, 9 months, 24 months following surgery. It is clear that after orthognathic surgery, levels of body image rise. However, the role that surgery has in improving general body image is open to debate. It is suggested that following surgery, patients may experience a period of “cognitive dissonance.” This theory states that people are motivated to view the outcomes of a situation that is high in costs or risks in a favorable way. This may explain why patients experience feelings of bliss with other parts of their body. Over time, however, patients begin to focus attention on other physical imperfec-
tions, and feelings associated with the “halo effect” may fade. Additional investigations are needed to further understand the long-term changes in body image after orthognathic surgery.

**Social/interpersonal relations.** A common belief of patients undergoing orthognathic surgery is that interpersonal relationships, particularly those with the opposite sex, will improve. With enhanced perceptions of self-concept and body image, it can be hypothesized that patients will engage in greater social activity after surgery. Several investigators have examined the changes in social relations after orthognathic surgery. Studies show that following a decline in social activity during the early weeks after surgery, there is a gradual increase in recreational and social activities at 4 months and increased levels of social potency and social responsiveness at 6 months postsurgery. Patients also report less inhibitions when kissing, fewer disadvantages related to physical appearance, less teasing, and perceive a greater capability of establishing long-term relationships. The decline in social activities immediately after surgery is likely due to postsurgical swelling and/or maxillomandibular fixation. Hatch et al. found similar significant improvements on the psychosocial dimension scores of the Sickness Impact Profile. Social interaction, communication, emotional behavior, and alertness behavior progressively improved from presurgical baseline when assessed 8 weeks, 6 months, 12 months, and 24 months after surgery.

Some studies suggest that the social benefits obtained from orthognathic surgery decline over time. For example, Lam et al. examined 53 patients (average age = 23.5), 9 months postsurgery and found that social activity levels declined to near presurgical levels. Similar results were found in another study. The percentage of patients reporting positive comments from others increased from 2 to 6 months after surgery but then declined when assessed 18 months following surgery.

Social activities with the opposite sex have also been examined in unmarried patients (age > 15 years) following orthognathic surgery. Significant increases in recreational and social activities occurred with members of the same sex but did not occur with members of the opposite sex.

In general, social activity and interpersonal relations improve after orthognathic surgery. Some studies suggest that these improvements decline over time. One explanation is that after surgery, patients receive an abundance of positive feedback from family, friends, and their clinicians. This feedback encourages patients to engage in greater degrees of social activity. Over time, facial changes and levels of self-confidence stabilize, and the salience of the facial changes to others as well as to the self diminishes. This may explain the decline in social activity and positive social feedback reported in some studies. This decline does not necessarily mean that the social benefits obtained from surgery are lost. This merely suggests that patients adjust to their new look, and the exhilaration felt in the early months following surgery wanes.

These findings also suggest that changes in social behavior with respect to the opposite sex occur at a slower pace. Anticipation of improvements in this area of socialization, and realization that improvements have not yet occurred may partly explain the decline in social activity observed in some patients. Additional time may be needed before changes in heterosexual interactions are observed.

**Emotional impact.** Few studies have examined the emotional state of patients after orthognathic surgery. Before treatment, patients may experience some anticipatory anxiety and tension. In surgical cases, anxiety may be associated with a patient’s fear of sensory loss, swelling, pain, the surgical procedure itself, and the physical changes after treatment. However, these fears are temporary. After surgery, research shows that patients experience positive mood states. One study found that patients showed increased vigor and lower levels of tension anxiety 6 months after surgery. In addition, positive mood states and lower levels of fatigue and depression were observed. Other studies found similar results reporting less social anxiety, lower levels of depression, and increased levels of well-being at 6 months and greater feelings of happiness, 1 year following surgery. Although these studies suggest that patients’ emotional states after surgery are positive, further research is needed on this issue.

**Adverse effects.** As found in orthodontic treatment, patients report few adverse psychologic effects following surgery. The most difficult pe-
period appears to be immediately after surgery. During this period, patients report increased levels of fatigue, loss of vigor, moderate levels of tension and anxiety, and only a slight increase in depression. These negative mood states generally last for only about 4 to 6 weeks. Patients who report physical postsurgical problems, such as pain, numbness, and oral functional problems are more likely to report negative mood states at these early stages. However, these physical problems do not influence self-esteem, body image, or satisfaction when assessed 9 months and 2 years after surgery. Others have found no adverse psychologic effects following surgery.

The degree of psychologic difficulties experienced after surgery has been related to patients' coping strategies. Kiyak et al suggest that vigilant copers (those who anticipate more problems) may experience more unnecessary anxiety than do avoiders (those who expect few problems). Anticipation of problems may result in a self-fulfilling prophecy. This occurs when an initial false definition of a situation evokes behavior that confirms the false belief. In 1 study, expectations of interpersonal problems significantly influenced patients' reports of interpersonal relations immediately after, 4 to 6 weeks, and 6 months following surgery. In general, however, patients report few long-term adverse psychologic effects following surgery.

Summary. Orthognathic surgery is associated with improved self-concept, body image, and social activities. However, the long-term benefits in these areas need further examination. Some studies show that these benefits decline over time as patients' outcomes become stabilized and attention is refocused on other physical imperfections. Research also shows that patients report negative mood states immediately after surgery. However, these states appear to be temporary and improve over time.

Maturational Factors
Adolescence is accompanied by sudden growth spurts, changes in facial features, emotional and hormonal changes, and a greater emphasis on peer opinions. It is also a period of heightened levels of insecurity and self-criticism. For individuals with dentofacial deviations adolescence can be difficult. Not only may peers be more critical of physical deviations at this period but also, individuals are likely to be more sensitive to criticism. Even the smallest physical deviations may be magnified and result in greater distress.

Corrective treatment for malocclusions can be very important to the adolescent. Early treatment may prevent the development of a poor self-concept. Because of their stage of development, adolescents may also have more problems adjusting to treatment. For example, adolescent patients report higher levels of pain after all phases of orthodontic treatment, particularly after debanding, and show more adverse psychologic effects than do adults and preadolescent patients.

Maturation may also influence the way in which adolescents respond to treatment. It is suggested that self-image will decrease from early to middle adolescence and then increase to previous levels in the teenage years. Furthermore, maturation may impact social interaction patterns, particularly with the opposite sex. Changes attributed to corrective treatment may be influenced by maturation. One study that compared patients who received orthodontic treatment with an untreated control group found that self-esteem, social goals, and social competency significantly improved over time for both groups. Other investigators have cautioned that psychologic changes after treatment may be influenced by maturation.

Therefore, patients may report feeling better about their appearance and have more positive levels of self-concept and self-esteem regardless of treatment effects. It is necessary that clinicians and researchers understand the influences of maturation on psychologic adjustment to malocclusion and the effects of maturation on treatment outcomes. In the absence of an untreated control group, interpreting psychosocial changes as direct results of treatment is inadvisable.

General Conclusions
A primary objective of orthodontics and orthognathic surgery is to improve patients' quality of life. This includes correcting functional deficiencies and improving facial appearance so that individuals find relief from the physical deviations that distinguish them from others. Patients are motivated to seek treatment, however, not only to correct functional and esthetic limita-
tions; they also have psychologic and social goals. An understanding of the psychosocial effects of malocclusion as well as the psychosocial benefits associated with treatment is essential.

Although dentofacial deviations have been historically associated with increased risks of psychologic maladjustment and negative social stereotyping, modern research shows that patients are generally able to adjust to these deviations and report relatively few psychosocial difficulties before treatment. Still, both patients and clinicians expect that orthodontic and orthognathic surgical treatments will result in improved psychosocial function. Clinical experience clearly supports these expectations. Patient reports to clinicians and office staff following treatment are most often strongly positive. It may surprise many clinicians that research shows few marked changes in patients' self-concept after orthodontic treatment and only transient benefits in overall body image. Except when patients require orthognathic surgery due to functional limitations or severe deformities, research has not shown significant long-term psychosocial improvements following correction of malocclusions.

Given the often dramatic improvements in esthetics, particularly following orthognathic surgery, and patient-reported satisfaction with outcomes, how can it be that nearly 30 years of research produces only limited evidence supporting significant long lasting psychosocial benefits? There are 2 possible explanations. First, it is possible that the psychosocial impact is, in fact, not as significant as clinical observation has led us to believe. This may be partly true. Just as patients may exaggerate the benefits of treatment shortly after completion, clinicians may be subject to a similar halo effect. Alternatively, it may be that current research methods are simply inadequate; ie, there are significant psychosocial changes, but the research methodology to date has been inadequate to document the psychosocial changes. The research examined in this review shows that most patients treated for malocclusions are psychosocially healthy before treatment. They have usually adapted to their malocclusion, have good coping skills, have positive self-concepts, and have positive social support systems. In such a generally healthy population, it is difficult to show further improvement, ie, a ceiling effect, and both possibilities should be addressed by future research. Future research may be able to more clearly document positive psychosocial changes by carefully controlling for the effects of maturation, the patient's age at treatment, the type and degree of malocclusion, the patient's coping skills, the time of assessment after treatment, the patient's perception of his/her malocclusion, and the impact of family and significant others. There is also the need to re-evaluate the assessment methodology. It is possible that the psychosocial assessments used to date are not detecting the psychosocial changes that are observed clinically. These factors have not been well controlled in many of the research reports to date. Prospective studies with appropriate control groups, calibrated examiners, and carefully selected patient relevant outcome measures are needed.

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