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Attitudes towards orthodontic treatment: a comparison of treated and untreated subjects

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SUMMARY The aims of the present study were to evaluate treated and untreated subjects' attitudes towards orthodontic treatment and to examine possible determinants of these attitudes. It was hypothesized that orthodontically treated individuals would differ from untreated respondents in their attitude towards orthodontists and orthodontic treatment, and that female subjects would have a more positive attitude towards orthodontics than male subjects.

Untreated individuals (n = 220) were used as a comparison group in the evaluation of orthodontic health care by previously treated subjects (n = 246). Two questionnaires were completed. The first, based on the Dental Attitude Questionnaire, contained 32 items about general attitude towards orthodontic treatment and was completed by both groups. The second questionnaire contained 46 negatively and positively based statements concerning different aspects of orthodontic treatment, and was completed by previously treated subjects. The reliability of both questionnaires was satisfactory.

Previously treated subjects were found to have a significantly more positive attitude towards orthodontics than untreated subjects. The subject's attitude towards the relationship with the orthodontist, satisfaction with the treatment result and experiences with follow-up appointments predicted the general attitude towards orthodontics. Age, but not gender, was found to be a significant predictor for a subject's general attitude towards orthodontics.

Introduction

It seems safe to assume that the general public has a positive regard for the profession of dentistry. In the USA, the UK, Australia and Finland, it has been shown that both children and parents have faith in dentists and orthodontists (Tulloch *et al.*, 1984; DiMatteo *et al.*, 1995). Recently, Richardson (1998) stated that, at least in the USA, orthodontic treatment is regarded as something of a status symbol, available on demand (whether or not necessary), to a privileged section of the community. However, not much is known about possible underlying factors that may determine this positive general attitude towards orthodontics.

In previous studies it has been reported that gender correlates with the general attitude towards the dental profession and orthodontics. Females have been found to have greater respect for the dental profession (Lahti *et al.*, 1995; DiMatteo *et al.*, 1995), to be more satisfied with oral health services (Lahti *et al.*, 1995), to have a greater willingness to accept and receive all forms of orthodontic treatment (Gravely, 1990; Gray and Anderson, 1998) and to perceive their oral health as impacting more strongly on their quality of life than males (McGrath *et al.*, 2000).

It has also been reported that parents who are former orthodontic patients are more likely to approve of orthodontic care in principle and to perceive a need for it in their child more often than parents without orthodontic experience (Pietilä and Pietilä, 1994; Pratelli *et al.*, 1998). These different perceptions do not seem to be explained by genetic differences, as the percentage of children with clinical need has been found to be the same for families with and without a history of active orthodontic treatment (Pietilä and Pietilä, 1994).

The aims of the present study were to evaluate current perceptions of the orthodontic profession in the Netherlands and to examine possible determinants of this attitude. It was hypothesized that orthodontically treated subjects would have a more positive attitude towards orthodontists and orthodontic treatment than untreated subjects. It was also expected that female subjects would have a more positive attitude towards orthodontics than male subjects, regardless of their orthodontic experience.

Materials and method

Subjects

As one of the aims of the study was to compare the effect of orthodontic experience on subjects' attitudes towards orthodontics, it was necessary to select a large group of relatively young subjects with and without recent orthodontic experience but similar other relevant

characteristics. In a previous study, first-year students of the University of Amsterdam were found to be relatively homogeneous with respect to general dental health care attitudes (Bos *et al.*, 2003), age, and many other variables, such as intelligence, personality and demographic aspects. Therefore, it was decided to use subjects from this population to examine attitudes towards orthodontists and orthodontic treatment.

In total, 466 subjects [246 previously treated subjects (185 females and 61 males) and 220 untreated subjects (134 females and 86 males)] participated. They took part in an exchange for additional course credits. All subjects were freshmen at the Department of Psychology of the University of Amsterdam [mean age 21.2 years, standard deviation (SD) 4.9].

Questionnaires

Two questionnaires were used. The first, based on the Dental Attitude Questionnaire (Bos *et al.*, 2003), contained 32 items concerning general attitude towards orthodontic treatment and was completed by the entire sample of previously treated and untreated subjects. The respondents were asked about their attitude towards social aspects of wearing brackets, behaviour of orthodontists, orthodontic advice, follow-up appointments, and the results of orthodontic treatment. Items could be answered on a six-point scale (1 = completely agree and 6 = completely disagree).

After this questionnaire was completed, only the sample of previously treated subjects completed a second questionnaire, in which they were asked about their recent experiences with orthodontic treatment. This questionnaire, based on an extensive literature study of health psychology and orthodontics, contained 46 negative and positive statements about different aspects of orthodontic treatment. The items were grouped based on content, so that eight subscales were formed (experiences with braces, the orthodontist, compliance, follow-up appointments, oral hygiene, treatment duration, diet and treatment result).

Statistical analysis

Using SPSS version 10.0 (SPSS, Chicago, Illinois, USA), the scale and item characteristics of the first questionnaire were determined. Items formulated positively were rescored, so that a high score indicated a positive attitude towards orthodontics. Differences in item level were examined using Student's independent samples *t*-tests. As recommended by Bonferroni, in order to reduce the type 1 error rate, for every individual *t*-test the critical significance level was adjusted to 0.01 (Stevens, 1996). A one-tailed sign test (Siegel and Castellan, 1988) was used to establish whether either group differed in their general attitude towards orthodontics. The total scores of both samples were also computed and compared, and differences between males and females were analysed, again using Student's *t*-tests.

The mean scores on the eight subscales of the second questionnaire were computed and analysed. Differences in sum scores for male and female subjects over all 46 items and over each of the eight subscales were examined, using Student's *t*-tests. Correlations between subscales were also examined. Finally, a multiple regression analysis was performed, in which the mean scores on the eight subscales, as well as sex and age, were used as independent variables, and the general attitude towards orthodontics, as assessed with the first questionnaire, was the criterion variable.

Results

The reliability of the first questionnaire for both treated and untreated subjects was satisfactory (Cronbach's $\alpha = 0.81$ and 0.75, respectively). The mean item scores, standard deviation (SD), and Student's *t*-values are presented in Table 1.

For 23 items, previously treated subjects scored more positively; in eight this difference reached significance ($P < 0.01$). Untreated subjects scored higher on nine items, four of which were significant ($P < 0.01$). A one-tailed sign test revealed a significant difference between untreated and previously treated subjects ($P = 0.010$) and the Student's *t*-test for the total scores was also significant (mean score treated subjects 125.70, mean score untreated subjects 121.88, $t = 2.71$, df 440, $P = 0.007$). Although no significant gender differences were found in the previously treated subjects, in the untreated subjects there was a significant difference between males and females (mean score males 118.67, mean score females 124.03, $t = –2.95$, df 200, $P = 0.004$).

The reliability of the second questionnaire for previously treated subjects was very satisfactory (Cronbach's $\alpha = 0.87$). The reliabilities of the subscales were also satisfactory (Cronbach's $\alpha = 0.77$, 0.70, 0.77, 0.46, 0.75, 0.73, 0.62 and 0.63, respectively). The mean item scores, SD, and Student's *t*-values for differences between male and female subjects are given in Table 2.

The highest mean item score was found on the subscale 'treatment result', and the lowest on the subscale 'diet'. A significant difference was observed between the total scores of male and female subjects (mean score males 176.70, mean score females 186.06, $t = –2.25$, df 217, $P = 0.025$). Only for the subscale 'follow-up appointments' was the difference in sum scores of males and females significant (mean score males 20.95, mean score females 23.87, $t = –2.18$, df 236, $P = 0.005$).

Table 3 shows the correlations between the sum scores on the different subscales with general attitude towards orthodontics as computed by the first questionnaire.

Experiences with the treatment result, appliances, the orthodontist, treatment duration, follow-up

Table 1 Item mean scores (M), standard deviations (SD), Student's *t*-values for differences between treated and untreated subjects, direction of differences (D_i) between mean item scores.

	Treated		Untreated		*t*-value	*P*	D_i
	M	SD	M	SD			
1. Braces cause a lot of trouble	2.79	1.47	2.66	1.23	1.02	ns	+
2. When you wear braces, you need to adjust your dietary habits	3.82	1.42	3.14	1.16	5.55	**0.000**	+
3. Orthodontists always say that you have to wear your braces more often than is really necessary	3.93	1.54	3.86	1.21	0.57	ns	+
4. It is no problem visiting the orthodontist regularly*	4.07	1.50	3.82	1.32	1.92	ns	+
5. It is not necessary to brush your teeth more often when you are wearing braces	4.70	1.30	4.47	1.21	1.91	ns	+
6. Orthodontists are interested in their patients*	3.39	1.39	3.60	1.12	–1.78	ns	–
7. It is nice to wear braces*	1.45	0.84	1.69	1.02	–2.79	**0.005**	–
8. Orthodontic treatment often has no use at all	5.26	1.07	5.04	1.08	2.18	ns	+
9. It is absolutely necessary to care more for your oral hygiene when you are wearing braces*	4.65	1.26	4.51	1.24	1.25	ns	+
10. Recommendations of orthodontists are often very easy to follow*	4.37	1.15	3.98	1.08	3.75	**0.000**	+
11. The duration of orthodontic treatment is 2 years or more	2.40	1.30	2.80	1.21	–3.39	**0.001**	–
12. It is a nuisance visiting the orthodontist time and time again	2.93	1.44	2.88	1.21	0.41	ns	+
13. People wearing braces are more often bullied than people without braces	3.58	1.40	3.17	1.41	3.17	**0.002**	+
14. It is nonsense visiting an orthodontist after your brackets have been removed	4.19	1.43	4.25	1.26	–0.42	ns	–
15. Elastics which should be worn with braces often have no use	4.94	1.01	4.56	1.04	4.04	**0.000**	+
16. Recommendations of orthodontists in general are easy to understand*	4.84	1.13	4.25	0.99	5.92	**0.000**	+
17. Other people see immediately whether or not you are wearing braces	2.65	1.41	2.55	1.21	0.84	ns	+
18. Orthodontists often are very nice*	3.76	1.23	3.85	0.99	–0.08	ns	–
19. It is not a problem at all when you stop treatment as soon as your teeth are straight	4.51	1.27	4.25	1.35	2.15	ns	+
20. Orthodontists often give indistinct information	4.36	1.17	3.99	0.94	3.68	**0.000**	+
21. It is absolutely forbidden to consume certain food and drinks when you are treated orthodontically*	3.60	1.55	3.88	1.32	–2.10	ns	–
22. Orthodontists only want to make a lot of money	3.83	1.40	3.75	1.37	0.66	ns	+
23. People wearing braces look foolish	4.88	1.13	4.42	1.37	3.95	**0.000**	+
24. The use of a mouth rinse is absolutely useless	4.83	1.17	4.77	1.08	0.63	n.s.	+
25. People often do not even see whether or not you are wearing braces*	2.84	1.32	2.74	1.28	0.86	ns	+
26. It does not matter if you wear your braces less than is recommended by the orthodontist	4.00	1.39	4.36	1.15	–3.00	**0.003**	–
27. Orthodontists always have something to complain about towards their patients	4.03	1.39	3.89	1.12	1.22	ns	+
28. It is difficult to recall appointments with the orthodontist	4.55	1.45	4.36	1.23	1.49	ns	+
29. Orthodontists often take only very little time with their patients	3.75	1.41	3.95	1.12	–1.63	ns	–
30. It is impossible to comply with all the orthodontist's instructions	4.11	1.34	3.84	1.12	2.38	ns	+
31. It does not matter what you eat or drink when you are wearing braces	4.13	1.40	4.48	1.18	–2.93	**0.004**	–
32. People who have had orthodontic treatment often have very pretty teeth*	4.41	1.28	4.02	1.30	3.24	**0.001**	+

*Items were rescored, so that a high score corresponds with a positive attitude towards orthodontics.
ns, not significant.

Table 2 Mean item and scale scores of previously treated males (n = 60), females (n = 185), ordered from high to low mean item scores, and Student's t-values for differences between male and female subjects.

Experiences with:	Males		Females		t-value	P
	Mean	SD	Mean	SD		
Treatment result						
8. My occlusion has hardly changed due to the orthodontic treatment	4.87	1.62	4.88	1.53	–0.03	ns
19. I am satisfied with the treatment result*	4.40	1.63	4.53	1.50	–0.58	ns
37. I am happy that I had orthodontic treatment*	4.76	1.42	5.17	1.17	–2.21	ns
44. I think the treatment was unnecessary	4.98	1.70	5.31	1.33	–1.54	ns
Mean item score on subscale	4.84	1.17	5.02	1.09	–1.10	ns
Braces						
1. I liked wearing braces because I knew it would benefit my future dental appearance*	3.27	1.57	3.51	1.49	–1.10	ns
3. Sometimes I felt embarrassed in the company of other people when I was wearing braces	3.92	1.64	3.98	1.71	–0.26	ns
4. I have never been bullied when wearing braces*	4.72	1.61	5.12	1.38	–1.88	ns
13. I did not mind at all wearing braces*	2.95	1.45	3.17	1.56	–0.96	ns
21. Wearing braces did not interfere with the contact I had with my friends*	4.56	1.73	5.07	1.53	–2.16	ns
30. When I wore braces I tried to avoid meeting other people	5.08	1.45	5.54	1.17	–2.50	ns
38. I wore my braces as little as possible because I did not like them	4.43	1.69	4.41	1.76	0.08	ns
40. When I wore braces people stared at me more often than they did previously	5.13	1.60	5.53	1.22	–2.04	ns
Mean item score on subscale	4.34	0.74	4.53	0.81	–1.65	ns
Orthodontist						
5. The orthodontist often criticized my dental situation	4.16	1.70	4.83	1.46	–2.95	**0.003**
9. I had a good relationship with my orthodontist*	4.13	1.52	4.14	1.63	–0.01	ns
16. The orthodontist never gave me clear advice	4.57	1.41	4.74	1.20	–0.90	ns
17. Sometimes the criticism I received from the orthodontist was not deserved	3.89	1.54	3.88	1.57	0.01	ns
22. I often got compliments from the orthodontist because my occlusion improved so well*	3.68	1.50	3.80	1.43	–0.55	ns
35. My orthodontist was very nice*	3.93	1.59	4.00	1.60	–0.28	ns
41. The orthodontist gave me so much advice, that I could not remember it all	4.62	1.81	5.19	1.20	–2.79	ns
42. I found it difficult to ask the orthodontist questions about the treatment	4.57	1.77	4.90	1.56	–1.36	ns
Mean item score on subscale	4.26	0.95	4.47	0.91	–1.49	ns
Treatment duration						
6. I think the treatment took too long	3.07	1.71	3.34	1.74	–1.07	ns
10. I stopped treatment earlier than was planned	4.18	1.92	4.65	1.78	–1.74	ns
27. Treatment took less time than I had expected*	2.78	1.49	2.68	1.73	0.39	ns
46. I would have stopped treatment sooner if my friends and family had not supported me	4.44	1.83	5.02	1.69	–2.27	ns
Mean item score on subscale	3.68	0.91	3.92	1.15	–1.47	ns

Table 2 *Continued*

Experiences with:	Males		Females		*t*-value	*P*
	Mean	SD	Mean	SD		
Follow-up appointments						
11. Sometimes I forgot that I had to see the orthodontist	3.59	1.81	4.37	1.82	–2.92	**0.004**
14. I did not like visiting the orthodontist	3.33	1.56	3.50	1.71	–0.71	ns
15. When I had an appointment with the orthodontist no one had to remind me*	3.33	1.54	3.92	1.65	–2.67	**0.008**
18. Sometimes others had to remind me to go to the orthodontist	3.07	1.56	3.94	1.75	–3.69	**0.001**
24. I felt concerned every time I had to visit the orthodontist	4.02	1.63	4.19	1.69	–0.70	ns
43. I did not mind visiting the orthodontist regularly*	3.39	1.61	3.77	1.65	–1.53	ns
Mean item score on subscale	3.49	1.04	3.98	1.17	–2.81	**0.005**
Compliance						
2. On the recommendation of the orthodontist I brushed my teeth more often during treatment*	2.78	1.46	2.91	1.51	–0.58	ns
7. It was difficult to follow-up the advice of the orthodontist	3.62	1.56	4.19	1.48	–2.56	ns
26. I wore my braces in accordance with the advice of the orthodontist*	3.93	1.44	4.04	1.47	–0.51	ns
29. I had to wear elastics as well, but I often forgot to wear these	4.52	1.71	4.87	1.67	–1.40	ns
31. I did not always tell the truth when the orthodontist asked me if I had worn the appliances all the hours I promised	3.34	1.84	3.44	1.90	–0.36	ns
32. Sometimes I forgot to wear my braces	2.61	1.69	2.97	1.87	–1.34	ns
34. I followed precisely the advice the orthodontist gave me*	3.37	1.26	3.66	1.42	–1.38	ns
36. When I had to wear elastics I wore them as advised by the orthodontist*	3.40	1.78	3.66	1.42	–1.04	ns
45. I did not mind changing my diet in accordance with the orthodontist's advice*	3.02	1.60	3.29	1.63	–1.11	ns
Mean item score on subscale	3.38	0.70	3.69	0.93	–2.25	ns
Oral hygiene						
20. When I wore braces brushing my teeth took more time*	3.47	1.37	3.15	1.61	1.50	ns
25. During treatment I did not need extra time to take care of my oral hygiene	3.82	1.54	4.13	1.63	–1.31	ns
33. When I wore braces I brushed my teeth more often than before*	3.19	1.55	3.65	1.65	–1.91	ns
39. When I wore braces I regularly used a mouth rinse*	2.29	1.51	2.47	1.66	–0.71	ns
Mean item score on subscale	3.26	0.91	3.36	1.09	–0.65	ns
Diet						
12. I adopted healthier dietary habits because of the treatment*	1.70	1.06	1.42	0.73	1.88	ns
23. During treatment I was allowed to eat and drink everything I liked	3.75	1.84	3.48	1.81	1.02	ns
28. I did not alter my diet during treatment	3.10	1.72	2.98	1.67	0.48	ns
Mean item score on subscale	2.89	1.19	2.64	1.07	1.53	ns

*Items were rescored, so that a high score corresponds to a positive attitude towards orthodontics.
SD, standard deviation; ns, not significant.

Table 3 Correlations between sum scores of previously treated subjects on different subscales and their general attitude towards orthodontics.

Experiences with	Treatment result	Braces	Orthodontist	Duration	Follow-up appointments	Compliance	Oral hygiene	Diet	General attitude
Treatment result	1.00								
Braces	0.25*	1.00							
Orthodontist	0.40*	0.46*	1.00						
Treatment duration	0.29*	0.42*	0.56*	1.00					
Follow-up appointments	0.14	0.40*	0.46*	0.42*	1.00				
Compliance	0.25*	0.35*	0.36*	0.33*	0.49*	1.00			
Oral hygiene	0.11	–0.11	0.07	0.05	–0.01	0.25*	1.00		
Diet	0.01	–0.13	–0.11	–0.02	–0.04	0.11	0.23*	1.00	
General attitude	0.35*	0.36*	0.59*	0.47*	0.53*	0.47*	0.08	0.05	1.00

*$P < 0.01$ (2-tailed).

Table 4 Regression analysis.

Experiences with	General attitude towards orthodontics	
	β	*P*
Treatment result	0.14	<0.01*
Braces	0.02	0.80
Orthodontist	0.36	<0.01*
Treatment duration	0.10	0.10
Follow-up appointments	0.23	<0.01*
Compliance	0.13	0.03
Oral hygiene	–0.04	0.45
Diet	0.09	0.08
Gender	–0.02	0.69
Age	0.14	<0.01*
Adjusted R^2	0.51	

*$P < 0.01$.

appointments, and compliance were significantly correlated with a subject's general attitude towards orthodontics. The results of the multiple regression analysis confirmed these correlations (Table 4).

As shown in Table 4, experiences with the treatment result, the orthodontist, and follow-up appointments were significant predictors of a subject's general attitude towards orthodontics. Age, but not gender, was also found to be a significant predictor.

Discussion

The hypothesis that previously treated subjects had a more positive attitude towards orthodontists and orthodontic treatment than untreated subjects was confirmed in the present study. Surprisingly, however, although previously treated female subjects evaluated their experiences with orthodontics more positively than males, they did not, like untreated female subjects, have a more positive attitude towards orthodontics in general. Although in previous studies (DiMatteo *et al.*, 1995; Lahti *et al.*, 1995), gender differences were found, it seems that these differences are dependent on the (lack of) orthodontic experience of subjects. Previously treated male subjects indicated more often than females that they were criticized by the orthodontist for their dental situation. Treated female subjects more often remembered appointments with the orthodontists without the help of others than males. Although males and females with orthodontic experience scored differently for several items, these differences were small, indicating that both males and females in general have a positive attitude towards their experiences with orthodontic treatment.

Age was found to be a significant predictor of a subject's general attitude towards orthodontics. Although in previous studies the same result was found (Kelly *et al.*, 1990; DiMatteo *et al.*, 1995), it was not expected that in the present, homogeneous sample of freshmen,

age would be a significant factor contributing to previously treated subjects' attitudes towards orthodontics. However, older respondents were found to have a more positive general attitude towards orthodontics than younger subjects. A possible explanation for this may be that for younger subjects, the orthodontic experience may still be fresh in their memory and it may be that time will make them forget the negative aspects, and value the positive experiences higher.

The attitudes of previously treated subjects towards orthodontics in general were predicted by their satisfaction with the treatment result, by the way they perceived their relationship with the orthodontist, and by their attitude towards follow-up appointments. Attitude towards braces, treatment duration and compliance did not predict a subject's general attitude towards orthodontics, but these factors were significantly correlated with this general attitude, even though some correlations were rather low. Oral hygiene and diet did not contribute to a subject's general attitude towards orthodontics.

The results of this study thus indicate that the general attitude of subjects towards orthodontics is not predicted by any specific factor of orthodontic treatment, such as for instance the relationship with the orthodontist or satisfaction with the treatment result, but by a combination of these factors. The subjects who had undergone orthodontic treatment had a more positive attitude towards orthodontics than untreated subjects, but this attitude seems to be predicted by the orthodontic experience itself, and not by any specific aspect of the treatment.

Because the attitudes of treated and untreated subjects were measured with an amended version of the Dental Attitudes Questionnaire, the reliability of the scale may have been altered. However, the internal consistency of the questionnaire used in the present study was highly satisfactory.

The different attitudes towards orthodontics of previously treated compared with untreated subjects may, at least partially, be explained by cognitive dissonance. It has been suggested (Forssell *et al.*, 1998) that patients who after prolonged orthodontic treatment report that they are satisfied with treatment results, do so because they feel the need to justify what they have gone through. Although the subjects were fairly similar according to demographic characteristics, the treated subjects in the present study might have differed in their occlusal status from the untreated subjects. However, in a recent investigation in which previously treated and untreated individuals were compared (Lagerström *et al.*, 2000), generally, good occlusal conditions were observed in both groups. Therefore, it would appear that the differences found in this study must be ascribed to the (lack of) orthodontic experience of the subjects.

Whether the present findings will generalize beyond the current study population will have to be answered in a follow-up investigation. Furthermore, as the type of orthodontic treatment was not taken into account in the present study, it is recommended that in future studies the experiences of orthodontic patients undergoing different types of treatment should be analysed more specifically.

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