Factors Influencing Adolescent Cooperation in Orthodontic Treatment

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This article reviews the research related to adolescent perceptions of dental-facial appearance, the meaning of these perceptions, and their influence on cooperation in orthodontic treatment. A social-developmental framework that acknowledges the importance of family and peers in shaping an adolescent’s perceived need for treatment seems to be most useful. This framework can then be extended to include the role of the orthodontist and professional standards in encouraging cooperative behaviors. Although the benefits of orthodontic treatment may be perceived in terms of somewhat narrowly defined improvements in appearance, these represent important goals for many patients. Parental support will be especially effective in ensuring cooperation early in treatment; however, adolescents who do not give up "control," or responsibility for outcomes, will be more cooperative over the longer term. The orthodontist’s relationship with both parents and adolescent patients is critical to ensuring successful results. Recommendations for developing an effective patient/parent-orthodontist partnership are provided. (Semin Orthod 2000;6:214-223.) Copyright © 2000 by W.B. Saunders Company

The successful outcome of orthodontic treatment requires not only knowledge and technical competence on the part of the treating orthodontist, but also considerable effort on the part of the patient. The behaviors required of the patient, such as keeping appointments, maintaining oral hygiene, adhering to dietary recommendations, wearing and maintaining appliances,1 are sometimes complex and may disrupt established routines or interfere with social activities. Because the preferred time for treatment in most cases continues to be during adolescence, the behaviors of these patients may also be significantly affected by the developmental tasks of their age group. For example, the development of independent identity involves separation from parental values and movement toward peer group standards—psychologic activity that may manifest as general resistance to adult authority. From this perspective, it is not surprising that both Allan and Hodgson2 as well as Weiss and Eiser3 found that patients 12 years of age and younger were more cooperative than patients in their teen years. Although these findings are important, they may not be of great assistance in predicting the responses of a given adolescent in orthodontic treatment. Rather, the social developmental context for that individual must be considered in a way that takes into account the attitudes and behaviors of parents, and perhaps the treating professionals, as well as the social milieu of the patient and the patient’s own perceptions.

Early in the conduct of a series of longitudinal studies of adolescent orthodontic patients carried out at the State University of New York at Buffalo in the 1980s,4 it was determined that the severity of malocclusion and the need for orthodontic treatment are assessed in very different ways by patients, their parents, and orthodontists. Because the salient concerns of these 3 groups with respect to malocclusion are almost certain to vary, this is not surprising. It is abso-
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Facial Esthetics and Malocclusion

The first step in understanding cooperation in orthodontic treatment lies in understanding the motivation for seeking treatment. Of course, we have long known that most people who seek orthodontic treatment do so for cosmetic reasons. This seems to follow from the general literature on physical attractiveness, which shows that people learn concepts of facial attractiveness early in life and that facial attractiveness is a social asset and unattractiveness, a social liability. Furthermore, whereas epidemiological research has suggested that at least 70% to 75% of the population could benefit from orthodontic treatment for some form of occlusal malocclusion, such functional considerations are not necessarily linked to the need for treatment as it is perceived by patients. Rather, most individuals view orthodontics as a means for improving dental-facial appearance. Consequently, professional guidelines for assessing orthodontic treatment need usually incorporate some estimate of esthetic impairment. The rationale usually given for this inclusion is that esthetic impairment, through its potentially negative impact on self-esteem, or self-efficacy, could result in personal or social difficulties. The Buffalo studies showed this to be the case, at least, within a limited definition of self-esteem.

Professional Assessments

The accurate assessment of esthetic impairment is complex. Efforts to include consideration of impact on appearance in standardized indices of malocclusion have not been well regarded, perhaps because practitioners are so keenly aware of the more subtle effects of tooth positioning that they do not trust standard scoring methods. It appears that most orthodontists prefer to rely on their own judgments of esthetic, as well as functional, impairment. Social psychology would tell us that no one (not even an orthodontist) is free of learned biases, particularly in such subjective matters as evaluating appearance. However, it must be noted that data from the Buffalo studies show that both appearance and functional factors are highly correlated with orthodontists' judgments about the general severity of malocclusion. Clearly, orthodontists take esthetic factors into consideration; it should not be assumed, however, that their assessments of the importance or degree of esthetic impairment match those of their patients.

Peer- and Self-Perceptions of Malocclusion

Studies examining adolescents' perceptions of their own need for orthodontic treatment have shown these judgments to be highly dependent on esthetic factors. There appears to be considerable distortion in these perceptions, however. Shaw found that the majority of children in a sample he studied could not identify photographs of their own occlusal features, nor could they accurately describe their occlusal features. In the Buffalo studies, children who were seeking orthodontic treatment provided evaluations of their dental-facial attractiveness that were unrelated either to orthodontic indices of their need for treatment or to peer evaluations of their dental-facial attractiveness. Children not seeking treatment, on the other hand, provided self-evaluations of attractiveness that were moderately correlated with both professional and peer evaluations of their need for treatment. When asked to rank order for attractiveness pictures reflecting several types of malocclusion, children who were not seeking treatment tended to rank order pictures of their own types of malocclusion as relatively more attractive than did others. In other words, those who believe they need treatment do not have a very clear self-image of their dental-facial appearance, and we can speculate that this may cause problems related to their expectations for treatment. On the other hand, those who do not believe they need treatment may have unrealistically positive perceptions of the attractiveness of their dental-facial features. Regardless of the specific implications for these 2 groups, however, these studies clearly support the notion that perceptions of appearance, rather than objective evaluations, will be the more important factor in determining one's own need for treatment.
These findings present a reasonably coherent picture when viewed in the context of other work. Not surprisingly, research has shown that normal occlusion is perceived as more attractive than malocclusion, although general attractiveness of a face may be more salient in assessing appearance than dental characteristics per se. Moreover, it appears that a consistent hierarchy exists for the objective attractiveness of various types of malocclusion. Using drawings depicting various types of malocclusion imposed on a standard, moderately attractive face, the Buffalo work produced a set of rankings for occlusal attractiveness that were highly consistent with those obtained 10 years earlier by Cohen and Horowitz. Pitt and Korabik, moreover, related some of these findings to a measure of self-esteem. Children with low self-esteem judged profiles reflecting their own occlusal conditions to be further from the ideal than did children with higher self-esteem. This seems to explain also why the evaluations of their own dental-facial attractiveness by children seeking orthodontic treatment are not highly correlated with the attractiveness ratings of orthodontists.

**Family Perceptions and Influence**

This description of how adolescents perceive dental-facial appearance would remain incomplete without an appraisal of the role that parents' perceptions may play in their children's evaluations of dental-facial attractiveness. The attitudes and perceptions of family members provide the foundation on which a child builds his or her self-perception of appearance, including dental-facial appearance. Data from the Buffalo studies showed that family members tended to make similar assessments of attractiveness. Significant positive correlation was found between children's self-perceptions of dental-facial attractiveness and their mothers' and siblings' perceptions. Fathers' and mothers' perceptions also were significantly associated, although the relationship between fathers' perceptions and children's self-perceptions were weaker. These relationships were found both within families seeking orthodontic treatment and others not seeking treatment, and they remained even when the statistical effects of severity of malocclusion, as professionally assessed, were removed.

**Dental-Facial Appearance and Social Behavior**

Reflecting on the available data, we can theorize that self-perceptions of dental-facial appearance begin with esthetic values shared within families and based generally on social norms, but that they may be strongly influenced by peer values and specific experiences of individual children, particularly those involving social responses. This latter observation helps to explain why the relative importance of dental-facial characteristics in defining self-perceptions of attractiveness may vary considerably from one individual to another. Theories incorporating concepts of social comparison and self-efficacy suggest that individuals evaluate themselves in comparison with others in their social environment. The family provides the most relevant environment early in life, but by adolescence the peer group sets the standard. In either of these contexts, we can see the emergence of a cycle of thought, action, and social consequences. Children who perceive themselves to be attractive will reflect those perceptions in their behaviors and generally will receive confirming social responses. The comparison group may express an attractiveness norm that reflects negatively on the individual, however. This, in turn, can affect the individual's perceived sense of self-efficacy or adequacy within that group and lead to behaviors that reflect more negative beliefs about the self, thereby inviting still more negative social responses.

Unfortunately, hard evidence of a relationship between self-perceptions of dental-facial appearance and social behavior is sparse. Shaw, Meek, and Jones found that children reported stronger feelings of upset when teased about their dental-facial appearance than when teased for some other reasons. Although there probably is some negative social feedback (and reaction to that feedback) associated with more visible and less attractive forms of malocclusion, this relationship is confounded by the fact that malocclusion is not usually the major determinant of facial attractiveness. Consequently, when studies have attempted to identify positive changes in social behavior as a result of orthodontic treatment, such specific relationships are difficult to identify.

Based on the extensive data collected in the
Buffalo studies, Albino, Lawrence, and Tedesco\textsuperscript{31} concluded that the effect of orthodontic treatment on social behavior may be masked by the maturational trends of the age group studied. Positive changes in self-perceptions of dental-facial attractiveness and in others’ evaluations of dental-facial appearance were seen when adolescents who received orthodontic treatment were compared with those who did not. These young people believed that their dental-facial characteristics were more attractive as the result of treatment, and these self-assessments were consistent with objective evaluations of their appearance. Although the perceptions of appearance before treatment may often be distorted as described,\textsuperscript{21} the experience of treatment appears to permit positive appraisals.

Similar changes were not reported for more general evaluations of appearance, or for changes in social behavior. Instead, both orthodontically treated and untreated groups of subjects showed greater self-esteem, more social behaviors, and more frequent initiation of social involvement with peers. It is possible that the measurement techniques used were not sensitive enough to identify changes in these areas; it is also possible that the manifestation of behavioral changes requires more time than was allowed by the follow-up schedule of the research. It seems more likely, however, that the maturational changes in self-esteem and social behavior are simply greater than the changes attributable to improved dental-facial appearance. These data notwithstanding, it is probably safe to assume that orthodontic treatment will continue to be viewed as a positive step by those who perceive their dental-facial features to be unattractive and that some positive psychologic impact will accrue as a result of treatment.

Figure 1 shows the various sources of information and experience related to parental, patient, and orthodontist attitudes that shape the decision to obtain orthodontic treatment.
Factors Related to Cooperation in Treatment

What may be of more interest to the orthodontist than the shaping of self-perceptions is the shaping of behaviors that will ensure a successful result of treatment, that is, the patient's adherence to prescribed routines for self-care and other regimens during orthodontic treatment. It is helpful in this regard to know that most patients expect improved dental-facial appearance as an outcome of treatment, but there is much more to know about factors influencing cooperation. For example, studies show that female adolescent orthodontic patients generally show more cooperative behaviors than their male counterparts. A number of studies have shown declines in the cooperative behavior of adolescent orthodontic patients over the course of treatment, eg, Southard et al and Albino et al. These findings are consistent with those found for other health problems requiring cooperation over longer periods of time. Sergl et al recently reported data supportive of earlier findings that discomfort caused by orthodontic appliances may affect treatment compliance, and even lead to premature termination of treatment.

As stated earlier in this article, the problem of cooperation by adolescent patients in orthodontic treatment is further complicated by the social and developmental issues of this time of life. The establishment of personal values and goals is a salient focus for teenagers, and the influence of parents may vary from promoting adaptive behaviors to providing standards against which to rebel. Just as the relative strengths of peer and parental influences are changing during adolescent maturation, so may the salient predictors of orthodontic treatment cooperation change over the 2 years or so required for treatment.

The studies of influences on cooperation carried out at Buffalo showed that factors predicting cooperation within the first 10 months of orthodontic treatment differed from those predicting cooperation when fixed appliances were removed, after an average of 26.6 months in active treatment. Kegeles reported that children whose parents encouraged treatment were generally cooperative; and Kreit et al found that uncooperative patients typically had poor relationships with parents. Albino et al reported adolescent cooperation early in treatment to be significantly and positively correlated with parents' attitudes. In particular, patient cooperation was higher for adolescents whose parents expressed positive attitudes toward orthodontic treatment and appliances, and who rated the child's occlusion as very important. This supports other evidence that parental beliefs are extremely important in orthodontic cooperation. Gross et al believe that because adolescents may have negative perceptions of orthodontic appliances, parental support is critical to treatment success.

When cooperation of the Buffalo orthodontic patients was assessed after about 2 years of treatment, parents' perceptions and positive attitudes toward treatment no longer directly predicted cooperation, although the children's ratings of the importance of their own occlusion was significantly correlated with cooperation scores. Moreover, earlier cooperation in treatment was predictive of later cooperation. It could be reasonably speculated that parental influence declines as children move into and through adolescence, but no relationship between age of patients and cooperation in treatment was found at any assessment point.

Measures of patients' perceptions of control in the treatment process yielded some strong correlations with cooperation scores over the longer term, seeming to confirm El-Mangoury's report that those with an internal locus of control cooperate better with orthodontic regimens than those with an external locus of control. Based on their scores on the Orthodontic Locus of Control Scale, adolescents who attributed responsibility for the outcome of their treatment to chance or to their orthodontists, rather than to themselves, were less likely to be viewed as cooperative over the long term of treatment. Conversely, patients who make fewer external attributions may retain at least some sense of responsibility over treatment outcomes, and believe that their participation and cooperation can facilitate treatment progress. The fact that these relationships between locus of control and cooperation were found only over the longer term remains puzzling. It may reflect a natural progression, whereby early in treatment, most patients will feel little control over the process and must learn gradually, and through interaction with the treating orthodontist, the ways in
which their own actions can influence treatment and its outcomes.

A number of studies have attempted to find relationships between personality or attitudinal variables and cooperation in orthodontic treatment. Southard et al.\(^2\) accounted for 24% of the variance in compliance among a group of 104 teenage orthodontic patients on the basis of gender, and 7 variables constructed from modifications of the Millon Adolescent Personality Inventory.\(^{45a}\) Cooperation was assessed after 2 years of treatment and was expressed as an average of the treating orthodontist’s ratings of 10 indicators of treatment compliance. As has been found in other studies, female patients were more cooperative than male patients. This study also suggested that preadolescent patients may be more compliant in the use of removable appliances. Among other stronger predictor variables identified were behavioral assessments of scholastic achievement and concerns related to security within the peer group. The negative relationships of social conformity and sensitivity scores to compliance in their study seemed to support earlier work.\(^{46a}\) These predictors are consistent with a view that the behavior of adolescents undergoing orthodontic treatment may be impacted by the importance of other social-psychologic pressures. More specifically, patients having difficulty with the developmental tasks of adolescence, as shown by concerns about peer approval, moodiness, or other signs of behavioral maladjustment, are less likely to be cooperative in treatment.

Nanda and Kierl\(^1\) used a methodology similar to that of the Southard group,\(^{32}\) but added a number of variables that had proved promising in previous studies. These included variables reflecting patients’ and their parents’ attitudes toward treatment and perceived relationships among patients, their parents, and the graduate student-orthodontists providing treatment. Two measures of cooperation were used, a chart review, which reflected incidents of noncompliance as well as cooperation, and the orthodontists’ evaluations of cooperation using the Orthodontic Patient Cooperation Scale,\(^{47}\) the same measure used in the Buffalo studies.\(^4\) Both measures were obtained after 6 months and after 12 months in treatment.

The authors accounted for 40% of the variability in scores from orthodontic patient cooperation charts and 60% of the variability in scores on the Orthodontic Patient Cooperation Scale. Most notable among their results was the strength of the orthodontist’s perceived relationship with the patient as a predictor of cooperation after 6 months and after 12 months of treatment. The correlation coefficient associated with this relationship increased from .37 after 6 months to .65 after 12 months. Unfortunately, the strength of these findings is probably compromised because of the bias involved in orthodontists’ rating both their relationships with patients and those same patients’ cooperative behaviors. It only stands to reason that practitioners would want to perceive those patients with whom they had developed strong positive relationships to be cooperative. This methodological weakness aside, the observation that the practitioner-patient relationship, and the practitioner-parent relationship is important to obtaining the cooperation of adolescent patients is supported by the data related to the more objective measure of cooperation based on chart review. The investigators’ thoughtful analysis of the issues related to orthodontist-patient relationships and cooperation are especially useful in terms of indicating directions for future research.

Other variables that contributed to prediction of cooperation tended to be associated with perceptions about relationships and attitudes toward treatment. These relationships were not strong, likely due to the restricted range of responses on some of these variables. Because only patients in treatment were studied, we would have expected potential patients with the most negative attitudes to have selected themselves out of treatment. In some cases, relationships between cooperation and attitudinal measures might have become evident had the investigators controlled statistically for the severity of malocclusion, as was done in the study by Albino et al.\(^{33}\)

**Discussion and Recommendations**

In attempting to make sense of the data related to cooperation in orthodontic treatment, it is difficult to avoid the fact that few generalizations hold. Even the reports of gender differences, often very persuasive ones suggesting that female patients are more cooperative than male
patients, are not always replicated. This suggests that the gender differences reported could reflect a social response bias, whereby women generally are seen to be more compliant and willing to follow instructions, including medical recommendations. Particularly when more subjective ratings of cooperative behaviors are used, expectations for more cooperative behavior on the part of female patients could be reflected in the ratings.

The studies reviewed also suggested possible differences in cooperation as a function of age. Tung and Kiyak recently looked at characteristics of preadolescent orthodontic patients and suggested that this group may be ideal candidates for treatment, in part because they are not yet dealing with the issues of identity confusion and concerns about the acceptance of others. Yet certainly, many older adolescent patients are highly cooperative as well. The Buffalo cooperation studies seem to suggest that age does not directly influence cooperation, but may somehow mediate the factors that are related to cooperation.

It is important to recognize that patients value enhanced appearances in general, however, it cannot necessarily be assumed that patient responses or behaviors in the orthodontic setting reflect perceptions of the self, personality attributes, or behaviors seen in other settings. Instead, we need to understand the impact of malocclusion on the individual patient's life, including the attitudes and values expressed by parents and by peers. Although a number of studies have attempted to link such attitudes and values to demographic and socioeconomic variables, Burden and Pine presented data that argue to the contrary. What can be said without equivocation is only that positive attitudes toward treatment and the desire to obtain treatment, on the part of both adolescent patients and their parents, are more likely to lead to cooperative treatment experiences than would more negative attitudes.

The work reviewed here also suggests that efforts to enhance cooperation of adolescent patients in orthodontic treatment might be most productively focused on the role of parents at the point when treatment is being considered and begun. Parents without previous experience related to orthodontic treatment will need information related to the treatment itself, to develop realistic expectations for treatment and an understanding of the patient's role in treatment. Of particular interest is information about the consequences of not treating, or delaying treatment; such information will help the parent to place a relative value on the investment in treatment. Later on, it becomes more important to focus directly on the patients themselves, using strategies that focus on building their own sense of responsibility for results. Fully using the social-developmental context in understanding and influencing patient behavior, however, requires that the orthodontist do all he or she can to understand both the patient's attitudes and beliefs related to treatment and those of his or her parents.

Patients' self-perceptions emerge from a history of experiences in face-to-face interactions that are interpreted in light of family and peer values and influences. Clinicians' perceptions, on the other hand, are based in academic understanding and professional familiarity with occlusal conditions across a much larger population; and they are tempered by an understanding of both the limitations of treatment and the potential benefits. These are very different ways of looking at the same occlusal problems, but this does not mean that they must be in conflict. In the treatment setting, these differing perspectives must be given room to influence one another.

It is important that orthodontists listen carefully to patients and that they gain as complete an understanding as possible of how the patient views his or her occlusal problems. This will involve asking questions about how the patient feels about his or her dental-facial appearance, what the expectations are for improvement, and whether there is any sense of pressure from parents, siblings, or peers related to treatment. An acknowledgement of the patient's perspective is critical to ensuring the development of a treatment partnership; but the orthodontist will also need to disclose the professional perspective. This means sharing with patients, as honestly and as fully as possible, the professional expectations for treatment including the importance of patient participation and ownership of the treatment process. This same process should occur with the parents of orthodontic patients particularly when working with younger, preadolescent patients. The parents' views and concerns need to be fully acknowledged, and they need to
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hear about the treatment partnership that needs to be built by the clinician and the patient.

Within the relational context established by a sharing of goals, concerns, and expectations, the orthodontist can assist the patient in the development of perceptions of control that will foster cooperative behaviors. The underlying principle is that when patients are involved with the treatment process and can clearly relate their own behaviors to treatment progress and outcomes, they will feel "in control." This feeling of control will then reinforce cooperative behaviors, and those behaviors will occur more frequently. To ensure that this chain of events occurs, however, the treating clinician will need to be explicit with the patient about how patient behaviors influence treatment, not just once, but with each visit. Part of every visit should involve feedback about the specific level of hygiene, adherence to diet restrictions, wearing of bands or headgear, or other patient-controlled behaviors that have occurred since the last visit. The patient should be asked to report and discuss these behaviors with the orthodontist, and the orthodontist should then relate these behaviors very specifically to the current progress of treatment and expected outcomes for treatment. The goal here is to encourage the patient to invest in the ultimate outcome and to do so through experiencing some control over that outcome.

Table 1 describes the roles of orthodontist, patient, and parent within a maximally effective treatment scenario. In this situation, each member of the treatment partnership has roles that vary over time, in terms of what is required to ensure optimal patient cooperation and successful treatment outcome.

Viewing issues of cooperation in orthodontic treatment within a social-developmental framework helps to ensure that a patient-centered approach is maintained both in assessing need for treatment and in providing that treatment. Because we acknowledge that treatment need may not always be related to health or function alone, it is incumbent on the practitioner to understand the patient's, and in the case of adolescents, the parents' values and expectations of treatment. With this in mind, professional evaluations of appearance can be thought of as one source of data that influences patient perceptions, whereas patient perceptions also influence professional evaluations of the need for treatment. In an earlier article, these were referred to as 2 "cultures," the clinical and the social.26 The critical point to understand is that both perspectives are essential to the understanding of the treatment process and, it follows, to the achievement of successful treatment outcomes.

### Table 1. Critical Factors for Adolescent Cooperation in Orthodontic Treatment

<table>
<thead>
<tr>
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<th>Pre-Treatment</th>
<th>Early in Treatment</th>
<th>Throughout Treatment</th>
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</thead>
<tbody>
<tr>
<td><strong>Child</strong></td>
<td>Perceives functional/ esthetic impairment</td>
<td>Develops realistic expectations</td>
<td>Assumes control of behaviors related to effects/outcomes of treatment</td>
</tr>
<tr>
<td></td>
<td>Perceives need for treatment</td>
<td>Learns coping/control strategies</td>
<td>Shares responsibility for treatment outcomes</td>
</tr>
<tr>
<td></td>
<td>Desires treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Parent</strong></td>
<td>Perceives need for treatment</td>
<td>Enables treatment</td>
<td>Supports and approves child's active participation and responsibility in treatment</td>
</tr>
<tr>
<td></td>
<td>Believes in efficacy of treatment</td>
<td>Takes interest in treatment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Places high value on occlusion/treatment</td>
<td>Encourages home care</td>
<td></td>
</tr>
<tr>
<td><strong>Orthodontist</strong></td>
<td>Professionally evaluates treatment need</td>
<td>Engages parent and patient in goals, expectations</td>
<td>Develops partnership with patient</td>
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<td></td>
<td>Seeks to understand patient and parent perceptions</td>
<td>Acknowledges patient and parent perceptions</td>
<td>Shares responsibility with patient for progress, setbacks, outcomes of treatment</td>
</tr>
<tr>
<td></td>
<td>Communicates goals, expectations, potential problems in treatment</td>
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References


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