

Factors affecting patients' adherence to orthodontic appointments

Omar M. Bukhari,^a Keyvan Sohrabi,^b and Mary Tavares^c

Boston and Cambridge, Mass, Mecca, Saudi Arabia, and Seattle, Wash

Introduction: Studies show that attendance at orthodontic appointments affects treatment outcomes, treatment duration, and the probability of side effects. The aim of this study was to predict factors that influence patients' attendance at orthodontic appointments. **Methods:** We conducted a face-to-face guided interview survey of 153 participants from orthodontic clinics in the Greater Boston area. Attendance at scheduled orthodontic appointments was self-reported as always, sometimes, or rarely. Participants' characteristics, including demographics, dental insurance, and oral hygiene practices, were self-reported. Moreover, from dental records, we collected the time that the participants spent undergoing active orthodontic treatment. Multivariable ordered logistic regression was used to report proportional odds ratios and attendance probabilities. A likelihood ratio test was performed to ensure that the proportional odds assumption held. **Results:** For overall appointment attendance, 76% of the participants reported always attending, 16% reported sometimes attending, and 8% reported rarely attending. Based on multivariable logistic regression (adjusted for age, race, and sex), the participants with optimal oral hygiene practices were almost 6 times (5.9) more likely to attend appointments than those who did not ($P = 0.002$). The odds of attending appointments decreased significantly (by 23%) for every 6-month increase in treatment duration ($P = 0.008$). Participants covered by non-Medicaid insurance were 4 times ($P = 0.018$) more likely to attend appointments than were those with Medicaid insurance. **Conclusion:** Our findings indicate that adherence to orthodontic treatment follow-up visits was strongly correlated to insurance type, treatment duration, and oral hygiene practices. Unlike previous studies, sex was not a significant predictor of adherence. (*Am J Orthod Dentofacial Orthop* 2016;149:319-24)

A challenging task facing a dental team is supporting patients in changing their oral health behaviors and maintaining those changes.¹ According to the American Association of Orthodontists, because orthodontic treatment is seldom finished rapidly, the assumption would be that patients who want good-looking smiles and healthier occlusions would attend every appointment and comply with every treatment instruction to accomplish the desired outcome as rapidly as possible.² In orthodontics,

adherence means attending appointments, maintaining good oral hygiene, wearing elastics or functional appliances as instructed, and avoiding foods that can loosen the brackets.

In 2003, Trenouth³ found that the failure rate of patients who completed orthodontic treatment was 10.3%, and the failure rate of patients who discontinued orthodontic treatment was 21.4%. Therefore, we could say that attendance affected treatment success. In other studies, "no-show" rates for orthodontic appointments ranged from 13.6%⁴ to 23.3%.⁵ Patients who neglected orthodontic appointments during active treatment were likely to prolong their treatment durations⁶⁻⁹; as a result, they might experience more harmful side effects.¹⁰ Missed appointments decrease the possibility that orthodontic treatment will be completed successfully.³

The American Association of Orthodontists Insurance Company suggests the following possible causes for a patient's failure to keep orthodontic appointments: teenaged patients who are less than passionate about treatment; an unexpected illness or a crisis in the family; and adults who report interferences with work schedules

^aResident, Harvard School of Dental Medicine, Boston, Mass; lecturer, Faculty of Dentistry, Umm Al-Qura University, Mecca, Saudi Arabia.

^bResident, School of Dentistry, University of Washington, Seattle, Wash.

^cSenior clinical investigator, Forsyth Institute, Cambridge, Mass; program director, Dental Public Health Residency, Oral Health Policy and Epidemiology, Harvard School of Dental Medicine, Boston, Mass.

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Address correspondence to: Omar M. Bukhari, Harvard School of Dental Medicine, Oral Health Policy and Epidemiology, REB 204, 188 Longwood Ave, Boston, MA 02115; e-mail, omair_bukhari@hsdm.harvard.edu.

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Table 1. Characteristics of respondents from the 3 orthodontic practices stratified by responses to attendance question

Characteristic/answer to the question	Always (n = 116)	Sometimes (n = 25)	Rarely (n = 12)	Total (n = 153)	P value (X ²)
Age category (y)					0.309
<12	21 (81%)	5 (19%)	0	26 (100%)	
12 to <16	58 (77%)	9 (12%)	8 (11%)	75 (100%)	
>16	37 (71%)	11 (21%)	4 (8%)	52 (100%)	
Sex					0.038
Male	48 (67%)	17 (24%)	7 (9%)	72 (100%)	
Female	68 (84%)	8 (10%)	5 (6%)	81 (100%)	
Race					0.075
White	37 (84%)	2 (5%)	5 (11%)	44 (100%)	
Black	37 (69%)	15 (28%)	2 (3%)	54 (100%)	
Hispanic	31 (76%)	6 (15%)	4 (9%)	41 (100%)	
Other	11 (79%)	2 (14%)	1 (7%)	14 (100%)	
Insurance type					0.022
Medicaid	64 (69%)	18 (19%)	11 (12%)	93 (100%)	
Non-Medicaid	52 (87%)	7 (12%)	1 (1%)	60 (100%)	
Brushing/flossing daily					0.003
Yes	101 (81%)	15 (12%)	8 (7%)	124 (100%)	
No	15 (52%)	10 (34%)	4 (14%)	29 (100%)	
Mean time of active treatment (SD)* (mo)	8.8 (6.7)	7.3 (5.8)	10.8 (7.2)	21 (16)	0.322*
Mean age (SD)* (y)	14.6 (4)	14.8 (2.6)	15.4 (3.5)	14.7 (3.9)	0.740*

*Based on ANOVA test.

and emotional pressures.² An additional cause, probably the most critical and frequent cause, is that the patient simply forgot.^{11,12} Forgetting indicates patient behavioral attitudes and oral health literacy.

Although previous behavioral epidemiologic studies have tried to establish a connection between a patient's compliance with treatment, missed appointments, and oral hygiene, we could not find a study performed in private orthodontic offices in the United States. Although it is commonly thought that there is a correlation among elastic wear, showing up for appointments, and oral hygiene level, studies have shown contradictory results. Moreover, because of a lack of consensus about factors affecting attendance and the high percentage of malpractice claims against orthodontists who have frequent no-show patients, the American Association of Orthodontists Insurance Company recommends paying close attention to patient attendance deficiencies and addressing them as early as possible. Therefore, in this study, we predicted that attendance through a set of variables collected during the first visit would help to predict possible future attendance behavior, improve outcomes, and reduce the percentage of malpractice claims associated with no-show patients.

MATERIAL AND METHODS

The study population was orthodontic patients in the Greater Boston area of Massachusetts. The participants

were recruited from 3 private orthodontic offices in Boston, Cambridge, and Somerville. One hundred fifty-three participants were invited to participate in the study, and none refused or was unable to complete the questionnaire because of literacy problems. The subjects included 81 girls (53%) and 72 boys (47%). Their mean age was 14.7 years (SD, 3.9 years), and the mean average treatment time was 21 months (SD, 16 months). Demographics and participants' characteristics are shown in Table 1. Overall, there were 54 African Americans (34.6%), 44 whites (28.8%), 41 Hispanics (27.6%), and 14 (9%) participants from other ethnic backgrounds. Medicaid insurance was used by 93 of the participants (60.9%). Patients with severe dentofacial deformities were excluded. Parents' consents and children's assents were obtained.

This was a convenience sample of patients who agreed to take the surveys and signed the consent form. The study was approved by Committee on Human Studies of Harvard University Faculty of Medicine.

The participants completed self-administered questionnaires guided by a face-to-face interview. The questionnaire was divided into 8 parts: (1) demographic data, (2) oral hygiene practices, (3) payment method, (4) attendance history, (5) patients' and parents' perceptions about the importance of braces, (6) treatment duration (actual time that the participant was undergoing active orthodontic treatment), (7) Oral Impact on Daily Performances scores, and (8) Peer Assessment Rating scores.

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