Information-seeking behavior of adolescent orthodontic patients

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Introduction: Health-information-seeking behavior is the purposive search for health-related information. The literature contains few articles examining this behavior as it relates to orthodontics; therefore, the aim of this study was to investigate how adolescent orthodontic patients seek information about their treatment, why they search for this information, and how they prefer the information to be available. Methods: In-depth interviews were conducted with 15 subjects, 10 to 16 years old, who were considering orthodontic treatment. The purpose of the interviews was to identify themes that were then used to develop a questionnaire to investigate information-seeking behavior. The questionnaire was distributed to 50 adolescent orthodontic patients. Results: The main sources of information were talking to a dentist or an orthodontist (84%), talking to peers (66%), and reading information leaflets (64%). Surprisingly few respondents had used the Internet (8%). The preferred sources of information were talking to an orthodontist (26%) and family members (12%), followed by talking with the general dentist (10%), viewing a DVD (10%), or reading information leaflets (10%). Conclusions: The preferred method of obtaining information was verbal, followed by audiovisual and written. Audiovisual information could be beneficial for those who find reading difficult or who struggle to retain verbal information. Few patients accessed information via the Internet, and this was attributed to concerns about the reliability of the information. (Am J Orthod Dentofacial Orthop 2013;143:303-9)
allowed him or her to understand what to expect; therefore, this might reduce the fear of the unknown and also the anxiety level, stress, and pain.

Dental education has been shown to improve children’s knowledge and reduce concerns about treatment, all of which might impact on the patients’ compliance. Habibian et al. found that children who were undergoing orthodontic treatment often had little knowledge of their treatment. For a patient to provide a valid consent to treatment, he or she must be able to understand, have time to consider, and be able to ask questions about the nature, purpose, benefits, and risks of the procedures. Patients should also be able to retain the information they are given to prove that they have sufficient understanding of the procedures. Thomson et al. investigated retention of information in children and parents after an initial orthodontic consultation. Parents responded better to verbal information than did children, and it was suggested that verbal information given to children should be reinforced with either written or visual information. Patel et al. found that patients who received verbal information supplemented by audiovisual information had better retention of it than those who received verbal information supplemented by written information. However, a more recent study found that supplementing verbal information with written information had no effect on patient anxiety in orthodontic clinics.

Different methods of delivering information have been used in health care. Information leaflets are a popular method of supplementing information given by clinicians. However, health literacy can be a barrier to delivery of information; for those with low reading ability, including young patients, it might be time to move away from the traditional information leaflet and use a different method to provide information. The aim of this study was to investigate how adolescent orthodontic patients find information about orthodontic treatment, why they search for this information, and how they prefer the information to be made available.

**MATERIAL AND METHODS**

Ethical approval was granted, and written parental consent and patient assent were obtained. For parts 1 and 2 of the study, patients were included if they were aged between 10 and 16 years, willing to participate in the study, accompanied by a parent or legal guardian who consented to their inclusion, and either had not started treatment or were within 8 weeks of starting fixed appliance treatment. Patients were excluded if they were receiving multidisciplinary treatment, had undergone a previous course of fixed appliance treatment, or were receiving only removable appliance or headgear treatment. A sample size calculation was not appropriate because this study was investigating patients’ opinions, and no hypothesis was being tested. The study was conducted in 2 stages: part 1 used qualitative methods to investigate information-seeking behavior and develop a patient-centered questionnaire, and part 2 involved piloting and distributing the questionnaire.

In part 1, in-depth semistructured interviews were conducted with 15 patients who had not yet begun treatment (6 girls, 9 boys; mean age, 12.9 years) to collect qualitative data and identify themes that could be used to develop a patient-centered questionnaire. Face-to-face interviews were undertaken by 1 researcher (R.S.) in a nonclinical area; the interviewer was a qualified dentist in an orthodontic graduate training program. Interview training was provided by the other researchers (S.J.C. and F.S.R.); both were experienced interviewers who had previously received in-depth interviewer training. The techniques involved were covered over a series of training sessions; 5 practice interviews were then undertaken before the study, and detailed feedback was provided after each interview.

All interviews were recorded and transcribed verbatim into Word format (Microsoft, Redmond, Wash) by the interviewer immediately afterward. A topic guide was used during the interviews, but themes and concepts that arose during the interviews that were relevant to the research question but not in the guide were also fully explored. Interviews were carried out informally with no time pressure, and the interview ended when the patient had no further comments and all relevant topics had been explored. The interviews continued until no new themes arose.

The interviews were analyzed by using content analysis whereby the researcher read the transcripts several times, and sections of the interviews were coded into themes and subthemes. A framework approach, developed by the National Centre for Social Research, was used to manage the data from the interviews. This involved creating a separate workbook in Excel (Microsoft) for each main theme and summarizing the transcripts into the spreadsheet. The columns represented subthemes, and the rows represented each patient; quotes from the interviews were placed in the relevant cells. Using the framework spreadsheet made it easier to visualize interrelationships among the data and to order the subthemes.

The questionnaire was developed, following the principles defined by Williams, from the themes identified in the framework analysis. This process was undertaken by all 3 researchers, 2 of whom were senior clinicians experienced in qualitative research and development of patient-centered questionnaires. The questionnaire was divided into sections that represented the main themes identified in the framework spreadsheet. Most
questions had a list of possible responses to choose from, and these were generated from analysis of the interviews. Each participant was allowed to provide additional information after each section, in case his or her views were not included.

The questionnaire was pilot tested on 8 patients to assess its readability and acceptability, and they were asked to make suggestions for improvement. The readability of the questionnaire was assessed by using the Flesch Reading Ease test. Minor changes were made after this: eg, printing the instructions in bold and using duplex printing. The questionnaire is reproduced in the Appendix.

The questionnaire was then distributed in person to 50 patients at the Eastman Dental Hospital’s Orthodontic Department of the University College London Hospitals Foundation Trust in London, United Kingdom, as they attended a routine appointment. The patients either had not started treatment or were within 8 weeks of commencing treatment, as described in the inclusion criteria. They were asked to complete the questionnaire in the department immediately after their appointment, although 1 patient returned the questionnaire by post.

RESULTS

For part 1, questionnaire development, 15 patient interviews were undertaken; the content analysis identified 7 main themes (Fig 1); within each main theme, there were a number of subthemes. The questionnaire was also divided into 7 sections representing the main themes identified, and a section for demographics was also included.

1. Information needs: what patients wanted to know and any anxieties or concerns regarding forthcoming treatment.

2. Written information: if, how, and why patients obtained information in this format.

3. Verbal information: if, how, and why patients obtained information in this format.

4. The World Wide Web: investigated patients’ usual Internet activity, how they use the Internet to search for information, and their concerns regarding the reliability of information on the Internet.

5. Patients’ attitudes toward the media.

6. Patients’ attitudes toward audiovisual information.

7. Preferred source: patients were asked to specify their single preferred method for receiving information about orthodontic treatment.

For part 2, in the pilot study, the questionnaire took an average of 15 minutes to complete (range, 11-18 minutes), and the Flesch Reading Ease score of the questionnaire was 84.8, which corresponds to a reading age of approximately 10 years.

The results of the questionnaire are presented according to the themes from the framework analysis. Fifty-five patients were approached, but 5 patients or their parents refused to participate, giving a response of 91%. Fifty patients completed the questionnaire; 62% were female, and 38% were male. The average age was 12.6 years (SD, 1.5 years).

The second section enquired how patients found information about orthodontics and what they wanted to know about wearing an appliance. Most patients (84%) said that they had found information about their future treatment by talking to the family dentist or an orthodontist. Over half of patients also obtained information by talking to friends (66%) and parents (60%), and from reading an information leaflet (64%). Fewer patients had talked to other family members (28%), siblings (20%), watched television (10%), or looked on the Internet (8%) for information. Most patients wanted to know whether having a brace fitted hurts (66%), how to brush their teeth once a brace had been fitted (66%), and whether it would affect their eating (50%) or speech (46%). Some patients wanted to know exactly how a brace was fitted (36%), whether a drill would be used (32%), and whether they would be awake during this procedure (24%). Forty percent of the patients also wanted to know how a brace would be taken off (Fig 2).

Sixty-two percent of the patients had read the information leaflet that is routinely sent with their initial appointment letter. They thought that information leaflets were generally useful because they explained what would happen (78%) and gave advice (56%). Almost half of the respondents thought that the leaflets were easy to read (48%), showed how orthodontics could help them (44%), and answered their questions (42%).

![Fig 1. Main themes identified from the patient interviews in part 1 of the study.](image-url)
The main perceived disadvantages of information leaflets were that patients lost them (40%), that they did not understand the technical language used (18%), and that they did not have time to read the leaflet (16%). The most popular suggestions for improving information leaflets were to make leaflets for different age groups (62%), to give more information on how braces are fitted (56%), and to include information about useful Web sites (44%). Some respondents said that they did not like the photographs and would prefer cartoon images or a combination of cartoons and photographs in the leaflets. A chi-square test showed no difference in the preference for photographs or a combination of cartoons and photographs between the different age groups.

The fourth section of the questionnaire asked patients whom they would approach if they wanted to discuss orthodontic treatment. The majority said they would prefer to talk to their orthodontist (46%), followed by their parents (32%), friends (16%), and siblings (12%).

The section regarding the Internet showed that patients used it either every day (64%) or at least once or twice a week (26%). Nearly all patients used the Internet for homework (92%), and the next most popular activity was social networking (76%). However, only a few patients (8%) said that they had used the Internet to look for orthodontic-related information. Most patients said they would use Google (Mountain View, Calif) (90%) for information about their treatment, and 96% said they would use the word “braces” as the primary search term. Only 2 patients said they would search using “orthodontist,” and 1 patient would search for “orthodontics.”

Mobile phone applications were not commonly used; few patients (3%) had seen a phone application about orthodontics. However, almost half (48%) thought a DVD would be useful because it could show how appliances are put on and would be interesting to watch. The main perceived advantages of watching a DVD were to see what would happen in future appointments (82%) and to gain information about orthodontic treatment (72%). Over a third of the respondents (36%) thought that watching a DVD on braces would make them feel less nervous about their future treatment.

The final section of the questionnaire asked patients to select their single preferred method for receiving information about orthodontics (Fig 3). The overall preferred method was verbal information: talking to an orthodontist (26%), followed by talking to family members (12%) or their own dentist (10%). A DVD (10%) and information leaflets (10%) were the next favored sources...
of information. Interestingly, the Internet was selected by only 4% of the patients.

**DISCUSSION**

Qualitative research aims to develop concepts to understand people’s behavior in the natural setting; it is a method of collecting valuable data that are impossible to obtain with quantitative methods. The main advantage of in-depth interviews is that the participant might feel more relaxed and confident because it is a 1-to-1 conversation; therefore, this might encourage participants to express their thoughts more readily. The disadvantages are that appropriate training is needed to develop a good interview technique, and there is a risk of introducing bias in the interviews. Part 1 of this study used 1-to-1 semistructured in-depth interviews to investigate patients’ perspectives on the subject, and detailed information came from a few patients. A large sample was not required because in-depth interviews provide much useful information if the data are analyzed appropriately. In this study, 15 patients were interviewed; by that time, no new themes or concepts arose, and content analysis was used to analyze the information provided. This is a particularly useful technique to inform the development of a questionnaire, since it looks at the most common themes, which can then be used in the final questionnaire. The content analysis identified 7 main themes regarding information-seeking behavior; these themes were used to develop the questionnaire to enable more data to be collected and therefore generate trends.

The questionnaire was judged to have adequate content validity because it was developed in a robust manner from themes identified in the patient interviews, and all response options included in the questionnaire were generated from the interviews. The questionnaire was also reviewed by orthodontists in the department, the ethics committee, and the 8 patients who took part in the pilot study; these reviews contributed to the face validity. Triangulation was carried out informally; data from the questionnaire were compared with findings from the interviews and identified the same trends.

The most commonly used methods for obtaining information were talking to an orthodontist, talking to friends, and reading information leaflets. This is probably because patients use information that is easy to access; this highlights the importance of making information readily available. Surprisingly, fewer patients than expected had sought information from the Internet, even though many of them (64%) used the Internet every day. This might be because specific Web sites are not routinely recommended to patients in the hospital where the study was undertaken, but some patients also highlighted concerns over the reliability of information on the Internet. Health information is increasingly delivered via the Internet because it can be provided to many people at minimum cost; it is convenient for the user and also allows the video transmission. However, patients should be cautious when obtaining information on orthodontic treatment from the Internet, since they could view Web sites that rank highly on a particular search.
engine list but do not necessarily provide high-quality information.\textsuperscript{19} Most patients said they would use the Google search engine to find information about orthodontics, and nearly all patients stated that they would use “braces” as the primary search term. Currently, many reliable orthodontic Web sites (eg, American Association of Orthodontists and British Orthodontic Society) only rank highly when the search term “orthodontics” is used. This highlights the importance of reliable orthodontic Web sites appearing high on the rankings when searching with “braces” and other patient-friendly terms, and this would be a recommendation for national societies in the future.

The majority of patients use social networking sites (76%); therefore, these routes could be used for delivering orthodontic information to adolescents in the future to improve access to high-quality and reliable information.

The information that patients most commonly wanted to know related to how an appliance is fitted and whether this process hurts, how to clean their teeth once the appliances are on, and how this might affect their diet and speech. This information is routinely given verbally, but these findings suggest that patients do not retain all of this information. Parents are likely to remember more verbal information than adolescents; therefore, verbal information should be given to the parent as well as to the patient.\textsuperscript{11} In addition, patients and parents should be encouraged to obtain information from secondary sources—eg, leaflets, DVDs, and the Internet—to enhance their knowledge and understanding.

Information leaflets were read by many patients, and sending them with the initial appointment might encourage patients to read them. However, we noted during the questionnaire distribution that a few parents and children could not easily read the information leaflets and required them to be read by the researchers. For people with low literacy levels this can be a barrier to receiving appropriate information; this means that certain groups of patients and parents do not currently benefit from this mode of information.\textsuperscript{20} Some patients thought that the leaflets lacked information on how a brace is fitted, and they were unsure what instruments would be used. Surprisingly, some patients were also unsure whether they would be awake when having fixed appliances fitted. These patients were in the 10- to 11-year age group, so they were perhaps less likely to have obtained information from their peers compared with older patients. These uncertainties might contribute to anxiety in some patients, especially before having fixed appliances placed; therefore, audiovisual information such as a DVD or an online video would be beneficial to provide a visual explanation of the procedures. It would also be a useful adjunct to verbal or written information given by clinicians and might benefit patients with language barriers or low reading ability who find that information leaflets are difficult to read.

This study suggests that orthodontic information leaflets might not be appropriately tailored to all adolescent patients. Some thought that the photographs were useful and gave a realistic image of orthodontic appliances. However, others said that the photographs made them feel nervous and they would prefer cartoon images. Information leaflets could be improved by having different formats for different age groups or even producing individualized leaflets. In addition, reputable Web sites could be clearly recommended in the leaflets to help patients find further information if desired.

The preferred method for obtaining information was talking to an orthodontist (26%), presumably because patients believe that they have the greatest knowledge about orthodontic treatment. However, educating parents is important, because many children are also likely to seek further information from their family. It is important that parents are also directed to accessible and reliable information to aid their understanding of their child’s treatment. This will enable them to reassure their child with confidence if the child is anxious or has uncertainties about the orthodontic treatment. These findings might vary in different settings; however, they illustrate the importance that all clinicians should provide information in the most appropriate way for their patients.

\textbf{CONCLUSIONS}

1. Patients used a variety of methods to find information about orthodontic treatment, including talking to their dentist or orthodontist and reading information leaflets.

2. The Internet was not used as frequently as had been expected. However, most patients used the Internet for social networking; therefore, these routes should be used to provide information. Reliable orthodontic Web sites should also ensure that they rank highly on search engine listings.

3. The preferred modes of information provision were verbal, followed by audiovisual and written. Audiovisual information, to supplement verbal information, could be beneficial for those who find information leaflets difficult to read.

4. Adolescent patients felt that they lacked information on some aspects of orthodontic treatment. A DVD or a YouTube (Google) link to a site covering some of these aspects might improve understanding and reduce anxiety in some patients.
We thank all participants who gave their time so freely.

SUPPLEMENTARY DATA

Supplementary data related to this article can be found in the online version at http://dx.doi.org/10.1016/j.ajodo.2012.10.018.

REFERENCES