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Patient-reported experience and outcomes from orthodontic treatment

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Contribution of authors

Sophy Barber and Elizabeth Bradley were responsible for the design and conduct of the research, gaining ethical approval, site set up, data collection, analysis and interpretation, and drafting, review and completion of the manuscript.

Andrew Shelton and Trevor Hodge provided feedback on the research design, participated in site set up and data collection, and reviewed the final manuscript.

David Morris, Hilary Bekker and Steven Fletcher provided the data collection tool and reviewed the final manuscript.

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Abstract

Background: Orthodontic treatment aims to address negative psychological, social and physical effects of malocclusion. Patient-reported experience and outcome measures are important for assessing the quality of care.

Aim: To measure patient-reported impact of orthodontic treatment in terms of pre-treatment concerns, treatment experience and treatment outcome.

Population: NHS orthodontic patients (12+ years) who have completed comprehensive orthodontic treatment, excluding orthognathic surgery and craniofacial anomalies.

Setting: Four sites in Yorkshire including two secondary care settings (Leeds Dental Institute and St Luke's Hospital, Bradford) and two specialist orthodontic practices.

Design: Cross-sectional descriptive survey.

Methods: Participants were opportunistically identified by the direct clinical care team during scheduled appointments and those eligible were invited to participate. Data was collected using the Orthodontic Patient Treatment Impact Questionnaire (OPTIQ), a validated 12-item measure with questions relating to pre-treatment experience, impact of treatment and outcome from treatment.

Results: Completed questionnaires for analysis included 120 from primary care and 83 from secondary care. The most common pre-treatment concerns were alignment (89%) and being embarrassed to smile (63%). The most common expectations from orthodontic treatment were improved confidence to eat (87%) and smile in front of others (72%), improved appearance of teeth (85%) and reduced teasing/bullying (63%). Only 67% respondents recalled receiving written information and lowest recall related to retainer type and length of retention. The most commonly reported complications were sore mouth (68%), fixed appliance breakage (61%) and gingivitis (39%). Treatment caused greatest impact in relation to pain, limitations in eating and effect on speech. Overall satisfaction with orthodontic treatment was reported by 96% of respondents, 87% would have orthodontic treatment again if needed, and 91% would recommend treatment to a friend.

Conclusions: The OPTIQ is a useful patient-reported tool to identify pre-treatment concerns and expectations, treatment experience and outcome. Orthodontic treatment leads to high levels of satisfaction.

Key words: orthodontic treatment, patient-reported, concerns, experience, outcome, satisfaction, impact

Background

Untreated malocclusion has been shown to cause negative psychological, social and physical impacts that can cause a reduction in oral health-related quality of life¹. Orthodontic treatment aims to improve the appearance and function of teeth, improve psychosocial wellbeing and reduce the risk of future problems that may arise from malocclusion, such as tooth wear, gingival problems and pathology associated with impacted teeth². Orthodontic treatment accounts for approximately a tenth of the NHS dental primary care budget in England, which was £3.4 billion in 2015-16³, yet still the demand for orthodontic treatment exceeds provision. The 2013 Child Dental Health Survey found 9% of 12-year olds and 18% of 15-years old were undergoing orthodontic treatment, but a further 37% and 20% of 12- and 15-years olds respectively were judged to be in need of orthodontic treatment⁴.

Patient-reported experience measures (PREMs) and patient-reported outcome measures (PROMs) are important for assessing quality of care⁵. PROMs contribute the evaluation of the effectiveness and safety of care from a patient perspective, while PREMs provide information about the process of receiving care⁶. Patient satisfaction is a commonly used patient measure; however, satisfaction has been found have a limited ability for discriminating between parts of care and a ceiling effect that can mask negative experiences within care⁷. In this study, an orthodontic-specific patient-reported tool was used to examine pre-treatment concerns, treatment experience and treatment outcome, with the ambition of identifying areas for service improvement.

Aim

To measure patient-reported impact of NHS orthodontic treatment in primary and secondary care settings. Impact was measured in terms of pre-treatment concerns, treatment experience and treatment outcome.

Design

Cross-sectional descriptive survey using a validated questionnaire with post-treatment orthodontic patients in primary and secondary care.

Setting

Respondents were recruited from four NHS sites in Yorkshire including two secondary care settings (Leeds Dental Institute and St Luke's Hospital, Bradford) and two specialist orthodontic practices. These sites cover a diverse urban and rural population and were selected to provide a varied sample. Staff providing orthodontic treatment at the sites included Consultant Orthodontists, Specialist Orthodontists, Specialty Trainees and Orthodontic Therapists.

Population

The study population included orthodontic patients aged 12 years and older who had completed NHS orthodontic treatment and were in orthodontic retention. Respondents were required to be able to read English and younger participants were invited to complete the questionnaire with parental help. Orthognathic patients and those with cleft lip and/or palate and craniofacial anomalies were excluded because the measurement tool was not developed for this group so it may not be able to accurately capture their treatment experience.

Materials and Methods

Ethical approval was granted by Yorkshire and Humber Research Ethics Committee on 26th April 2018 and from the Health Research Authority on 30th April 2018 (18/YH/0161). Local approval was granted by each participating site.

Participants were opportunistically identified by the direct clinical care team during scheduled appointments. All patients who attended for a retainer review were screened against the eligibility criteria and those who were appropriate were invited to participate. Verbal and written information about the research was provided at the start of the appointment. Those who agreed to participate were given a questionnaire at the end of their appointment to complete in the waiting room and return to a sealed box.

Data was collected using the Orthodontic Patient Treatment Impact Questionnaire (OPTIQ). The OPTIQ contains 12-questions in three sections relating to pre-treatment experience, impact of treatment and outcome from treatment (Supplemental Table 1). Development of the OPTIQ involved focus groups with 12 pre-orthodontic treatment patients (eight aged <16 years and four aged ≥16 years) and 12 post-orthodontic treatment patients (seven aged <16 years and five aged ≥16 years) to develop a preliminary questionnaire, which was then piloted with ten post-treatment orthodontic patients of all ages⁸. The final questionnaire has been psychometrically tested and validated for the target population of this study⁹.

Consent was implied by completion of the questionnaire and participants were advised to leave the questionnaire blank if they did not want to participate. Instructions for survey completion were given at the start. Basic demographic information was collected at the end of the survey (gender, age, ethnicity, first language, level of education, location of treatment and source of referral). No personal data was collected. Due to the number of sites and clinicians involved in recruitment, it was not possible to accurately record the number of people approached to participate.

Questionnaires were collected at the end of each week and returned to one researcher for collation (EB). Questionnaires were assigned a study identification number and responses were transferred into Microsoft Excel 2011 v14.7.7. Data was reported descriptively in terms of respondent demographics and patient-reported pre-treatment concerns, recall of information provision, treatment experience and outcome from treatment. At the time of the study there was no validated system for converting ratings given by respondents into a meaningful score, so responses are reported descriptively as categorical data. The effect of age groups (12-15 years, 16-17 years, 18+ years) and care setting (primary/secondary) on pre-treatment concerns, treatment experience and outcome were examined for similarity in trends.

Results

Data was collected between July 2018-January 2019. In total, 215 questionnaires were returned, of which 203 were complete and included in analysis. The characteristics of the sample are given in Table 1. The respondents included 120 from primary care and 83 from secondary care. No differences in characteristics were found between the respondents from different care settings.

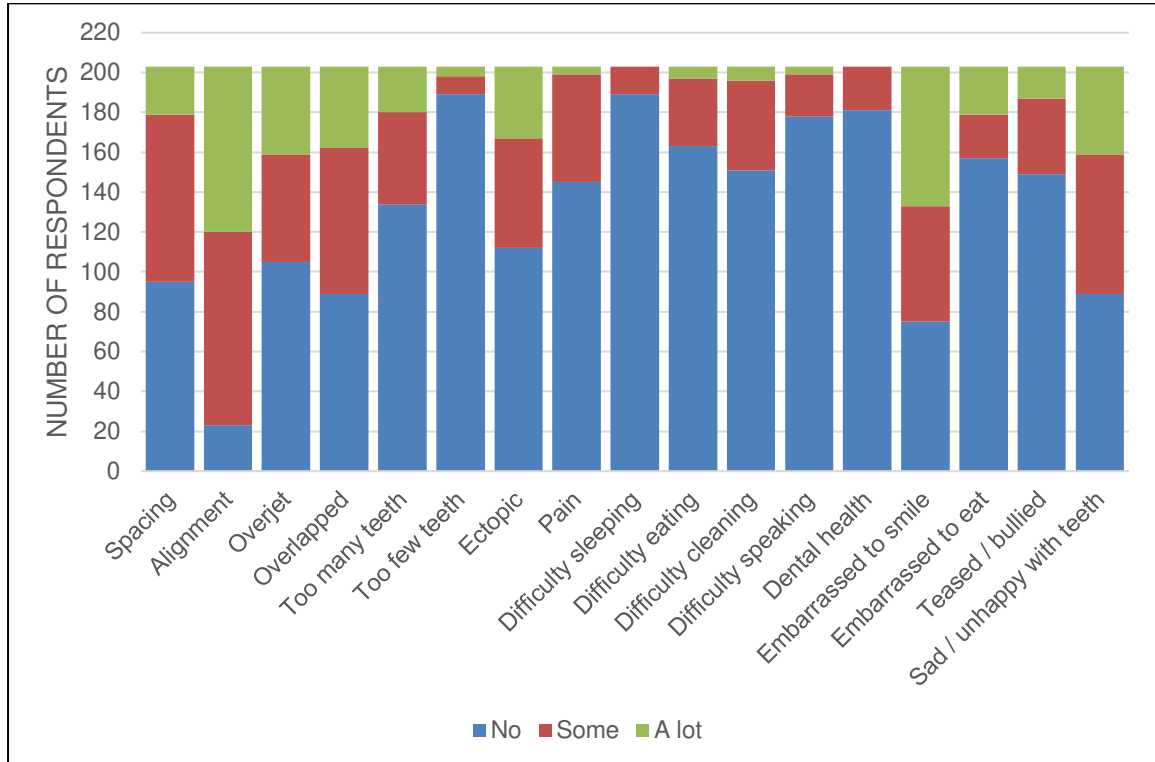
Table 1: Characteristics of sample (*may have answered in more than one category)

Age	12-15y	49	First language	English	186
	16-17y	80		Other	12
	>18y	68		Not reported	5
	Not reported	6		Education	At school
Gender	Male	68	GCSE		64
	Female	130	A-level		59
	Not reported	5	Degree		10
Ethnicity	White/mixed	141	Higher degree		6
	Asian/mixed	41	Not reported		7
	Black/mixed	14	Source of referral*	Dentist	174
	Chinese	0		Parent	16
	Not reported	7		Patient	17

Pre-treatment concerns and expectations

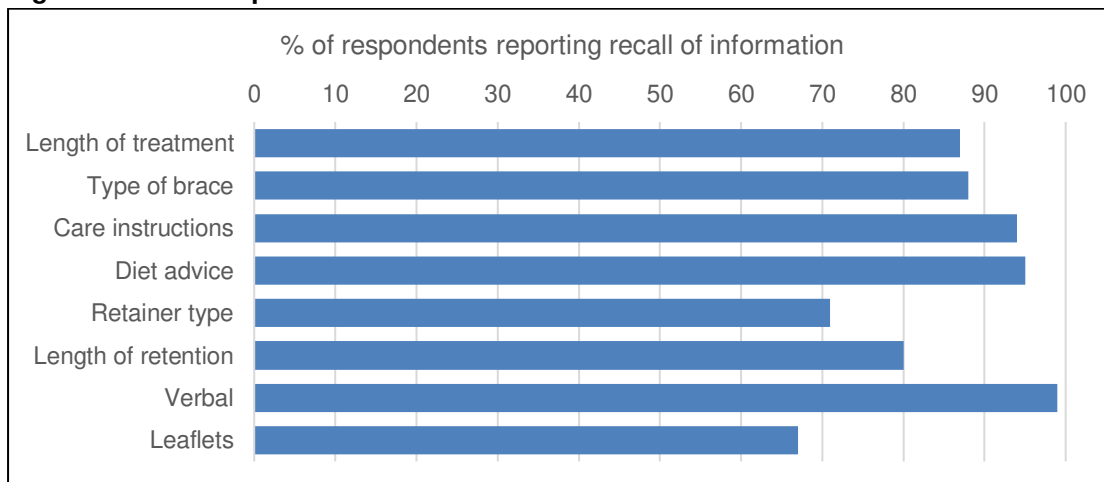
The frequency of self-reported pre-treatment concerns are summarised in Figure 1. The most commonly reported pre-treatment concerns were alignment of the teeth (41% 'a lot' and 48% 'a bit') and being embarrassed to smile (34% 'a lot' and 29% 'a bit'), followed by overjet (22% 'a lot' and 27% 'a bit') and being sad or unhappy with teeth (22% 'a lot' and 34% 'a little'). The least reported concerns related to functional issues (speech, sleeping and eating), dental health and ability to clean, and missing teeth. One respondent reported no pre-treatment concerns. Similar trends were seen in patient-reported pre-treatment concerns across age groups and care setting (Supplemental Figure 1). A higher proportion of patients in primary care reported overlapped and ectopic teeth.

The most common expectations from orthodontic treatment were improved confidence to eat (87%) and smile in front of others (72%), improved the appearance of the teeth (85%) and reduced teasing or bullying (63%). Over half (57%) of respondents thought treatment would make brushing easier. Similar trends were seen across age groups and care setting (Supplemental Figure 2). Additional comments made by some respondents about their pre-treatment problems and motivation for treatment are given in Supplemental Table 2.

Figure 1: Patient-reported pre-treatment concerns

Recall of pre-treatment information

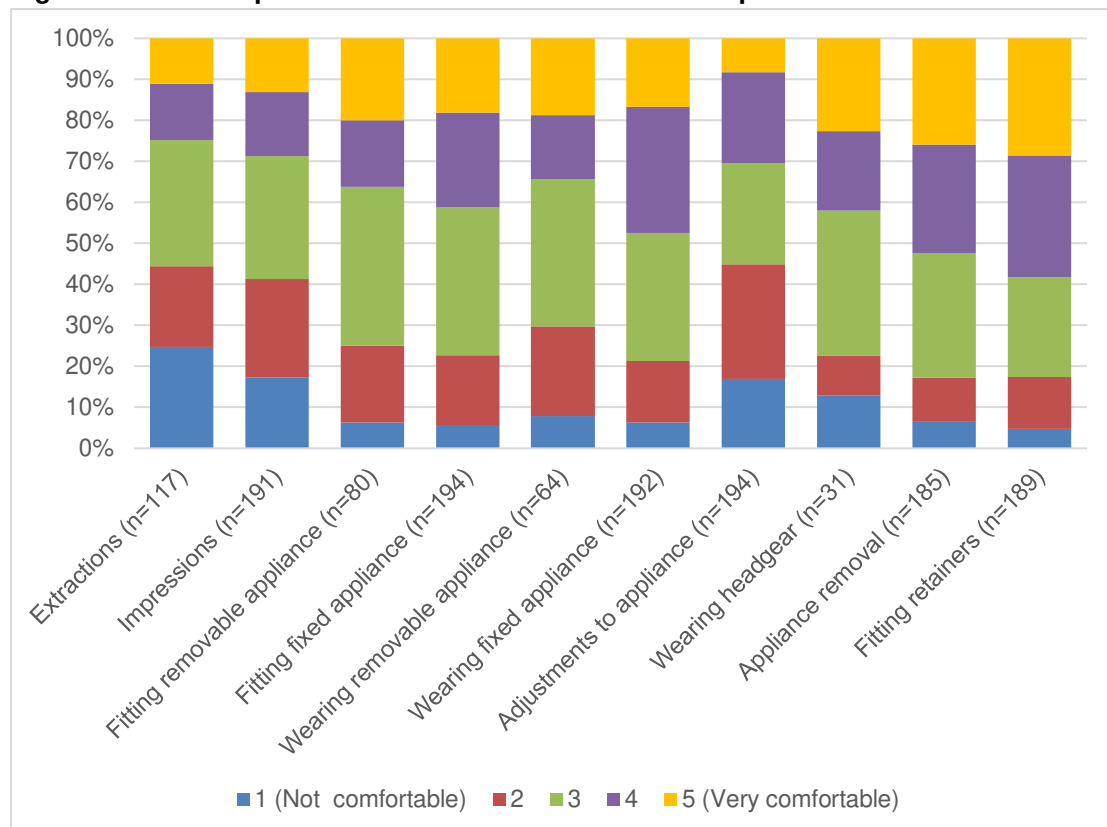
Patient-reported recall of pre-treatment information provision is shown in Figure 2. Nearly all respondents remembered receiving verbal information while only 67% recalled written information. Greatest recall of pre-treatment information related to oral hygiene and diet advice. Retention was the area with lowest recall, with 71% recalling being told about retainer type and 80% about length of retention. Generally, adults had higher recall of being given information and leaflets were more commonly given in secondary care (Supplemental Figure 2). A higher proportion of patients from primary care recalled being told the length of treatment but fewer recalled discussing retainer type.

Figure 2: Patient-reported recall and source of information

Treatment experience

Questions relating to the comfort of procedures identified that extraction was the least comfortable, followed by adjustments to the appliance and impressions. Appliance removal and retainer fit were the most comfortable procedures (Figure 3). Examination of differences between age groups suggested adults found extractions more uncomfortable than young but wearing removable and fixed appliances less uncomfortable compared to young people, while children (<16 years) found removable appliances and headgear more uncomfortable than older adolescents and adults (Supplemental Figure 4). There were apparent differences in discomfort ratings between care settings, with a lower proportion of secondary care respondents generally rating procedures as uncomfortable.

Figure 3: Patient-reported level of comfort of orthodontic procedures

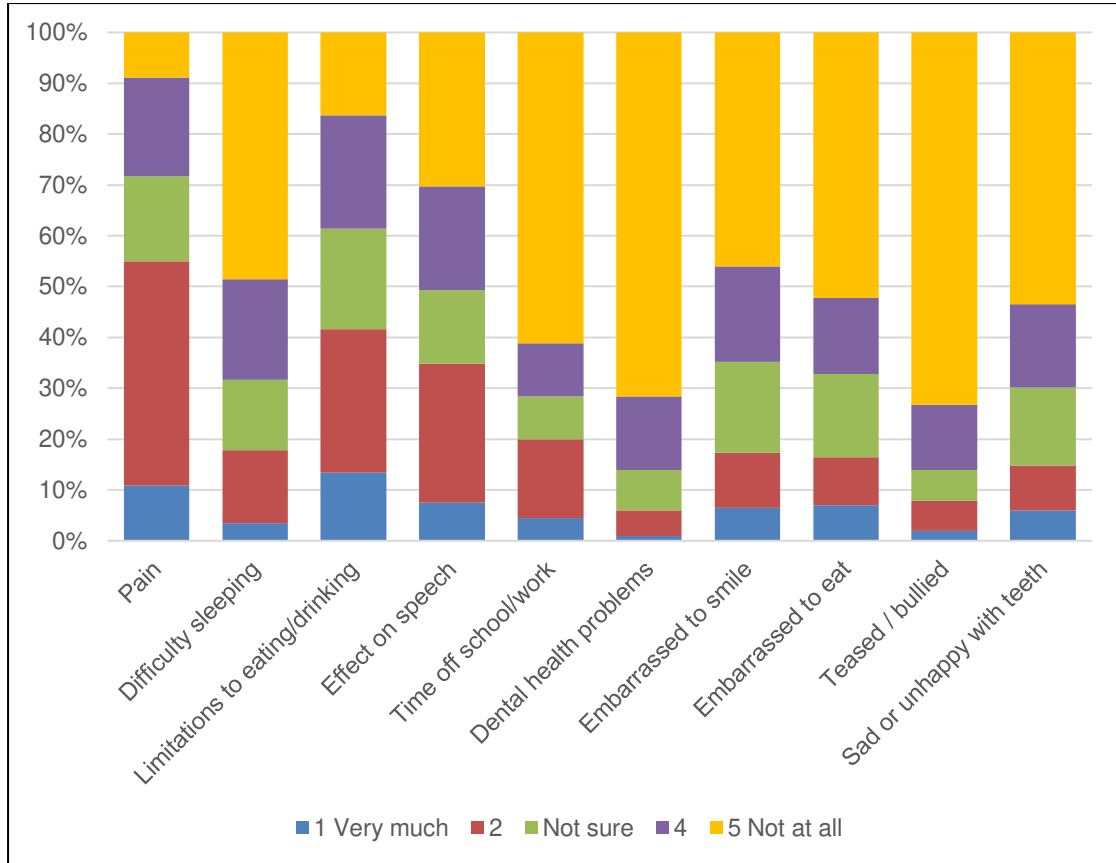


The most commonly reported complications related to orthodontic treatment were sore mouth (68%), fixed appliance breakage (61%) and gingivitis (39%). Impressions were repeated at the start and end of treatment for 17% and 14% respondents respectively. Retainer breakage was reported by 17% respondents. Trends in complications between age groups and care settings were generally similar (Supplemental Figure 5).

The impact during treatment on respondents' daily life is summarised in Figure 4. Treatment caused greatest impact in relation to pain, limitations in eating and effect on speech. Least impact was seen in relation to dental health, being teased or bullied, psychosocial wellbeing domains and time off school. Difference in trends were observed by age group, with children reporting greater relative impact on speech, while older adolescents reported greater impact on pain and sleeping. Adults reported more impact on time off work or school than other groups. (Supplemental Figure 5a).

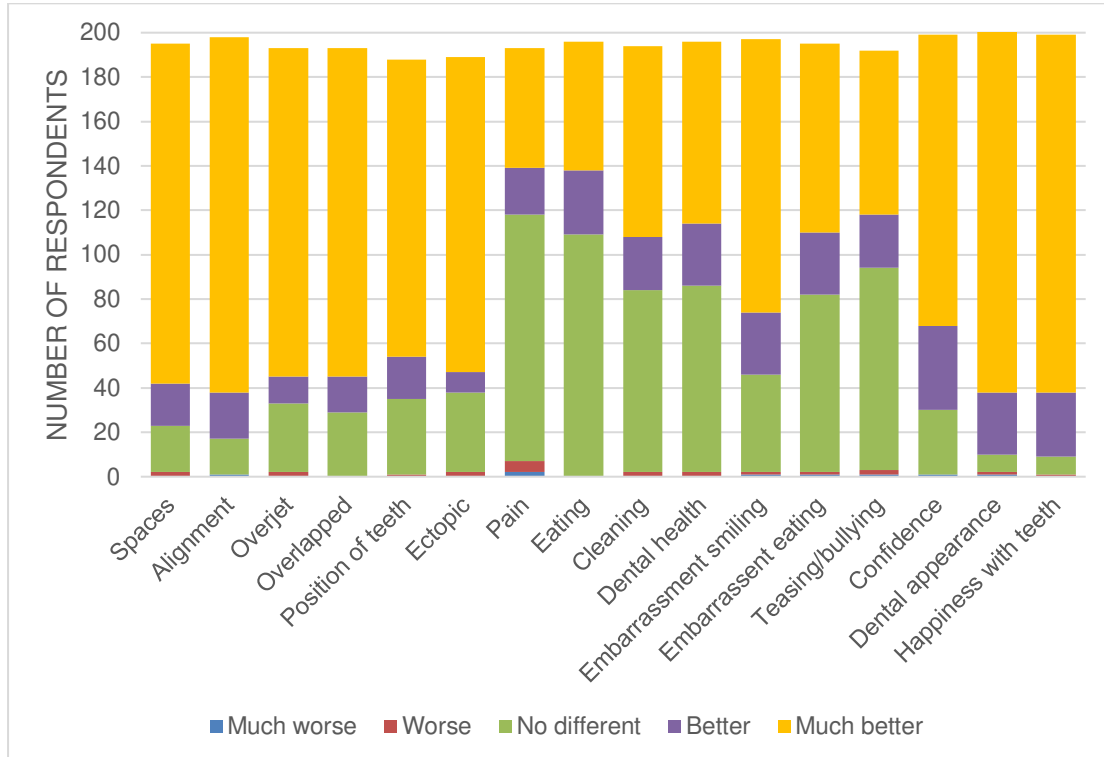
Comments about orthodontic treatment and respondents' experience of orthodontic services are given in Supplemental Table 2. Comments are largely positive but some respondents highlighted the length and burden of treatment, discomfort and challenges in communication with the clinician.

Figure 4: Impact of receiving orthodontic treatment on daily life



Treatment outcome

Change in pre-treatment concerns following orthodontic treatment is given in Figure 5. Some respondents rated specific features of malocclusion 'much better', even if they had not reported pre-treatment concerns related to this feature. Dental appearance, embarrassment when smiling, confidence and happiness with teeth were reported to be much improved. The proportion of respondents no change in pain, eating and cleaning was approximately equal to the proportion reporting improvement. Importantly, seven respondents reported worse pain at the end of treatment, and one to two respondents reported worsening in each of the other categories. Similar trends in patient-reported outcomes were seen across the age groups and care settings, although older adolescent's (16-17 years) were generally the most positive about post-treatment improvements (Supplemental Figure 7).

Figure 5: Patient-reported change in pre-treatment concerns

Overall satisfaction with orthodontic treatment was reported by 96% of respondents, while 91% and 83% reported family and friends respectively had commented on how well orthodontic treatment had worked. 87% would have orthodontic treatment again if needed and 91% would recommend treatment to a friend. The low number reporting dissatisfaction prevented any subgroup analysis.

Comments about treatment outcome and respondent comments to other people about their experience of orthodontic treatment are given in Supplemental Table 2. Generally respondents reported that despite challenges of treatment, they felt the outcome was worthwhile and they would recommend treatment to others.

Discussion

Specific features of malocclusion, such as alignment of the teeth and overjet, were identified as causing concerns in this study, alongside general quality of life impacts from malocclusion. This reflects previous research about the impact of malocclusion on oral health-related quality of life¹⁰⁻¹³. The higher proportion of patients in primary care reporting ectopic teeth than secondary care is somewhat surprising, as often these patients require surgical intervention provided by a multidisciplinary hospital team. This finding could be an anomaly attributed to differences in interpretation of the description 'tooth growing in wrong place or direction'.

The most common expectations from orthodontic treatment were improved appearance, confidence to eat and smile in front of others and reduced teasing or bullying. This supports previous research showing the main motivation for treatment is appearance and the associated psychosocial benefit^{14,15}. The perception by over half the respondents that treatment would make brushing easier is interesting, as although the relationship between malocclusion and oral health is complex¹⁶, there is some evidence orthodontics improves oral hygiene motivation¹⁷.

Effective pre-treatment information provision to improve recall is a challenging area with growing interest in more innovative and engaging methods¹⁸. The relatively poor recall of information about retention is an important finding, as retention is fundamental to long-term success of treatment but adherence is a recognised issue¹⁹. Future work is warranted to test whether more innovative information provision methods specifically focussed on retention increase recall, and if this subsequently impacts on adherence.

The findings around patient experience of undergoing orthodontic treatment are perhaps the most interesting and the free text comments in particular highlighted areas where patients found orthodontic treatment challenging. While previous research has looked at the impact of orthodontic treatment on quality of life²⁰ and behaviour²¹, to the authors' knowledge there are not any orthodontic-specific PREMs routinely in use to monitor experience. While it might not be possible to reduce the impact of orthodontic treatment, more pre-treatment counselling may aid patient preparation for treatment.

Despite many patients reporting negative impacts during treatment, the study demonstrates overwhelmingly positive patient-reported outcomes. Most comments suggested the challenges of undergoing orthodontic treatment was justified by the result and 96% of respondents were satisfied. This high level of satisfaction and the reported change in pre-treatment concerns supports the continuation of orthodontics in the NHS. However, it is also important to recognise for a minority of patients a worsening of malocclusion features or quality of life was reported. While it is outside the scope of the OPTIQ to identify the aetiology of these effects, it might be that a tool such as the OPTIQ could be used in routine care to identify and manage those with suboptimal outcomes.

This study is the first to use the OPTIQ as a patient-reported measure of orthodontic treatment in routine NHS orthodontic care. The tool successfully delivered valuable information about pre-treatment concerns, experience of treatment and outcomes. This information is essential for demonstrating the value of orthodontics and for identifying areas for improved communication with patients and delivery of clinical care. The main limitation of the study was application of the tool to collect all data at the end of treatment. This may lead to some recall bias and in the future, it may be preferable to collect pre-treatment concerns at the start of treatment. In addition, despite the aim to recruit all consecutive eligible patients, there may have been some selection bias in those who were invited to participate and those who returned the questionnaire. The results of the analysis do suggest some additional modification and testing of the OPTIQ may be beneficial prior to its wider implementation. For example, a number of people indicated improvement in features of malocclusion which were not reported as a pre-treatment problem, so including an option of 'I did not have this problem' may give more accurate information about post-treatment change. Finally, some patients were unclear about whether 'overlapped' referred to a deep bite or crossed teeth, so for the reporting the term 'overlapping' has been used; however, the OPTIQ authors plan to provide a glossary to reduce ambiguity in terminology.

Conclusions

The OPTIQ is a useful patient-reported tool to identify pre-treatment concerns and expectations, treatment experience and outcome. The impact of orthodontics on patients may be underestimated, and although outcomes are favourable and satisfaction is high, targeting patient experience could improve the overall value of treatment. Integrating a patient-reported measure into quality assessment of treatment may provide useful data to justify continuation of funding for NHS orthodontic treatment.

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