

## Adherence in orthodontic settings: *Understanding practitioner views in a UK sample*

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### ABSTRACT

**Objective:** To explore predictors of adherence in adult orthodontic patients as reported by orthodontists in the UK.

**Materials and Methods:** Twenty-three orthodontists (47% female and 53% male) from the UK with approximately 15 years of experience each (M = 14.7; SD = 1.73) completed a questionnaire regarding the importance they give to a number of factors signaled in the literature as adequate predictors of adherence. This cross-sectional quantitative and exploratory survey consisted of four parts, requesting orthodontists to rate a list of predictors of adherence on (1) evaluation—how important they thought the predictor was to assess patient adherence, (2) application—the extent to which they used each predictor to assess adherence in their daily practice, (3) open-ended questions to collect any other perceived predictors of adherence, and (4) demographics.

**Results:** All participating orthodontists agreed that patients' regularity in attending appointments, maintenance of good oral hygiene, and utilization of dental appliances are the most important factors for predicting adherence. In the open-ended portion of the questionnaire, orthodontists also highlighted perceived cost of treatment as an important factor. The remaining factors included in the questionnaire were also rated as important or utilized, though they yielded a more varied pattern of response.

**Conclusions:** Appointment keeping, cooperating in the use of removable appliances, and oral hygiene were rated as the most important factors by orthodontists when assessing adherence in adult patients. The perceived cost of treatment was also highlighted by orthodontists as an important factor for adherence. (*Angle Orthod.* 2015;85:826–832.)

**KEY WORDS:** Orthodontic; Practitioner; Views; Adherence; UK

### INTRODUCTION

Adherence concerns the extent to which a person's behavior such as taking medication, following a diet, or

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engaging in lifestyle changes correspond with agreed recommendations received from a health care provider.<sup>1</sup> A number of studies in the field of orthodontics have investigated how patient adherence is associated with a range of outcomes such as discontinuation of treatment and patient satisfaction.<sup>2,3</sup> These studies consistently demonstrate that a lack of patient adherence is a major obstacle in achieving the desired goals of any medical treatment, even for the most promising treatment plans.<sup>2,4</sup>

Accordingly, adherence is also an important concept for dental treatment, so several types of direct and indirect measures have been developed and used to estimate adherence in orthodontic settings.<sup>5</sup> A number of studies have used direct measures of adherence such as timing devices attached to the appliances,<sup>6,7</sup> charting techniques, and clinical assessment by the orthodontist. Examples of these direct assessments involve examination of malocclusion improvement, cleanliness of headgear tubes and headgear strap,

and ease of appliance placement.<sup>8</sup> In contrast, indirect measures are mainly based on self-reports from the patient and other related persons. These often include feedback about wearing the appliance,<sup>9</sup> appointment keeping, and changes in oral hygiene.<sup>10-12</sup> Although direct and indirect measures of adherence can be useful, they vary in reliability and applicability in orthodontic settings.<sup>2</sup> Due to this limitation, it is useful to understand orthodontist views regarding adherence and its measurement by directly asking them to summarize the importance and application of specific predictors.

Orthodontists' views on adherence have been researched in three questionnaire studies.<sup>2,5,13</sup> On the basis of these practitioner reports, a set of predictive behaviors have been proposed as indicators of poor adherence, such as level of oral hygiene and appointment keeping. While these indicators are useful, in these three studies a number of limitations have been identified. These studies have been conducted on young and adolescent orthodontic patients but have not examined adults, none of the studies looked at orthodontists in the UK, and the most recent study was conducted almost 10 years ago. These studies have also looked at either open- or closed-ended questions, rather than both types of questions, which would give more in-depth information about views on adherence. Further investigation into the appropriate predictors of adherence in this setting is therefore necessary.

This study aims to explore predictors of adherence in adult orthodontic patients, ranked in terms of importance and actual use, as reported by orthodontists. Specifically, the present study addresses the limitations of the previous studies, and examines what orthodontists who treat adult patients in the UK view as the most important and useful predictors of adherence and which of these, if any, they use in their daily practice. In particular, the following two questions are investigated: (1) What do orthodontists think patient adherence is? (2) How do orthodontists measure and record adherence?

## MATERIALS AND METHODS

### Type of Study

This is a cross-sectional quantitative and exploratory survey (including both closed- and open-ended questions) about predictors of adherence, that was informed by previous literature.

### Sample/Participants

Participants were selected to be an appropriate group of professionals with different levels of experience who treat adults in orthodontic settings. The

rights of the human participants were protected, and approval was obtained from Research Ethics Committee. Participants were recruited from orthodontic department using a convenient sampling method; subsequently, a snowball strategy was employed to recruit orthodontists from outside the college who were affiliated with department. Recruitment took place through a short e-mail sent to these eligible participants asking them to consider taking part in the anonymous and confidential survey. In accordance with Dillman<sup>14</sup> prescribed details of frequency of contact, orthodontists received an initial e-mail. Then, in case of nonresponse, two subsequent e-mails at two weekly intervals were sent as a reminder. As a result, 23 orthodontists (47% females and 53% males) with approximately 15 years of experience ( $M = 14.7$ ;  $SD = 1.73$ ) answered the questionnaire (77% participation rate).

### Materials

The questionnaire consisted of four parts, requesting orthodontists to rate a list of predictors of adherence: (1) evaluation—how important they thought the predictor was to assess patient adherence; (2) application—the extent to which they used each predictor to assess adherence in their daily practice; (3) open-ended questions to collect any other predictors of adherence that they thought were worth including when assessing adherence in adult patients, which they were also requested to rate in terms of their salience (importance and use); and (4) demographics, including gender, years in practice with adults, years of practice with children and adolescents, type of orthodontic specialization, qualification, and country of orthodontic education. The items in part 1 were answered on a five-point Likert scale (with 1 indicating that they rated the indicator as not important for adherence and 5 that they rated it as very important). Part 2 also required responses on a five-point Likert scale (with 1 indicating that they rated the indicator as never applicable regarding adherence and 5 that it was always used in the daily practice). Part 3 invited participants to provide answers to open-ended questions to offer any other predictor of adherence, and asked participants to rate these predictors on their importance and applicability on a five-point Likert scale. Items were extracted and adapted from previous studies assessing adherence in dental practice.<sup>2,5,13</sup> The overall scale was found to be highly reliable (28 items;  $\alpha = .83$ ); whereas Cronbach's alphas for the 14 important and 14 use items were .5 and .87, respectively.

Descriptive analyses (eg, frequencies, central tendency, and dispersion measures) were executed for

**Table 1.** Mean Importance Ratings for Each Factor in Order of Highest Importance. Responses From N = 23 Orthodontists

Factor	Frequency of Responses (%)					Mean	SD
	Extremely Unimportant	Very Unimportant	Neither Unimportant nor Important	Very Important	Extremely Important		
The patient keeps appointments.				26	74	4.74	0.45
The patient cooperates with the use of removable dental appliances (such as retainers) and/or elastics.				30	70	4.70	0.47
The patient demonstrates excellent oral hygiene.				39	61	4.61	0.50
The patient is observed to be involved in treatment.			9	52	39	4.30	0.63
The patient has distorted or damaged wires and/or loose bands.			4	65	30	4.26	0.54
The patient arrives promptly at clinic.			13	65	22	4.09	0.60
The patient's behaviour is sullen, hostile, belligerent, or rude.			30	39	30	4.00	0.80
The patient complains about having to wear braces.			30	43	26	3.96	0.77
The patient has a negative view or perception of their malocclusion.			26	57	17	3.91	0.67
The patient is observed to be enthusiastic about treatment.		4	26	52	17	3.83	0.78
The patient complains about treatment procedures (ie, procedures performed by the orthodontist).		9	30	43	17	3.70	0.88
The patient thinks that facial aesthetics are important.		9	35	43	13	3.61	0.84
The patient speaks of personal problems or demonstrates such problems.		9	48	39	4	3.39	0.72
The patient is pleasant to the clinic staff.	4		61	22	13	3.39	0.89

each item in the list and the two scales (eg, importance and applicability). Additional predictors added in the open-ended response sections of the questionnaire were coded and then organized into categories; for each category, a similar descriptive analysis is reported. Finally, there was further descriptive analysis of the two scales covering the whole list of predictors (the original list and those added by the participants).

## RESULTS

### Research Questions

1. *What factors do orthodontists consider as important when assessing adherence in adult patients?* Thirty-one (N = 31) respondents were approached, and of those, 23 submitted full data, giving a response rate of 77%. Participants were presented with 14 factors that they rated on a five-point Likert scale. Higher scores indicate higher importance rating assigned to the factor. The mean ratings for each factor (and SD) are presented in Table 1.

Based on a cutoff score of 4.5 out of 5, it appears that the three highest-rated factors in terms of importance were "The patient keeps appointments," "The patient cooperates with the use of removable dental appliances (such as retainers) and/or elastics," followed by "The patient demonstrates excellent oral hygiene." The lowest-rated factors, factors that scored on average below 3.5, were "The patient is pleasant to the clinic staff" and "The patient speaks of personal problems or demonstrates such problems," while

items such as "The patient arrives promptly at clinic"; "The patient's behavior is sullen, hostile, belligerent, or rude"; "The patient complains about having to wear braces"; and "The patient has a negative view or perception of their malocclusion" were rated moderately.

When considering the pattern of ratings, there was uniform agreement on how important each of the following items was rated (with all clinicians thinking it was either very important or extremely important): "The patient keeps appointments," "The patient cooperates with the use of removable dental appliances (such as retainers) and/or elastics," and "The patient demonstrates excellent oral hygiene."

When looking at the items on which clinicians disagree about level of importance for adherence, we find that factors such as "The patient is pleasant to the clinic staff," "The patient speaks of personal problems or demonstrates such problems," and "The patient thinks that facial aesthetics are important" show a varied pattern of response.

2. *What factors do orthodontists report to use for assessing adherence of adult patients in their daily practice?* Participants were presented with the same 14 factors as before, which they rated on a five-point Likert scale. Higher scores indicate higher frequency of use assigned to the factor. The mean ratings for each factor (and SD) are presented in Table 2.

It appears that the highest-rated factors, with a rating of 4.4 or higher, were "The patient demonstrates excellent oral hygiene," "The patient keeps appoint-

**Table 2.** Mean and SD frequency of Use for Each Factor in Order of Highest Utilization. Responses From N = 23 Orthodontists

Factor	Frequency of Use (%)					Mean	SD
	Never	Rarely	Sometimes	Most of the Time	Always		
The patient demonstrates excellent oral hygiene.				41	59	4.59	0.50
The patient keeps appointments.				41	59	4.59	0.50
The patient cooperates with the use of removable dental appliances (such as retainers) and/or elastics.			9	41	50	4.41	0.67
The patient has distorted or damaged wires and/or loose bands.		9	14	36	41	4.09	0.97
The patient is observed to be enthusiastic about treatment.	5		18	50	27	3.95	0.95
The patient has a negative view or perception of their malocclusion.		14	18	36	32	3.86	1.04
The patient is observed to be involved in treatment.	9		23	32	36	3.86	1.21
The patient complains about having to wear braces.	5	9	23	41	23	3.68	1.09
The patient arrives promptly at clinic.	9		9	77	5	3.68	0.95
The patient thinks that facial aesthetics are important.		14	23	50	14	3.64	0.90
The patient complains about treatment procedures (ie, procedures performed by the orthodontist).		9	41	27	23	3.64	0.95
The patient is pleasant to the clinic staff.	14	5	27	36	18	3.41	1.26
The patient's behaviour is sullen, hostile, belligerent, or rude.	9	18	27	23	23	3.32	1.29
The patient speaks of personal problems or demonstrates such problems.	9	32	32	14	14	2.91	1.19

ments," followed by "The patient cooperates with the use of removable dental appliances." The lowest rated factors, receiving an average of 3.4 or lower, were "The patient speaks of personal problems or demonstrates such problems," and "The patient's behavior is sullen, hostile, belligerent, or rude." Items such as "The patient has a negative view or perception of their malocclusion," "The patient is observed to be involved in treatment," and "The patient complains about having to wear braces" were rated moderately.

There was uniform agreement on how frequently each of these items was used, with all clinicians reporting that either it was used most of the time or always utilized to assess adherence: "The patient demonstrates excellent oral hygiene" and "The patient keeps appointments."

When looking at items on which clinicians disagree about the frequency of use in assessing adherence, we find factors such as "The patient speaks of personal problems or demonstrates such problems"; "The patient's behavior is sullen, hostile, belligerent, or rude"; and "The patient is pleasant to the clinic staff."

It thus appears that there is uniform agreement that two of the adherence predictors appearing in the literature are the most frequently used factors when assessing adherence: "The patient demonstrates excellent oral hygiene" and "The patient keeps appointments."

When looking at the importance (Table 1) and use (Table 2) factors and their associated ratings, we noted with interest that the same three factors (appointment keeping, use of appliances, and oral hygiene) which were rated as the top three factors in terms of importance, also appeared as the top-rated factors in terms of use. With regard to those factors rated as not particularly important (pleasantness to clinic staff, speaking of personal problems, and patient

views about facial esthetics; Table 1), there is no uniform agreement among respondents as to the importance of these factors (pleasantness to staff and talk about personal problems) although they do generally feature as low-rated variables in terms of use in everyday clinical practice. Some of the middle-rated variables in terms of use (eg, patient involvement in treatment, prompt arrival at clinic, and distorted wires or bands), which are rated as moderately important (Table 1), are also moderately used as adherence predictors in practice.

*3. Are there any other factors that do not appear in the literature that orthodontists believe are predictors of adherence?* In general, clinicians think that factors such as the level of awareness about different dimensions of the treatment (eg, "Treatment awareness"), the associated costs, self-image issues, general importance for patient's life, previous experiences with orthodontists, and difficulties with work schedule, are aspects that are identified as important in adherence. These factors are also used to assess it (Table 3).

The most important additional factor for adherence, according to orthodontists, is "Cost of treatment" (M = 4.75; SD = 0.55), whereas the least important factor is "Previous experiences" (M = 3.5; SD = .71). The most frequently used factor to assess adherence is knowledge about the "Importance for patient's life" (M = 4.5; SD = .71), whereas the least employed is "Cost of treatment" (M = 2.42; SD = 1.52).

In summary, from the factors given to clinicians, there were three that were rated as the most important by everyone, which describe adherence in terms of the regularity in attending appointments, use of appliances, and demonstration of adequate oral hygiene. Likewise, two of these factors were, in addition,



**Table 3.** Mean and Standard Deviation of Groups of Factors That Do Not Appear in the Literature and Were Added by Clinicians

	Importance		Use	
	Mean	SD	Mean	SD
Treatment Knowledge and Awareness (N = 13) Patients are aware of the aims of treatment and are motivated to achieve the aims. Good understanding of treatment goals ie, clear expectations of expected result. Asking questions about their treatment progress. How much they listen to what you are saying. Choice of appropriate treatment plan for patient. Attention to advice given and not repeating the same info each visit. Noticing breakages of appliance and requesting emergency appointments for repair. Demonstrates ability to place/replace such appliances/elastics (factor 2 questions below are the same) How they engage with you during appointments. Informed consent. Knowledge of fixed appliances eg, from friends/family/children/own research. Discussing tooth changes during treatment and worrying about things they see (that are normal effects of braces!) such as spaces appearing in alignment phase, teeth not straightening out quickly, centre lines not correct etc. Able to communicate with appliances in situ. Ability of patient to understand treatment goals and make informed consent to treatment.	4.21	0.70	4.14	0.66
Cost of Treatment (N = 6) Cost of treatment. Treatment cost. Cost of treatment. Financial commitment. Cost of treatment. Financial support.	4.75	0.55	2.40	1.52
Self-image (N = 3) General appearance—dress, personal hygiene, etc. Patient arrives to appointment wearing their appliance/elastics. Aesthetic orthodontic appliances.	4.00	0.00	4.00	0.00
Importance in Their Life (N = 2) Importance they place on their treatment in their overall life (priority). Their response to finding out that retention is “permanent/lifelong.”	4.50	0.71	4.50	0.71
Previous Experiences (N = 3) Previous treatment as child which has relapsed or they failed to complete ... these patients as adults are often well motivated for treatment. History of previous treatment eg, previous relapse following treatment.	3.50	0.71	3.50	0.71
Work Schedule (N = 2) Time to attend appointments. This is dictated by their employment so clinic times of 9–5 pm may not help compliance. Working environment.	4.00	0.00	4.00	0.00
Others (N = 5) Age. Case improvement. Oral hygiene. Parental/partner support. Presence of dental disease.	4.00	1.22	4.00	1.41

reported as the most frequently used to assess adherence in daily practice, namely “The patient demonstrates excellent oral hygiene,” and “The patient keeps appointments.”

Similarly, the factors that did not seem to be universally endorsed as important were “The patient is pleasant to the clinic staff,” “The patient speaks of personal problems or demonstrates such problems,” and “The patient thinks that facial aesthetics are important.” Likewise, factors less frequently employed to assess adherence were “The patient speaks of personal problems or demonstrates such problems”;

“The patient’s behavior is sullen, hostile, belligerent, or rude”; and “The patient is pleasant to the clinic staff.” Therefore, both “The patient is pleasant to the clinic staff” and “The patient speaks of personal problems or demonstrates such problems” were signaled as the least important in adherence and the least frequently used to assess such behavior in adult patients.

## DISCUSSION

This study investigated the extent to which factors of adherence found in the literature are signaled by

orthodontists as important indicators of such behavior and frequently utilized when assessing adult patients in daily practice. The procedure requested a group of clinicians to rate a list of 14 factors as to their relevance to adherence and their frequency of utilization. Examples of factors indicating adherence were "The patient demonstrates excellent oral hygiene" and "The patient keeps appointments." Apart from those extracted from the literature, an open-ended question was included to collect any other factor relevant or used by the sample.

The results of the study show a clear pattern of agreement for three factors signaled by all the clinicians as particularly important in adherence. These factors were related to the consistency of patients in keeping their appointments, behaviors that demonstrated a high standard of oral hygiene, and cooperation in using removable appliances (such as retainers) and elastics. Of these three factors, two factors were also largely employed by clinicians when assessing adherence in adult patients in clinical contexts: patient effectiveness in keeping appointments throughout the treatment span and patient concern with their own oral hygiene. Such results indicated attitude-behavior agreement in the orthodontists' responses wherein, broadly, the factors they say they use in clinical practice as indicators of adherence were the same as those they deem important. These findings were consistent with some of the items included in the scale of patient cooperation developed by Slakter et al.<sup>13</sup> and partially support some of the findings reported by Mehra et al.<sup>5</sup> In both cases, behaviors associated with maintaining regular appointments, good oral hygiene, and adequate use of appliances were reported to be relevant factors in the adherence of orthodontic patients.

Even though all the factors were rated as somewhat important and used, two clearly yielded a varied pattern of disagreement among clinicians. These factors referred to when patients were pleasant to the clinic staff and when they conveyed personal problems in this context. In both cases, there was an unclear pattern of importance and use for assessing adherence in adult patients, so whereas some clinicians rated these items either as important/used or not important/not used, others evaluated them as irrelevant to make a judgment in any direction.

These results appear to contrast with Slakter et al.,<sup>13</sup> who found that speaking or demonstrating personal problems during appointments was an adequate measure of adherence. However, as results yielded in our study are related to behaviors in adult patients, such contrast rather indicates that this factor is specific

for the case of children, which would contribute to confirming that this factor may be less applicable to older ages.

As with all studies using nonprobabilistic samples, there are obvious limitations in this study that offer opportunities for further research. For instance, it would be worthwhile to evaluate whether these findings can be replicated when a larger and randomly selected sample from a similar population of clinicians is requested to rate the same list of factors. Further, administering a similar procedure to orthodontists from a different setting would enhance the external validity of the results, as different results could be achieved in other cultural contexts. However, as this study has only an exploratory scope, much work remains to be done on identifying reliable and valid factors indicating adherence in adult orthodontic patients.

## CONCLUSIONS

- Overall, there was a high level of agreement on which factors are most important and utilized for predicting adherence in orthodontic settings.
- Appointment keeping, cooperating with the use of removable appliances, and excellent oral hygiene were rated as the most important and utilized factors by orthodontists when assessing adherence in adult patients.
- In open-ended questions, orthodontists also highlighted the perceived cost of treatment as an important factor in adherence.

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