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Referral patterns of Dutch general dental practitioners to orthodontic specialists

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SUMMARY General dental practitioners (GDPs) act as gatekeepers for specialist dental care since they generally decide whether, when, and where to refer patients. It is important for orthodontists to understand the factors influencing the referral decision in order to be able to satisfy both the referring dentists and the patients. A specifically designed questionnaire was sent to a random sample of 634 GDPs in The Netherlands. In part A, general characteristics of the GDPs such as gender, years in practice, number of patients in the practice, possibilities to refer to an orthodontist, and number of patients referred to the orthodontist per year were collected. Part B assessed the importance of 20 various factors related to the GDPs' usual referral decision. Intraclass correlation coefficients (ICC) were calculated to assess the relationship in rank scores of the items of the various groups.

The response rate was 60 per cent. Most GDPs (38 per cent) had the possibility to refer to three to four orthodontists, 22 per cent could choose between five and six, and 21 per cent could refer to one or two. Most GDPs (55 per cent) actually referred to one to two orthodontic specialists, while 34 per cent choose between three and four orthodontists. The rank order of the items for male and female dentists was nearly equal (ICC = 0.99, $P < 0.001$). The most important factors governing the choice of an orthodontic treatment provider by GDPs were patient satisfaction, favourable experience in the past, and oral hygiene monitoring by the orthodontist.

Introduction

General dental practitioners (GDPs) act as gatekeepers for specialist dental care because they generally decide whether, when, and where to refer patients for specialist care. As such, they play a central role in the referral process. Therefore, both from the perspectives of practice business and healthcare resource allocation, dental specialists have to rely heavily on GDPs referring patients to them, in order to keep a balanced relationship between the demand and supply of specialist dental care. To be able to provide satisfactory services to both the referring dentists and the patients, specialists must understand the factors that are important in the GDP decision making to refer a specific patient to a particular specialist. This information provides the specialist with the opportunity to selectively improve their service and create a well-organized and flourishing practice on the one hand, and keep a balanced relationship between the demand and supply of specialist care on the other.

Research that has been carried out in the medical and dental field, with respect to the referral process concentrates on the question of what kind of patient is referred to a specialist (Coulthard *et al.*, 2000; Ree *et al.*, 2003; McQuistan *et al.*, 2006; Cottrel *et al.*, 2007). They pertain to questions such as 'When is the level of a case so difficult that the general practitioner refers a patient to a specialist with advanced knowledge and training?' For example, Ree *et al.* (2003) concluded in their study of the referral patterns for endodontic treatment that the major factors considered to be important for referring to an endodontist were the presence of an obstruction in the canal, followed by the presence of a perforation or resorption, and persistent signs and symptoms. The general impression from these studies is that the most common reasons for referral are the anticipated difficulty of the treatment and the medical compromise.

However, the reasons why referrals are made to a particular specialist are also important. Kennedy and McConnell (1993) investigated factors influencing the decisions of general practitioners' referrals to particular hospitals. Short waiting lists and personal knowledge of consultants' expertise were considered to be of particular importance in making referral decisions for non-urgent elective procedures. In addition, proximity of the hospital played a role. Mahon *et al.* (1993) concluded that overall, the most common influences on the choice of hospital were its proximity and convenience, knowledge of the consultant, the general standard of clinical care, the patient's own preference, and the patient's previous attendance at the hospital.

With respect to orthodontics, in the study by Walley *et al.* (1999) that was designed to identify who chooses an orthodontic office and what factors might induce the attraction, the results revealed that the reputation of the practitioner was most important along with the level of caring attitude the office projected. It was also important that the office was located near the patient's home. Interestingly, the mother was the most important decision maker in the family in choosing the orthodontic office. Furthermore, McComb *et al.* (1995) indicated that the most important factors governing the choice of orthodontic provider by the dentist were the length of the waiting list and the standard of treatment provided. Finally, Guymon *et al.* (1999) carried out a study concentrating on the criteria general dentists use to choose an orthodontist. After categorizing the responses with respect to cost, convenience, communication, reciprocation, quality, and relationships, they showed that quality was the most important factor in referring a patient to an orthodontist. The high quality of the orthodontic treatment result and overall patient satisfaction were highlighted as the most important factors in the referral decision in a recent study by Hall *et al.* (2009). In summary, a number of rather diverging professional and personal factors have been found to play a role in the process of referring to a specific specialist.

There have been no previous studies on the factors that may influence the decision to refer a patient for orthodontic treatment by GDPs in The Netherlands. Therefore, the aim of this study was to investigate current referral patterns of Dutch GDPs to orthodontic specialists and to assess factors influencing the GDPs' referral decisions to a specific orthodontist.

Materials and methods

A questionnaire was designed to investigate the factors that influenced the decision process to refer to a specific orthodontist. The material for this questionnaire was derived from the dental and medical literature with respect to studies about referral reasons from general medical practitioners or GDPs to specialists (Mahon *et al.*, 1993; McComb *et al.*, 1995; Guymon *et al.*, 1999; Walley *et al.*, 1999).

The questionnaire comprised two parts. In part A, general characteristics of the GDPs were collected, that is, gender, number of years in clinical practice, and number of patients in the practice. Furthermore, the GDPs were asked how many orthodontists they could refer to in their region, to how many they referred, and the mean number of patients they referred for orthodontic treatment per year. In addition, the same questions were asked about referring patients for orthodontic treatment to a GDP who conducts orthodontic treatment in their region. Finally, the number of patients the referring GDP treated orthodontically was assessed.

In part B, GDPs were asked to assess of 20 items to indicate to what level this item was applicable regarding their decision to refer to a specific orthodontist. The first version of part B was initially piloted among 15 GDPs who were not included in the main study. Their ideas were added to the material and the questionnaire was amended. Answers could be given on a scale from 1–4 (1 = not applicable at all and 4 = totally applicable). The items were based on six referral constructs, derived from the study by Guymon *et al.* (1999), with several questions for each construct (except for one construct which comprised only one item). These constructs were costs (one item), convenience (six items), communication (three items), reciprocation (three items), quality (four items), and relationships (three items).

A sample of 634 GDPs was randomly selected from the Dutch Dental Association (Nederlandse Maatschappij tot bevordering der Tandheelkunde, NMT) database. The gender, year of graduation, and region of the country that these GDPs practiced were known. The questionnaire was mailed to the GDPs with a stamped addressed return envelope. The option was given to send the questionnaire in the envelope or by e-mail. To encourage a response, a financial incentive for a continuing postgraduate education course at the Academic Centre for Dentistry Amsterdam was offered as a raffle prize for GDPs responding within eight weeks, only when a response rate of 60 per cent was reached at that time. A second questionnaire mailing to non-respondents was made one month later, followed by a third reminder 10 weeks later. All responses were treated anonymously but were coded with a number to enable the investigators to trace the responses for the follow-up letter.

Data analysis

Completed questionnaires were entered into a database prior to analysis (Statistical Package for Social Sciences 15.0 for Windows, SPSS Inc., Chicago, Illinois, USA). Differences between respondents and non-respondents were assessed by means of χ^2 tests. Next, the referral patterns were described and, where appropriate, tested with Wilcoxon signed rank tests. The order of importance of the items was assessed by ranking the items by their mean score. To assess whether the ranking of the importance of the items was comparable for different groups of dentists (male/female, number of years in clinical practice, and number of patients in practice), intraclass correlation coefficients (ICC) were calculated to assess the relationship in rank scores of the items of the various groups.

The next step was to determine whether the set of 20 items could be reduced to a meaningful set of underlying latent variables or constructs, based on both an explorative factor analysis (principal component analysis, PCA) and a confirmative factor analysis using LISREL 8.80 (linear structural relationships; Scientific Software International, Inc., Lincolnwood, Illinois, USA). Factor analysis is used in this type of questionnaire study to limit the number of

variables. The items of a questionnaire are combined into several so-called factors based on linear associations between the items. Depending on the distribution of the frequencies of the item scores (skewness and kurtosis), a correlation matrix based on Pearson correlation coefficients, or a polychorical correlation matrix, was used in the factor analyses.

Subsequently, in order to assess which constructs were the most important, analysis of variance (ANOVA) for repeated measures was used to compare the scale scores. Independent sample *t*-tests and one-way ANOVAs were used to determine whether the scale scores were related to gender, number of years in clinical practice, and number of patients in practice. A significance level of 5 per cent was used.

Results

Respondents

From the 634 questionnaires, 383 replies (60.4 per cent) were received (Figure 1). There was no statistically significant difference between respondents and non-respondents with respect to gender [$\chi^2 = 3.22$, degrees of freedom (df) = 1, $P = 0.073$] or year of graduation ($\chi^2 = 6.60$, df = 5, $P = 0.253$). There was, however, a difference with respect to region of the country ($\chi^2 = 18.33$, df = 8, $P = 0.019$). The response rate per region varied between 41.9 per cent (province of Flevoland) and 74.6 per cent (province of Noord-Brabant).

Incompletely filled-out questionnaires were discarded from the study ($n = 58$). Overall, 325 (85 per cent) respondents qualified for data collection and comparison. Using the data of these 325 respondents, there appeared to be a statistically significant difference in the year of graduation between the respondents and non-respondents ($\chi^2 = 21.32$, df = 5, $P = 0.001$). There were fewer respondents in the oldest age group in comparison with the complete respondent group. There was no difference between males and females ($\chi^2 = 3.38$, df = 1, $P = 0.066$) or between regions ($\chi^2 = 11.29$, df = 8, $P = 0.186$).

General information about referral for orthodontic treatment (part A questionnaire)

Of the respondents, 233 were male (71.7 per cent) and 92 were female (28.3 per cent). Table 1 shows the distribution of the number of years in clinical practice and the number of patients in the practice. Of the GDPs, 53.6 had fewer than 2500 patients in their office. Figure 2 shows the number of orthodontists and GDPs providing orthodontic treatment, who the GDPs could refer to in their region, and to how many orthodontists the GDPs actually referred. Wilcoxon signed rank tests showed that dentists actually referred to fewer treatment providers than were regionally available ($P < 0.001$). Furthermore, there were more orthodontists available than GDPs providing orthodontic treatment ($P < 0.001$) and dentists referred to more orthodontists than to other GDPs for orthodontic treatment ($P < 0.001$). Most GDPs (90 per cent) felt that they had sufficient possibilities to choose the orthodontist to whom they wished to refer. Figure 3 shows the number of patients referred for orthodontic treatment to orthodontists and GDPs providing orthodontic treatment, as well as the number of orthodontic patients treated by the GDPs themselves. More patients were referred to orthodontists than to GDPs providing orthodontics, than were orthodontically treated by the GDPs in their own practice ($P < 0.001$).

Factors related to referral (part B questionnaire)

The percentages of responses to factors related to the referral to a specific orthodontist are shown in Table 2. As can be seen, 'patients are satisfied' and 'favourable experiences in the past' were the most important factors. Table 3 shows the ranking of the importance of the items for the total group as well as for male and female GDPs. The rank order of the items of male and female GDPs was nearly equal and this was confirmed by an ICC of 0.99. The group was divided into three different periods of the GDP's time in clinical practice: 0–10 years, 11–20 years, and 21 years or more. The rank order of the items between these different groups was tested

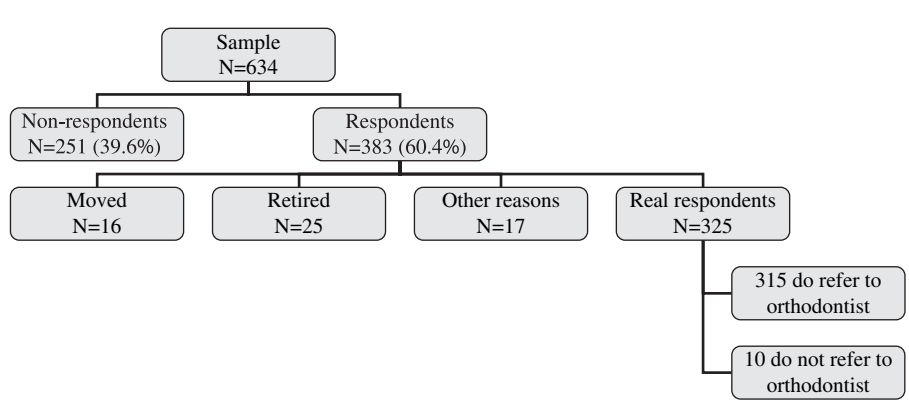

Figure 1 Flow chart of the respondents and non-respondents.

and found to be nearly equal (ICC = 0.98). The rank order between groups of GDPs with different numbers of patients was also the same (0–2500, 2500–4000, greater than 4000; ICC = 0.97).

For the next analyses, 315 GDPs were included, that is, all GDPs who actually referred patients to specialist orthodontists. The analyses of skewness and kurtosis showed that for all 20 items, either the ratio of skewness and standard error of the mean (skewness/SE), the ratio kurtosis/SE, or both were higher than 2. Therefore, for the confirmative and explorative factor analyses, a polychoric correlation matrix was used. Using a confirmative factor analysis, excluding the item 'fees of orthodontists are lower than the orthodontic fees of dentists', the five-factor model described in 'Materials and methods' was fitted. This model did not fit ($\chi^2 = 1119.96$, $P < 0.001$, goodness of fit index = 0.684, root mean square error of approximation = 0.159). Slight adjustments of the model also did not lead to a significant fit.

Table 1 Frequency distribution of years in practice, practice organization, and number of patients in the office.

	% General dental practitioners
Years in practice	
0–5 years	5.6
6–10 years	11.1
11–15 years	7.1
16–20 years	22.8
21–25 years	25.6
Greater than 26 years	27.8
Number of patients in the office	
Less than 1000	10.8
1000–2500	42.8
2500–4000	33.2
4000–5500	5.8
Greater than 5500	7.4

Next, a PCA was performed to reveal whether another underlying set of dimensions could be identified. The first explorative analysis (varimax rotation) extracted five factors with an eigenvalue higher than 1, explaining 60.3 per cent of the variance in the items. The fourth and fifth factors did not appear to be easily interpretable. Therefore, the analysis was repeated with a forced extraction of four factors. This resulted in a better interpreted solution, explaining 54.4 per cent of the variance. Only one item (fees of orthodontists are lower than the orthodontic fees of dentists) did not fit the factor with the highest factor loading of this item. Therefore, it was decided to exclude this item from calculating scale scores. If an oblique rotation method was used (direct oblimin), the same pattern occurred; thus, the results from the varimax rotation method are presented. The results are shown in Table 4.

The first factor was characterized by a mix of items, mostly of the original communication and quality constructs (items 1, 3, 5, 13, 15, 16, 17, and 18; Cronbach's alpha = 0.79). The second factor was characterized by a reciprocal relationship between the dentist and orthodontist (items 6, 8, 9, and 20; Cronbach's alpha = 0.60). The third factor concerned the proximity of the orthodontist and preference of the patient (items 2, 4, 7, and 19; Cronbach's alpha = 0.55) and the fourth factor concerned a small and efficiently working practice (items 10, 11, and 12; Cronbach's alpha = 0.63). Total scores were calculated by determining the mean score per factor. As stated above, one item, treatment fees, was not included in any of the scales.

The mean scores for the four scales are shown in Table 5. ANOVA for repeated measures with pairwise comparisons (Bonferroni) indicated that all means differed significantly ($F_{3, 307} = 385.94$, $P < 0.001$). Independent sample *t*-tests showed that female GDPs scored slightly higher [mean = 2.48, standard deviation (SD) = 0.57] than male GDPs (mean = 2.32, SD = 0.57) on the scale 'proximity of the

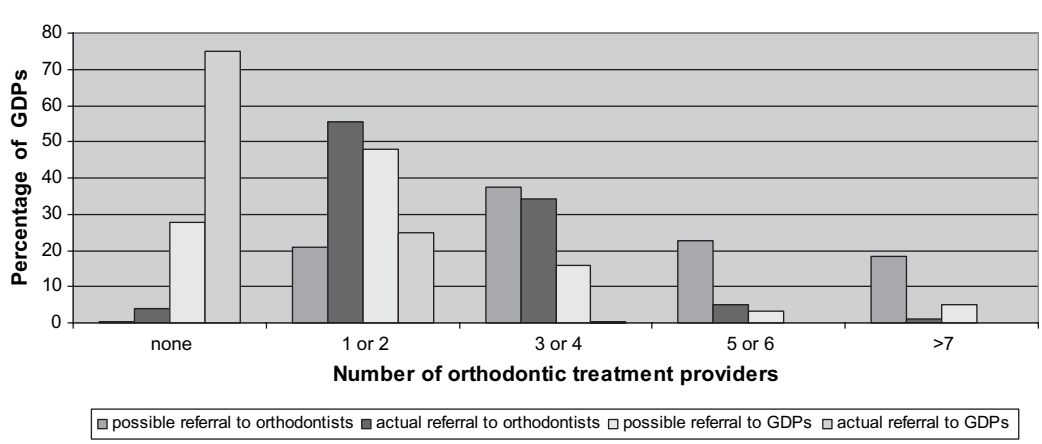

Figure 2 Possible and actual referral percentages to orthodontists and general dental practitioners providing orthodontic treatment.

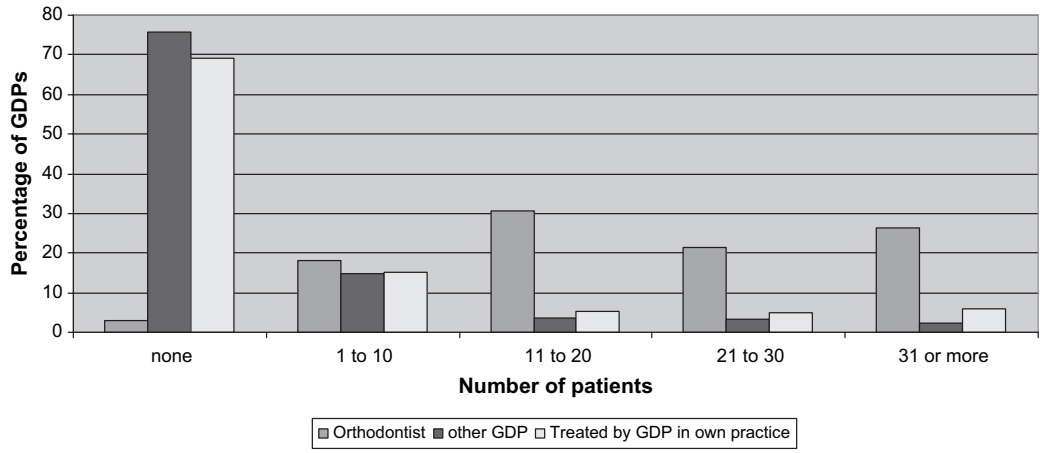

Figure 3 Number of patients referred per year to orthodontists and other general dental practitioners (GDPs) and the number of patients treated in the GDPs' own practice.

Table 2 Percentage of responses to factors related to the referral to a specific orthodontist.

	Items	Not applicable	Somewhat applicable	Applicable	Totally applicable
1	Easy to reach by telephone	25.0	38.5	28.8	7.7
2	Proximity to patient's school	13.8	34.6	40.4	11.2
3	Orthodontist is known personally to you	8.0	29.3	44.1	18.6
4	Proximity to own practice	29.9	46.0	19.0	5.1
5	Pays attention to oral hygiene	6.1	16.8	50.6	26.5
6	Expresses thanks for the referral	19.2	44.1	30.0	6.7
7	Proximity to patient's home	18.5	33.2	40.6	7.7
8	Orthodontist helps you with your orthodontic patients	69.7	16.5	10.4	3.4
9	Gives your patients priority on his/her waiting list	11.5	31.1	39.7	17.6
10	Small practice	51.9	38.4	8.1	1.6
11	No lengthy waiting list	18.4	31.4	40.8	9.4
12	Finishes cases quickly	29.8	51.0	15.4	3.8
13	Patients are satisfied	2.6	6.5	43.9	47.1
14	Fees of orthodontists are lower than the orthodontic fees of the dentists	71.0	24.4	2.9	1.6
15	Is nice to children	6.8	20.9	47.9	24.4
16	Agreement on extraction decisions	20.0	21.9	34.8	23.2
17	Favourable experience in the past	5.4	7.0	43.5	44.1
18	Gives information about the treatment plan very quickly	11.5	31.1	39.7	17.6
19	Patient prefers the orthodontist	13.8	28.8	40.7	16.7
20	Refers patients to you	64.2	25.6	7.0	3.2

orthodontist' and 'preference of the patient' ($t = -2.22$, df = 312, $P = 0.027$). There were no differences between male and female GDPs for the other scales. There was no difference between years in clinical practice (0–10 years, 11–20 years, greater than 20 years) in the scale scores, nor between number of patients in the practice (all $P > 0.05$).

Discussion

In the current study, 325 respondents qualified for data collection, representing a reasonable sample of Dutch GDPs. This study was conducted using a randomly selected group of Dutch practitioners from the database of the NMT. This database includes all registered dentists in The Netherlands. As a result, a percentage of this sample was not in active clinical practice because of retirement or other reasons and had to be excluded from this study. The final group of respondents appeared to differ from the non-respondents in year of graduation, most probably because the majority of the dropouts belonged to the group of retired dentists ($n = 25$). Although the final response rate is on the low side, it is in line with this type of questionnaire studies among GDPs. The response rate might have been higher if the incentive to respond, a cheque for a continuing postgraduate education course, was offered as a raffle prize for all GDPs responding, without a time limit. Overall, there seems to be no reason to doubt the validity of this sample.

Table 3 Responses to items based on the mean and standard deviation (SD).

Rank	Item	Total group		Male			Female		
		Mean	SD	Mean	SD	Rank	Mean	SD	Rank
1	Patients are satisfied	3.35	0.72	3.35	0.71	1	3.40	0.73	1
2	Favourable experiences in the past	3.26	0.81	3.21	0.84	2	3.33	0.81	2
3	Pays attention to oral hygiene	2.97	0.82	2.90	0.82	3	3.18	0.79	3
4	Is nice to children	2.90	0.85	2.89	0.84	4	2.93	0.90	4
5	Orthodontist is known personally to you	2.73	0.86	2.70	0.90	5	2.79	0.80	5
6	Gives information about the treatment plan very quick	2.63	0.90	2.61	0.91	6	2.71	0.90	8
7	Agreement on extraction decisions	2.61	1.05	2.56	1.03	7	2.76	1.11	7
8	Patient prefers the orthodontist	2.60	0.92	2.54	0.92	8	2.79	0.94	6
9	Proximity to patient's school	2.49	0.87	2.46	0.87	10	2.55	0.87	9
10	No lengthy waiting list	2.41	0.90	2.47	0.90	9	2.31	0.87	11
11	Proximity to patient's home	2.37	0.87	2.31	0.87	11	2.58	0.87	10
12	Expresses thanks for the referral	2.24	0.84	2.21	0.83	12	2.32	0.86	12
13	Easy to reach by telephone	2.19	0.90	2.15	0.87	13	2.30	0.97	13
14	Proximity to own practice	1.99	0.84	1.99	0.88	14	2.03	0.75	14
15	Finishes cases quickly	1.93	0.78	1.94	0.80	15	1.93	0.76	15
16	Gives your patients priority on his/her waiting list	1.77	0.93	1.75	0.91	16	1.83	1.00	16
17	Small practice	1.59	0.71	1.63	0.73	17	1.53	0.66	17
18	Refers patients to you	1.49	0.76	1.49	0.78	18	1.53	0.75	18
19	Orthodontist helps you with your orthodontic patients	1.47	0.81	1.48	0.78	19	1.48	0.91	19
20	Fees of orthodontists are lower than the orthodontic fees of the dentists	1.35	0.62	1.31	0.54	20	1.46	0.78	20

Table 4 Results of the principal component analysis based on a polychoric correlation matrix (varimax rotation, four factors forcedly extracted).

	Items	1	2	3	4
1	Easy to reach by telephone	**0.425**	0.296	0.093	0.143
2	Proximity to patient's school	0.073	−0.041	**0.684**	0.211
3	Orthodontist is known personally to you	**0.550**	0.460	0.081	−0.219
4	Proximity to own practice	0.103	0.446	**0.452**	−0.142
5	Pays attention to oral hygiene	**0.639**	0.194	0.243	−0.122
6	Expresses thanks for the referral	0.347	**0.559**	0.282	0.023
7	Proximity to patient's home	0.013	0.051	**0.826**	−0.034
8	Orthodontist helps you with your orthodontic patients	0.023	**0.693**	−0.200	0.127
9	Gives your patients priority on his/her waiting list	0.306	**0.577**	−0.177	0.263
10	Small practice	0.186	0.389	0.191	**0.614**
11	No lengthy waiting list	0.065	0.090	0.333	**0.671**
12	Finishes cases quickly	0.184	0.068	−0.063	**0.804**
13	Patients are satisfied	**0.748**	−0.067	0.018	0.282
14	Fees of orthodontists are lower than the orthodontic fees of the dentists	−0.111	**0.533**	0.120	0.432
15	Is nice to children	**0.717**	0.066	0.145	0.275
16	Agreement on extraction decisions	**0.722**	0.221	0.042	0.123
17	Favourable experiences in the past	**0.766**	−0.029	−0.284	−0.064
18	Gives information about the treatment plan very quick	**0.653**	0.203	0.080	0.075
19	Patient prefers the orthodontist	0.054	−0.047	**0.563**	0.158
20	Refers patients to you	0.223	**0.721**	0.048	0.100

The highest factor loadings per item are given in bold.

The results of the present study provide information about current referral patterns of Dutch GDPs to orthodontic specialists and factors influencing GDPs' referral decisions to a specific orthodontist. Although Dutch GDPs are allowed to undertake orthodontic treatment, dentists tend to refer their patients to specialists specifically trained for this work. However, given the recent development involving the fee difference for orthodontic treatment between orthodontist specialists and GDPs conducting orthodontic treatment (the fee being higher for the GDP than for the specialist as prescribed by the health authorities on the basis of the assumption of more efficient care delivery in the specialist practice), it is even more important for orthodontists to invest in the working relationship with GDPs in their region, although dentists did not seem to consider treatment fees in their decision to refer to a specific orthodontist. The item 'fees

Table 5 Means and standard deviations (SDs) for the subscales.

	Mean	SD	*N*
Communication and quality	2.84	0.54	310
Reciprocation	1.75	0.57	310
Efficiency	1.98	0.61	310
Proximity	2.36	0.57	310

of orthodontists are lower than the orthodontic fees of dentists' was rated as the least important.

Although the findings of this research do not support definitive statements about the factors that influence the GDP's choice of a particular orthodontist, they do help to give an insight. In this study, the major reason for referral was patient satisfaction. Other powerful factors in the decision to refer were favourable experiences in the past, attention to oral hygiene by the orthodontist, and the fact that the orthodontist is nice to patients. All these attributes belong to the construct 'communication and quality' and are in agreement with the findings of previous studies (Guymon *et al.*, 1999; Hall *et al.*, 2009). However, McComb *et al.* (1995) found that the most important factors governing the choice of a treatment provider were the length of the waiting list and the standard of treatment provided. In the present investigation, these specific factors were of moderate importance, possibly because of differences in treatment resource allocation in the countries from which these studies originate.

Items pertaining to the proximity of the orthodontist and preference of the patient were rated somewhat lower than those of communication and quality, but higher than items pertaining to a small and efficiently working practice and those regarding a reciprocal relationship between the dentist and orthodontist. An orthodontist striving for a better relationship with the referring GDPs in his or her region and aspiring for a higher number of referrals to their practice, might, for example, be well advised to train the practice personnel in communication skills. Items that ranked high pertain both to communication with the patient and with the referring GDP. The GDPs seem to appreciate when they are consulted and informed by the orthodontist. Patient satisfaction alone is also likely to be dependent on a good communicative relationship with the patient.

It is not entirely clear why GDPs only refer to one or two orthodontists when they have a choice of more. Possibly, this is a result of a subjective personal selection on the basis of the items assessed in the present study. Strictly speaking, these findings are applicable to countries with a similar structure and wide availability of specialist care delivery and cannot be unreservedly extrapolated to other European countries without third party payment for treatment. However, it is conceivable that the issues of quality of treatment and caring attitude in the specialist practice have an equally high rating in the referral decision irrespective of the financial basis of orthodontic treatment provision.

It was an explicit choice of the authors not to include 'quality of the treatment' or 'good treatment result' as items in the questionnaire. From comments of dentists in the questionnaire, it appeared that they do regard quality of treatment as an important factor. However, the concept of quality of treatment is too broad to capture with one item, whilst a good treatment result is the end goal of all orthodontic treatment. These items would not provide tools for improvement for the orthodontist; moreover, they raise the question of what a good treatment result actually is. Nevertheless, the importance of the quality of orthodontic treatment to the referring GDPs was highlighted in a recent investigation by Hall *et al.* (2009).

Conclusions

The findings of this study show that the most important factors governing the choice of an orthodontic treatment provider by GDPs were: patient satisfaction, favourable experience in the past, and oral hygiene monitoring by the orthodontist. Furthermore, these findings were consistent among different groups of GDPs.

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