

# Orthodontists' assessment and management of patient compliance

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**B**ecause orthodontic appliances are limited in what they can accomplish, some patient compliance is needed to correct malocclusions.<sup>1</sup> This cooperation includes properly caring for orthodontic appliances, maintaining excellent oral hygiene, and keeping scheduled appointments. Failure to conform to the prescribed treatment regimen may result in compromised treatment results or increased treatment time.<sup>2</sup>

Patient cooperation levels vary considerably, depending on several factors, including the patient's age and sex,<sup>2-11</sup> his or her perception of the malocclusion,<sup>12-14</sup> the influence of the parents on the child,<sup>3,7,11,14-18</sup> personality type,<sup>8,14,19</sup> and so-

cioeconomic and demographic factors.<sup>6,10,20-23</sup>

The orthodontist faces the complex issue of assessing and encouraging patient compliance on a day-to-day basis. Methods of assessing cooperation for various treatment regimens range from measuring the amount of tooth movement<sup>24</sup> to questioning the patient and parents about appliance wear, or even charting appliance wear with a timing device inserted into the appliance.<sup>25,26</sup> Techniques for improving compliance include educating the patient and parents about the importance of compliance,<sup>27-29</sup> verbal praise for compliant behavior,<sup>27,30,31</sup> treating the patient with respect and establishing good rapport,<sup>27,30-35</sup> using a signed contract with the patient,<sup>29,31</sup> add-

## Abstract

This study was designed to evaluate the use of predictors and methods of improving patient compliance. A survey of 118 items was developed by searching the literature for items that other researchers have found to be significant. The new questionnaire contained six sections. Sections 1 and 2 pertained to predictors of patient compliance; sections 3 and 4 related to methods of improving compliance. In section 5, the respondents were asked to evaluate patient personality traits that might be important in evaluating compliance, and in the last section, demographic background information on the respondents was collected. Questionnaires were mailed to 1,262 practicing orthodontists in the United States, and 429 responses were received. Patient-related items, such as desire for treatment and relationship with parents, were ranked as important factors motivating patients to comply. Verbal praise and communication were rated as important methods for improving compliance. Personality traits that orthodontists found to be predictive of patient compliance were: high self-esteem; obedient; accommodating; and self-confident. Patients' perceptions of their malocclusions, combined with their desire for orthodontic treatment, may be good indicators of compliance. Doctor-patient rapport and verbal praise may be useful ways to improve compliance.

## Key Words

Patient compliance • Orthodontics • Patient psychology

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**Table 1**  
**Mean scores and rank of the responses for the application and evaluation of the 20 predictors of patient compliance by the orthodontists. Each item was scored using a 5-point Likert-type scale**

| Predictors of patient compliance                          | Evaluation |                 | Application |                 |
|---|------------|-----------------|-------------|-----------------|
|   | Rank       | Means $\pm$ SD  | Rank        | Means $\pm$ SD  |
| Patient demographics                                      |            |                 |             |                 |
| Socioeconomic background of the family                    | 19         | 3.18 $\pm$ 0.87 | 19          | 2.97 $\pm$ 0.99 |
| Demographic background of the family                      | 18         | 3.35 $\pm$ 0.98 | 18          | 2.98 $\pm$ 0.99 |
| Sex of the patient  |            |                 |             |                 |
| Girls as more compliant than boys                         | 16         | 3.41 $\pm$ 0.90 | 16          | 3.22 $\pm$ 1.02 |
| Boys as more compliant than girls                         | 20         | 2.31 $\pm$ 0.71 | 20          | 2.28 $\pm$ 0.75 |
| Interpersonal relationships                               |            |                 |             |                 |
| Interaction between orthodontist and patient              | 4          | 4.10 $\pm$ 0.74 | 4           | 4.03 $\pm$ 0.79 |
| Interaction between orthodontist and patient's parents    | 10         | 3.51 $\pm$ 0.83 | 10          | 3.53 $\pm$ 0.89 |
| Interpersonal relationship between patient and parents    | 6          | 3.95 $\pm$ 0.76 | 6           | 3.71 $\pm$ 0.89 |
| Perceptions and interests of the patients and the parent  |            |                 |             |                 |
| Parental desire for orthodontic treatment                 | 9          | 3.64 $\pm$ 0.87 | 9           | 3.62 $\pm$ 0.85 |
| Patient's perception of their malocclusion                | 5          | 3.94 $\pm$ 0.88 | 5           | 3.75 $\pm$ 0.87 |
| Parent's perception of their child's malocclusion         | 12         | 3.41 $\pm$ 0.93 | 12          | 3.39 $\pm$ 0.87 |
| Patient's desire for or interest in orthodontic treatment | 1          | 4.47 $\pm$ 0.75 | 1           | 4.27 $\pm$ 0.76 |
| Patient's perception of his or her facial esthetics       | 8          | 3.72 $\pm$ 0.81 | 8           | 3.62 $\pm$ 0.89 |
| Parent's perception of child's facial esthetics           | 13         | 3.35 $\pm$ 0.89 | 13          | 3.34 $\pm$ 0.87 |
| Severity of the malocclusion                              | 14         | 3.34 $\pm$ 0.95 | 14          | 3.32 $\pm$ 0.92 |
| Patient's education                                       |            |                 |             |                 |
| Level of education of the patient                         | 15         | 3.47 $\pm$ 0.91 | 15          | 3.27 $\pm$ 0.92 |
| Patient's grade in school                                 | 17         | 3.34 $\pm$ 0.87 | 17          | 3.14 $\pm$ 0.93 |
| Maintenance of oral health and appliances                 |            |                 |             |                 |
| Frequency of broken appliance                             | 2          | 4.35 $\pm$ 0.75 | 3           | 4.15 $\pm$ 0.85 |
| Maintenance of good oral health                           | 3          | 4.27 $\pm$ 0.72 | 2           | 4.25 $\pm$ 0.68 |
| Appointment punctuality                                   |            |                 |             |                 |
| Frequent delinquency in appointments                      | 11         | 3.62 $\pm$ 0.96 | 11          | 3.41 $\pm$ 1.06 |
| Promptness for appointments                               | 7          | 3.86 $\pm$ 0.74 | 7           | 3.71 $\pm$ 0.85 |

ing color highlighted or stamped notations to the patient's treatment progress notes and making them visible to the patient, and offering immediate rewards.<sup>37,38</sup>

A variety of methods for recognizing and improving patient compliance have been found to be important by researchers and effective by clinicians. However, the clinical application of these techniques has not been evaluated. Further, no study has evaluated current clinical trends pertaining to patient compliance. Hence, the present study was designed to evaluate the use of predictors and methods of improving patient compliance in contemporary clinical practice. (These predictors and methods were found to be important in the literature.)

#### Materials and methods

An 118-item questionnaire was formed by including items found to be significant in literature related to compliance in orthodontic treatment. Specifically, these items pertained to predicting

and improving patient compliance. This questionnaire was mailed to 1,262 practicing orthodontists who were members of the American Association of Orthodontists in two regions of the United States, i.e., the north central and south central regions. The south central region had a total of 741 orthodontists in Arkansas, Louisiana, Oklahoma, and Texas. The north central region had a total of 521 orthodontists in Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota. Copies were mailed two more times to those orthodontists who did not respond. A total of 420 (33%) respondents were included in this study.

The questionnaire contained 118 items, divided into six sections. The sections were (1) predictors of patient compliance, (2) application of these predictors, (3) methods used to improve compliance, (4) application of these methods, (5) patient personality traits predictive of patient compliance, and (6) demographics of the orthodontists.

**Table 2**  
**Mean scores and rank of the responses for the application and evaluation of the 24 methods of improving patient compliance used by the orthodontists. Each item was scored using a 5-point Likert-type scale**

| Methods of improving patient adherence                              | Evaluation |                 | Applicaton |                 |
|---|------------|-----------------|------------|-----------------|
|   | Rank       | Means $\pm$ SD  | Rank       | Means $\pm$ SD  |
| <b>Patient education</b>  |            |                 |            |                 |
| Educating the patient about the consequences of poor compliance     | 2          | 4.32 $\pm$ 0.71 | 2          | 4.54 $\pm$ 0.61 |
| Educating the patient about the proper use of headgear              | 7          | 4.18 $\pm$ 0.75 | 6          | 4.42 $\pm$ 0.77 |
| Educating the patients about the proper use of elastics             | 4          | 4.27 $\pm$ 0.63 | 3          | 4.50 $\pm$ 0.65 |
| Educating the patient about the proper use of functional appliances | 11         | 4.03 $\pm$ 0.86 | 24         | 1.19 $\pm$ 1.05 |
| Discussing treatment goals with the patient                         | 3          | 4.30 $\pm$ 0.65 | 4          | 4.43 $\pm$ 0.67 |
| Discussing poor patient cooperation with the patient                | 6          | 4.19 $\pm$ 0.70 | 5          | 4.43 $\pm$ 0.66 |
| Using visual aids as videos, literature, posters, etc.              | 13         | 3.63 $\pm$ 0.85 | 12         | 3.60 $\pm$ 1.13 |
| <b>Parent education</b>   |            |                 |            |                 |
| Educating the parent about the consequences of poor compliance      | 5          | 4.21 $\pm$ 0.74 | 7          | 4.38 $\pm$ 0.71 |
| Educating the parent about the proper use of orthodontic appliances | 10         | 4.09 $\pm$ 0.72 | 9          | 4.34 $\pm$ 0.75 |
| Discussing poor patient cooperation with the parent                 | 8          | 4.16 $\pm$ 0.66 | 10         | 4.27 $\pm$ 0.71 |
| Discussing treatment goals with the parent                          | 9          | 4.09 $\pm$ 0.72 | 8          | 4.37 $\pm$ 0.75 |
| <b>Negative reinforcement</b>                                       |            |                 |            |                 |
| Having the parent disipline the child for poor cooperation          | 18         | 3.02 $\pm$ 1.03 | 17         | 2.50 $\pm$ 1.12 |
| Ridiculing the child for poor compliance                            | 24         | 1.46 $\pm$ 0.72 | 23         | 1.36 $\pm$ 0.67 |
| Charging additional fees for broken appliances                      | 17         | 3.19 $\pm$ 1.04 | 14         | 2.79 $\pm$ 1.25 |
| Increasing orthodontic fees for poor compliance                     | 19         | 2.90 $\pm$ 1.08 | 18         | 2.31 $\pm$ 1.14 |
| Scolding the patient  | 23         | 1.94 $\pm$ 0.85 | 21         | 1.79 $\pm$ 0.85 |
| <b>Quantitative evaluation of adherence</b>                         |            |                 |            |                 |
| Inserting timing devices into appliances                            | 22         | 2.44 $\pm$ 0.92 | 22         | 1.57 $\pm$ 0.94 |
| Using a time card for recording the hours a headgear is worn        | 14         | 3.43 $\pm$ 0.94 | 13         | 3.13 $\pm$ 1.42 |
| <b>Verbal praise</b>  |            |                 |            |                 |
| Verbally praising the patient                                       | 1          | 4.59 $\pm$ 0.55 | 1          | 4.64 $\pm$ 0.57 |
| Verbally praising the parent  | 12         | 3.76 $\pm$ 0.94 | 11         | 3.74 $\pm$ 1.06 |
| <b>Award/reward</b>   |            |                 |            |                 |
| Giving a reward   | 15         | 3.27 $\pm$ 1.00 | 15         | 2.73 $\pm$ 1.29 |
| Reducing orthodontic fees for good patient cooperation              | 21         | 2.52 $\pm$ 0.99 | 20         | 1.98 $\pm$ 1.06 |
| <b>Telephoning/same assistant</b>                                   |            |                 |            |                 |
| Using telephone reminders   | 16         | 3.25 $\pm$ 0.94 | 16         | 2.66 $\pm$ 1.27 |
| Assigning the same assistant to the patient                         | 20         | 2.89 $\pm$ 0.85 | 19         | 2.26 $\pm$ 1.16 |

The first and second sections included the same 20 items. The first section was designed to get a relative rating of the various items. In the second section, the orthodontist was asked to use a 5-point Likert-type scale to rate each predictor. This section also included questions on patient demographics and sex, interpersonal relationships, perceptions and interests of patients and parents, patient's education, maintenance of oral health and appliances, and appointment punctuality. The scale ranged from "strongly disagree" to "strongly agree" for the rating of items, and, from "never" to "always" for the application of items.

The third and fourth sections had 24 identical items related to methods of improving patient compliance. The third section was designed to evaluate the relative rating of items by the orthodontists, while the fourth section evaluated the use of these items as possible methods of improving patient compliance by the practitioners. These items were also evaluated on a 5-point

Likert-type scale and included methods related to educating the patient or parent, negative reinforcement, quantitative evaluation of compliance, verbal praise, awards and rewards, telephoning, and use of the same assistant.

The fifth section of the questionnaire evaluated 30 patient personality traits that might be important in determining compliance. They were divided into positive traits (19 items) or negative ones (11 items) and were scored on a two-point scale. Checking 1 meant "yes," the personality trait is predictive of patient compliance, and 2 meant "no," the personality trait is not predictive of patient compliance.

The sixth section of the questionnaire evaluated the demographic background of the orthodontist, including sex, years in practice, and size of the city where he or she practiced. The orthodontists were also asked to evaluate the percentage of premature terminations due to lack of patient compliance.

## Results

### Predictors of patient compliance

The items in sections 1 and 2, which pertained to the relative ranking and the application of predictors of patient compliance by the orthodontists, showed that of the 10 most important predictors of patient compliance, seven were patient-related items and only three were parent-related (Table 1). The 10 predictors were (1) patients' desire for or interest in orthodontic treatment, (2) frequency of broken appliances, (3) maintenance of good oral health, (4) interaction between the orthodontist and patients, (5) interpersonal relationships between patient and parent, (6) patients' perceptions of their malocclusion, and (8) patients' perceptions of their facial esthetics. The parent-related items were (7) promptness for appointments, (9) parental desire or interest in orthodontic treatment, and (10) interaction between orthodontist and patient's parents.

### Methods of improving patient compliance

The items in sections 3 and 4, which pertained to the relative ranking and the application of the methods of improving patient compliance used by the orthodontists, are presented in Table 2. The 10 most important methods were (1) verbally praising the patient, (2) educating the patient about the consequences of poor compliance, (3) discussing treatment goals with the patient, (4) educating the patient about the proper use of elastics, (5) educating the parent about the consequence of poor compliance, (6) discussing poor patient cooperation with the patient, (7) educating the patient about the proper use of headgear, (8) discussing poor patient cooperation with the parent, (9) discussing treatment goals with the parent, and (10) educating the parent about the use of orthodontic appliances.

### Patient personality traits predictive of patient compliance

The top 10 personality traits that were predictive of patient compliance as evaluated by orthodontists, in order from highest to lowest, were: obedient, high self-esteem, accommodating, self-confident, thankful, secure, polite, high academic achiever, self-conscious, and cheerful (Table 3).

### Demographics of the orthodontists

Analysis of the mean responses for each of the items in the questionnaire by age, sex, years in practice, and size of the population center did not show any statistically significant differences (Student-Newman-Keuls multiple comparison test).

### Early termination of treatment due to poor patient compliance

The survey revealed that 399 orthodontists out

of the total 420 respondents (95%) were compelled to terminate treatment prematurely in up to 5% of their patients due to poor compliance with the treatment regimen; the remaining 21 orthodontists (5%) indicated that the number of premature terminations was in the range of 5% to 10%.

## Discussion

Lengthy treatment time and the need for compliance can be demanding for an adolescent patient. The limitations of orthodontic appliances necessitate the compliance of patient behavior to achieve excellent treatment outcomes. Therefore, lack of patient compliance can be a disconcerting experience. Understanding the behaviors that are required to obtain patient cooperation can provide valuable information for the orthodontist prior to commencing treatment or devising a treatment plan.

Practicing orthodontists deal with the lack of compliance among patients on a daily basis. Most orthodontists have a limited background in the behavioral basis of compliance, or its lack thereof. Therefore, it presents a unique challenge in their practices.

### Predictors of patient compliance

Examination of the top predictors of patient compliance by evaluation and application revealed some differences in rank, although the overall perceptions were similar (Table 1). More items were found related to patients than to parents. Previous studies have also shown that parents may have a stronger influence on patient cooperation levels during the initial stages of treatment, but that later in the treatment patient compliance is largely related to the motivation and desire of the patient.<sup>3,6,10,13-17</sup>

It has been found that when the child's dependency needs are high, parental pressure tends to determine the patient's motivation. However, if the child's dependency needs are low and the need for peer approval is high, compliance levels are minimally affected by parental influences.<sup>3,6,16</sup> Similar studies by Kreit et al.<sup>3</sup> found that children who obtained treatment primarily due to their parents' wishes were generally adherent, although their own positive perceptions of treatment were also important. It was also found that the most nonadherent patients had poor relationships with their parents.

Gershater<sup>15</sup> examined the psychological considerations involved with orthodontic patients and found that one can obtain significant cues about conflicts and the family's attitudes toward the child and whether the parents are motivated to

assist the orthodontist in obtaining excellent patient compliance. Treatment is likely to be compromised if the parent appears to be helpless, frustrated, nagged, tense, hysterical, demanding, or insecure in coping with the child. There are strong maternal influences that may have a bearing on the outcome of the orthodontic treatment. Albino et al.<sup>6</sup> found that increased levels of compliance were related to parental support and belief in the value and effectiveness of fixed orthodontic appliances. Parental attitudes in influencing adolescent compliance appeared to wane over the course of the treatment.

The patient's cognitive development appeared to have a greater influence in altering compliance later in treatment. This study proposed that parental beliefs are extremely important in orthodontic compliance. Therefore, assessing the relationship between the patient and parent and the parents desire or interest in orthodontic treatment may be a good method of predicting the level of patient cooperation.

Sinclair<sup>37</sup> reported that orthodontists assessed the level of oral hygiene and the attitude toward orthodontic treatment as possible predictors of patient compliance. The positive correlations between oral hygiene and patient's attitude toward orthodontic treatment may also have a direct bearing on the upkeep of orthodontic appliances and compliance with treatment regimens. Dorsey and Korabik<sup>20</sup> found that one of the main reasons for pursuing orthodontic treatment was the patient's perception that increased social and occupational opportunities might result from treatment. Based on these studies, it can be inferred that the greater the patients' desires for or perceptions of the need for orthodontic treatment, the better will be their compliance.

The interaction between orthodontist and patient was ranked fourth among all the predictors of patient compliance. This finding is supported by several other studies that reported that the doctor-patient interaction was an important factor in establishing good patient compliance.<sup>26,31-34</sup> These studies also showed that treating the patient with respect can facilitate an increase in patient compliance.

Since most adolescent patients are brought to the orthodontist's office by the parent or guardian, appointment punctuality is dependent on the parent or a guardian and not necessarily on the adolescent. Therefore, the predictors concerning frequent delinquency in appointments and promptness in keeping them are more parent-related, but were nevertheless considered to be significant predictors of patient compliance. It is

possible that the lack of parental interest in scheduled appointments might set a poor example for the child, which in turn can affect the compliance levels of the child.

#### Methods of improving patient compliance

Orthodontists' perceptions of the methods of improving patient compliance were largely similar for perceived importance and application (Table 2). Only minor differences in rank were observed between the responses of orthodontists in evaluation and application of the methods in their practices.

The most common methods reported by orthodontists to improve patient compliance were verbally praising the patient, educating the patient about the consequence of poor compliance, discussing treatment goals with the patient, educating the patient about the proper use of elastics, discussing the results of poor cooperation with the patient, and educating the patient about the proper use of headgear. These items demonstrated that communication with the patient about the need for compliance was of paramount importance in improving patient compliance. The orthodontists who responded to this questionnaire seemed to follow recognized techniques of improving patient cooperation that have been recommended by several researchers.<sup>6,26-30</sup>

The respondents ranked four parent-related items among the important methods for improving compliance: educating the parent about the consequence of poor compliance, discussing treatment goals with the parent, discussing poor patient cooperation with the parent, and educating the parent about the use of orthodontic appliances. The orthodontists perceived that parent education and interaction can have an important impact in the level of patient compliance. However, the patient-related items were ranked higher than the parent related factors.

This study suggests that educating the patient might have a greater impact on compliance than educating the parent. This finding is further supported by the studies of Fields,<sup>31</sup> Milgrom et al.,<sup>38</sup> and Rubin<sup>29</sup> who found that patient compliance was improved by involving the patients in their own treatment. Educating patients and giving them more autonomy over their treatment can decrease patient anxiety, which in turn might increase adherent behavior. Furthermore, the patient may feel that he or she is a more active participant in the treatment and that a team approach is applied where doctor and patient are striving together to achieve the same treatment outcomes.

**Table 3**  
**Mean scores and rank of responses for**  
**patient personality traits predictive of**  
**patient compliance by the orthodontists.**  
**Each item scored using a two-point scale**

| Patient's personality trait | % Yes |
|-----------------------------|-------|
| <b>Positive</b>             |       |
| Academic high achiever      | 68.6  |
| Accommodation               | 84.1  |
| Attractive                  | 29.4  |
| Calm                        | 47.7  |
| Charming                    | 29.2  |
| Cheerful                    | 57.3  |
| Content                     | 54.6  |
| Fun-loving                  | 31.1  |
| High self-esteem            | 88    |
| Kind                        | 46.2  |
| Obedient                    | 90.9  |
| Passive                     | 17.6  |
| Polite                      | 71.8  |
| Relaxed                     | 44    |
| Secure                      | 80.1  |
| Self-confident              | 81.9  |
| Sociable                    | 53.6  |
| Thankful                    | 81.8  |
| Warm                        | 55.6  |
| <b>Negative</b>             |       |
| Aggressive                  | 26.5  |
| Agitated                    | 18.5  |
| Argumentative               | 34.4  |
| Dominating                  | 18.4  |
| Introverted                 | 18.5  |
| Nervous                     | 15.8  |
| Outspoken                   | 27.1  |
| Self-conscious              | 58.2  |
| Sensitive                   | 40.8  |
| Sullen                      | 33.7  |

#### **Early termination of treatment due to poor patient compliance**

Five percent (21 of 420) of the orthodontists stated that they prematurely terminated treatment of 5% to 10% of their patients. The remaining 95% (399 of 420) reported terminating treatment prematurely in up to 5% of their patients. Brattstrom et al.,<sup>39</sup> in their study of 80 patients who had prematurely discontinued orthodontic treatment, found that the lack of motivation of adolescent patients was the most common reason for discontinuation of treatment. Their rate of premature termination was 4% of the patient population. The present study did not seek information on the number of patients the orthodontists might be obliged to treat with compromised treatment outcomes for the lack of patient compliance. Most orthodontists experienced difficulty with noncompliance from their patients. It is likely that in a fair number of their patients they succeeded in achieving only

compromised treatment results.

#### **Personality traits predictive of patient compliance**

The personality traits most predictive of patient compliance, ranked from highest to lowest by respondents, were high self-esteem, obedient, accommodating, self-confident, thankful, secure, polite, high academic achiever, self-conscious, and cheerful. These findings were supported by Cucalon and Smith,<sup>5</sup> who found that patients who thought poorly of themselves and had low self-esteem were generally poor cooperators. They also stated that adherent patients were high academic achievers, sociable, involved in several social activities, thought highly of themselves, took pride in their accomplishments, and were optimistic about their future. Allan and Hodgson<sup>2</sup> also found that cooperative patients were enthusiastic, outgoing, energetic, wholesome, self-controlled, responsible, trusting, determined to do well, hardworking, forthright and obliging.

#### **Clinical implications**

##### **Predicting patient compliance**

The patient's desire for orthodontic treatment should be evaluated because this was the most important item among the predictors of patient compliance. This is difficult to measure at the beginning of orthodontic treatment, and further research should attempt to construct an instrument that can evaluate the patient's desire for orthodontic treatment prior to starting treatment. Frequencies of broken appliances and oral hygiene maintenance were the most popular clinical predictors of compliance.

The unpopular methods of predicting patient compliance were sex and socioeconomic and demographic background of the patient's family.

##### **Improving patient compliance**

The orthodontists believed that verbally praising the patient for compliant behavior was the best way to improve compliance. Educating the patient about the consequences of poor compliance and discussing treatment goals were also found to be popular.

Negative methods, such as ridiculing the child for poor compliance and scolding, were found to be the worst methods for improving patient compliance. Other negative reinforcement items were also found to be unpopular. Increasing fees to improve compliance ranked very low as a method to improve compliance.

##### **Patient personality**

Patients who were obedient, had very high self-esteem, and were accommodating should be better compliers as suggested by the ranking of

**Table 4**  
**The 10 most important predictors of patient cooperation as evaluated by orthodontists**

| Evaluation   | Application  |
|--|--|
| 1. Patients' desire for or interest in orthodontic treatment | 1. Patients' desire for or interest in orthodontic treatment |
| 2. Frequency of broken appliances                            | 2. Frequency of broken appliances                            |
| 3. Maintenance of good oral health                           | 3. Maintenance of good oral health                           |
| 4. Interaction between orthodontist and patients             | 4. Interaction between the orthodontist and patients         |
| 5. Interpersonal relationships between patient and parent    | 5. Patients' perceptions of their malocclusion               |
| 6. Patients' perceptions of their malocclusion               | 6. Interpersonal relationships between patient and parent    |
| 7. Promptness for appointments                               | 7. Promptness for appointments                               |
| 8. Patients' perceptions of their facial aesthetics          | 8. Patients' perceptions of their facial aesthetics          |
| 9. Parental desire or interest in orthodontic treatment      | 9. Parental desire or interest in orthodontic treatment      |
| 10. Frequency of delinquent appointments                     | 10. Interaction between orthodontist and patients            |

**Table 5**  
**The 10 most important methods of improving patient cooperation as evaluated by orthodontists**

| Evaluation   | Application  |
|--|--|
| 1. Verbally praising the patient                         | 1. Verbally praising the patient                         |
| 2. Educating patient of consequence of poor compliance   | 2. Educating patient in consequence of poor compliance   |
| 3. Discussing treatment goals with the patient           | 3. Educating patient in proper use of elastics           |
| 4. Educating patient in proper use of elastics           | 4. Discussing treatment goals with the patient           |
| 5. Educating parent about consequence of poor compliance | 5. Discussing poor patient cooperation with the patient  |
| 6. Discussing poor patient cooperation with the patient  | 6. Educating patient in proper use of headgear           |
| 7. Educating patient in proper use of headgear           | 7. Educating parent about consequence of poor compliance |
| 8. Discussing poor patient cooperation with the parent   | 8. Discussing treatment goals with the parent            |
| 9. Discussing treatment goals with the parent            | 9. Educating parent in use of orthodontic appliances     |
| 10. Educating parent in use of orthodontic appliances    | 10. Discussing poor patient cooperation with the parent  |

responses. Those who were nervous, agitated, passive, introverted, and dominating may not be good compliers in orthodontic treatment.

### Conclusions

1. The most important methods of improving patient compliance were verbally praising the patient and communicating with the patient and the parent.

2. Patient-related items were assessed as more important than parent-related items. The patient's desire for or interest in orthodontic treatment, the interaction between orthodontist and patient, the patient's perceptions of his or her malocclusion, the interpersonal relationship between patient and parent, and the patient's perceptions of his or her facial esthetics were significant in seeking patient compliance.

3. Patients with better compliance levels possessed some or all of the following traits: high self-esteem, obedient, accommodating, self-confident, thankful, secure, polite, high academic

achiever, self-conscious, and cheerful.

4. The evaluation of items by age, sex, and years in practice of the orthodontists and by the population center in which he or she practiced did not have an effect on the mean responses.

5. Current clinical trends related to prediction of patient compliance and management were found to be similar to findings by other researchers.

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