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Title

The Impact of Orthodontic Appliances on Eating – young people's views and experiences.

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Abstract

Objectives: Orthodontic appliances are known to cause patients difficulty with eating. Learning more about issues faced whilst eating will allow us to create more informative and relevant patient information, thereby improving patient compliance and treatment success. This study aims to understand how orthodontic appliances impact on eating in the broader context and to explore adolescent patients' perceptions of eating with orthodontic appliances.

Methods: Purposive sampling was used and 19 participants currently undergoing orthodontic treatment and aged 11-14 years were selected for either a focus group or semi-structured interview to explore eating related issues. Data collection and analysis were carried out as an iterative process broadly following principles of thematic analysis. Data collection ceased when no new themes emerged.

Results: Two main themes relating to eating problems emerged: restriction of food choice and problems associated with the eating process. Participants reported restricting food choice due to physical aspects of the appliance, advice given by their orthodontist, fear of breakage and also to minimise embarrassment. Participants also reported problems with the time taken to eat, chewing problems, taste change and being messy whilst eating. Additionally, time in treatment, the location of eating and relationship with those present during eating influenced emotions. Some participants indicated a positive impact of orthodontic appliances on their diet.

Conclusions: These results can be used to further inform dietary advice offered to patients. Factors were identified which may not be considered in clinical practice but which could improve the value of dietary advice given to patients.

Keywords:

Adolescence, Diet, Eating behaviour, Food, Orthodontic Appliances

Introduction

Most orthodontic treatment is undertaken in adolescence. Nutritional intake at this age is very important as the nutritional demands of the body increase to support the changes of pubertal growth and development during this time (Riordan, 1997). Anecdotally, we know that orthodontic appliances can have a negative impact on eating. Further understanding of these impacts would facilitate a patient-centred approach to providing eating advice.

The outcome of orthodontic treatment is heavily dependent on the co-operation of the patient for a positive result (McNair et al., 2006). Learning more about what is important to the patient with regard to eating with orthodontic appliances will therefore allow us to provide more informative and patient-relevant information. Currently, information provided regarding orthodontic appliances and eating is largely anecdotal and tailored to minimise damage to teeth and appliances. Patient-centred dietary advice tailored by age and appliance type is lacking.

Most adolescents have a significant level of control over the foods they choose to eat; many are able to buy their own snacks and are likely to consume snack foods more frequently than adults (Anderson et al., 1994). Adolescents can choose their own meals at school and some also take part in the purchase and preparation of food at home (Johnson et al., 2002). This is an age when parental control of food choice is likely to decrease (Johnson et al., 2002) alongside an increase in social participation with food and the development of eating related behaviours. Food choices in this age group are likely to be influenced by peer-pressure (Gill et al., 2008). Healthier eating may be more prevalent in girls than boys and may be influenced by social status (Johnson et al., 2002), whilst snacking behaviour and the consumption of confectionery is greater in those with a disadvantaged home life (Siega-Riz et al., 1998). Practical factors such as price, the time available for food shopping and the preparation and cooking of food (Anderson et al., 1994) are also likely to impact on food choice.

These factors will be important when patients undergo orthodontic treatment as the reduction of the number of food intakes; particularly of free sugars-containing foods is critical to prevent decalcification. Adolescent orthodontic patients are at an age where they are half as likely to have a healthy diet as those in their thirties. In addition, their parents may have little influence on their eating habits (Anderson et al., 1994). Therefore, orthodontic treatment will need to be emphasised as an important reason to alter food choices in this age group. Detailed information is currently limited regarding adolescent orthodontic patients and their eating habits.

Previous research has highlighted that orthodontic appliances impact on speaking and eating, with fixed appliances having the most significant effect (Bernabe et al., 2008). Patients report problems with eating hard foods and issues with food getting stuck in their brace (Al Jawad et al., 2012). Dietary advice given to patients will also impact on eating habits, with patients reporting avoiding toffee, chewing gum and fizzy drinks, sweet foods, hard and sticky food based on the advice of their orthodontist (Al Jawad et al., 2012; Johal et al., 2013). However, prior to orthodontic treatment patients may have unrealistic expectations about whether eating will be affected, with some patients indicating that they did not think orthodontic treatment would affect what they eat and drink (Sayers and Newton, 2006). This shows the importance of ensuring that patients are more aware of the challenges likely to be experienced and the changes they may need to make.

Therefore, the current study aims to explore in-depth how orthodontic appliances impact on eating and to explore adolescents' perceptions of eating with these appliances; identifying the issues surrounding eating with different types of orthodontic appliances. A qualitative approach using focus groups and semi-structured interviews was considered most appropriate to explore in detail patients thoughts and opinions regarding eating with orthodontic appliances, with focus groups being used to inform the topic guides for subsequent semi-structured interviews.

The objectives were to obtain qualitative data exploring the impact of orthodontic appliances on eating through focus groups and in-depth semi-structured interviews.

Subjects and Methods

Ethical approval for this study was granted from County Durham and Tees Valley 2 Research and Ethics Committee (REC reference number 09/H0908/44).

Recruitment

Potential participants were identified during routine appointments in the Orthodontic Department at Newcastle Dental Hospital in 2010-11. Patients were considered eligible to participate in the study if they were 11-14 years of age and receiving orthodontic treatment with fixed, functional, removable or retainer appliances. In addition participants needed to have an understanding of English such that an interpreter would not be required. Those on a therapeutic diet or with any medical conditions impacting on diet were excluded from the study. Purposive sampling was used and participants were selected according to their age, gender and type of orthodontic appliance.

Potential participants were given a brief verbal introduction to the study by the clinician and an information pack containing further details of the study to take home. If they indicated they would be happy to participate, study appointments were arranged to coincide with their treatment appointment 6-8 weeks later. Any questions were answered and written consent obtained from both the participant and their parent (LT).

The study aimed to recruit sufficient participants to ensure no new themes emerged.

Focus Groups

A topic guide was produced (LT) which was piloted in the target population for clarity and understanding. Focus groups were undertaken in a non-clinical area of the Dental School with no time constraints.

Focus groups were undertaken with the aim of generating a semi-structured interview guide to explore further issues. Three focus groups were arranged: fixed appliances; functional appliances;

removable appliances and retainers, however patients failed to attend for the functional appliance / retainer focus groups and these were therefore conducted as interviews.. The aim was to recruit 4-6 patients to each focus group, however this proved difficult. The focus group was conducted by a trained moderator (LT) and assistant moderator (SLR) who reassured the group and confirmed that anonymity would be maintained. Discussions were digitally audio recorded and any non verbal communication was noted by the assistant moderator. All audio recordings were subsequently transcribed verbatim by the principal researcher (LT) immediately following the interviews.

Attempts to recruit to further focus groups continued, however all participants who indicated a willingness to participate in the study preferred to be interviewed, and therefore no further focus groups were arranged.

Semi-structured Interviews

Data from the focus group informed development of an interview topic guide, the content validity of which was reviewed by the research team and orthodontic clinicians. Interviews were transcribed verbatim and analysed in a timely fashion, allowing the topic guide to evolve in an iterative process as unanticipated issues were raised in interviews. This process continued until no new issues emerged from the interviews.

The interviews were conducted by the researcher (LT) and recorded and transcribed as described above. Due to the one-to-one nature of interviews some parents attended and when contributions were made by parents they were included in the transcriptions but not in the analysis.

Data Analysis

Data collection and analysis in this study was carried out as an iterative process which broadly followed the principals of the thematic analysis method (Braun and Clarke 2006). Transcriptions were analysed using classical "low technology" methods (Kreuger and Casey 2009), by collecting quotes on "post-it" notes and arranging them into initial themes. These themes were then reviewed

to ensure they truly represented the data and refined to explore links and relationships between them (LT). The data was then reviewed by the research team using verbatim quotes under thematic headings.

Participants were allocated a unique identifying code describing gender (M-Male / F-Female), age (years, in bold), appliance type (F-Fixed / FU-Functional or removable / RE-Retainer) and numerical identifier (superscript), for example (M **13** F⁰⁹) describing a 13 year old boy with a fixed appliance (identifier 09).

Results

A total of nineteen participants took part in the research as detailed in table 1. One focus group occurred over a nine month period,

Two major themes were identified: 'restriction of food choice' and 'process of eating' as detailed in table 2. Factors that influenced the impact of the appliance on eating were also identified, including time in treatment, the location of eating and relationship with those present during eating.

1. Restriction of Food Choice

Restriction of food choice was experienced by participants wearing all types of appliances. Three reasons were cited most often as the cause of the limitation:

- The effects of the appliance on the teeth for example the physical/functional aspects of wearing an appliance and changing hard / crunchy foods (e.g. carrots, hard chocolate) for soft foods (e.g. pasta, yoghurt).
- The restrictions advised by the orthodontist to reduce decalcification (e.g. sweets, fizzy pop) and breakages (e.g. chewing gum, toffee) and the fear associated with breaking the appliance

- The restrictions imposed by the wearer of the appliance to minimise any embarrassment or difficulties associated with food getting stuck in their appliance (e.g. meat, green vegetables).

A. Negative Restrictions

Results from participants with fixed appliances revealed that they restricted their food choice due to pain, tooth mobility and fear associated with breaking the appliance. For example:

“Just really aching in all my teeth, all I could eat was pasta” (M 13 F⁰⁹)

“Like crunchy things they hurt and I was scared in case it broke” (M 14 F¹⁴)

“if the chocolate bar was quite hard and that it would be quite difficult because your teeth are still a bit loose or wobbly” (M 13 F¹²)

“cos I love carrots but I just can’t eat them plain now and that cos when you bite them it just gets stuck in the wires and its horrible and that”. (M 13 F¹¹)

Results from participants with functional appliances described the limitation in food choice being due to the functional difficulty of eating with the appliances. For some participants, trying to eat with their functional appliance in-situ was distressing.

“It would be just horrible I just like wouldn't be able to eat anything at all.” (M 13 F¹¹)

“I was just really upset because I did not want to have to eat like that all the time and I thought I would not be able to eat very much.” (F 14 FU⁰⁴)

Restrictions experienced early in treatment by patients with fixed appliances may have reduced with familiarity, for example:

“Well I was a bit scared to eat anything at first because I thought it might pull it out.” (F 11 F⁰⁵)

“I still do [eat chewing gum] I’ve had them on for two years now so it’s easy, it took a while though and it was like a really long time before I would.” (F 14 F⁰²)

Unlike participants with fixed appliances, those with functional appliances showed less adaptation to their appliances and most removed them for eating.

“well at first when I ate it was just soft stuff I was fine with but I just couldn’t eat anything else so I ended up not actually eating anything with them.” (F 13 FU⁰³)

Participants in the retainer appliance group highlighted that the orthodontist advised not to eat with retainers in place, therefore any issues were associated with the restrictions recommended by the orthodontist, for example:

“I’ve got to like take them out to eat.” (F 14 RE⁰¹)

B. Positive Effects

Positive effects of restriction of food choice were also described by both boys and girls with both fixed and removable appliances. It was viewed as helping them towards maintaining a healthier diet or making healthier food choices, presumably as a result of advice given to them by their orthodontist / dentist.

“I tried to eat a bit less how can I say I don’t like eat sweets cos I think they will ruin my teeth so it’s trying to keep a little bit healthier cos I have to try and avoid some foods and the foods I would normally eat I have to try and avoid so.” (F 13 F⁰⁷)

“I have a bit too much pop so that has helped me to stop drinking as much.” (M 12 FU⁰¹)

2. Process of Eating

When participants were asked about the impact of appliances on the process of eating, the issues emerging included the time taken to eat, being messy, chewing and taste.

A. Time taken to Eat

Participants reported taking longer to eat with fixed appliances and functional appliances. This was influenced by the length of time in treatment and where the meal was being eaten. There is a certain pressure for participants to try and keep up with their friends. For example, participants with fixed appliances reported:

“When I first got them on cos they are like really tight and they hurt so you can't really, cos you are eating so slowly you can't really eat with all your friends cos they are all like going quicker than you and it takes ages to eat when you get them tightened and when you first get them on so I did not tend to eat for the first couple of weeks at school like I just used to take a yogurt in or something and wait until I got home.” (F 14 RE⁰¹) (describing fixed appliances)

“I always like finish my meal last and everybody's waiting and that.” (F 14 F⁰²)

Taking longer to eat at school had an impact; participants felt different to their peers and as a consequence they modified their behaviours in order to finish at the same time, for example:

“I changed it [my food] like when I got them tightened or first got them like I'd take a packed lunch for like the first week or two weeks and then I'd get used to like eating again I'd start going on dinners again.” (F 14 RE⁰¹) (describing fixed appliances)

This was an issue for fixed appliance patients and was influenced by the venue of the meal and whom they were eating the meal with. As a result, the participants made modifications to their behaviour at school by not eating as much.

“you are like sitting there the only one eating and you are like... I just didn’t take as much.”

(F 14 RE⁰¹) (describing fixed appliances)

Participants with functional and removable appliances did not report the same variation following adjustments on the time taken to eat. Some chose to remove the appliance to facilitate eating, for example:

“Well I think I tried it once but then I had to take them out and put them in their box

because when I ate it just took too long.” (F 13 FU⁰³)

B. Being messy

There were comments regarding being messy for all the different types of appliances. Participants with fixed appliances suffered from embarrassment when food got caught in the braces and this is likely to be an ongoing problem throughout treatment. For example, one participant when asked if there was anything they would change about the brace during eating answered:

“Not get things stuck, it was annoying and made you feel scruffy.” (M 13 F¹²)

Some patients reported an emotional response to eating publicly and the embarrassment associated with getting food stuck in the appliance. Participants reported:

“It’s just in case you get something stuck and you think people are going to stare at you or something.” (M 13 F⁰³)

“most people can’t understand what it’s like, it’s a bit embarrassing because they’ll be looking thinking she’s got something stuck in her brace why can’t she take it out, but sometimes you don’t even know.” (F 14 RE⁰¹) (describing fixed appliances)

Cleaning the appliance was also a big issue for some participants; shown by the following quote when asked what is the hardest thing about eating with fixed braces;

“Just cos every time you have to clean it and take like mouthwash to school or something you have just got to keep it clean all the time.” (F 14 F⁰²)

For participants with removable, functional or retainer appliances feeling messy was related to removing the appliances at meal times. This impact was influenced by the venue when eating and the relationship with others.

“Well sometimes it’s like embarrassing pulling it [the brace] out and everyone’s like urgh whats that but like people I am close to are just used to it so it depends where I am.” (F 14 RE⁰¹)

The following quotes show that some participants felt different to others when removing their appliances and that they were also worried about how other people would react to them removing the appliance:

“I felt kind of embarrassed taking my brace out in front of people cos they don’t like the look of it or anything so I got like really embarrassed.” (F 11 FU⁰²)

“I think it was just I did not know how other people felt about taking them out in front of them I just felt a bit funny.” (F 13 FU⁰³)

Participants modified their behaviour when removing their brace in front of others and described various methods of concealing the appliance.

“I normally cough or something and put it in my case.” (F 14 FU⁰⁵)

Comparing eating with fixed appliances and retainers, highlighted the problem that removing an appliance can have, for example:

“They [retainers] are worse than the fixed braces cos you’ve got to think a lot more cos with the fixed brace it’s like just there like you eat with it but with the retainer you’ve gotta like take it out and watch you don’t eat stuff with it in not to forget about it.” (F 14 RE⁰¹)

C. Difficulty Chewing

Many participants reported difficulty with chewing; however the reasons discussed were different across the appliance types. Participants with fixed appliances had difficulty chewing due to the pain, particularly immediately after the appliance was bonded or adjusted:

“At first when I got them it was quite hard like so I gotta be careful not to eat too much chewy food try and bite with your back teeth not your front teeth cos it hurts.” (F 13 F⁰⁷)

“It is hard eating for the first couple of weeks and then it just feels normal after.” (M 13 F⁰⁹)

Participants with functional and removable appliances reported difficulty chewing because of the appliance, for example:

“Well do you know those spike bits at the back they touch and your teeth don't so it is like really hard to chew.” (F 14 FU⁰⁴)

D. Alteration of Taste

Taste was only mentioned by participants with functional appliances; for example:

“I can still taste things but not as well.” (M 12 FU⁰¹)

Discussion

In healthcare research, interviews and focus groups are the most common methods used in qualitative research. In this study, qualitative methods were used with thematic analysis which is the most common method of data analysis used in qualitative work (Burnard et al., 2008).

Focus groups aim to provide participants with the opportunity to hear the views of others with time to reflect on their own and others views thereby allowing them to deepen their response (Ritchie and Lewis, 2003). The participants were all school-aged adolescents and therefore the proposed time set for the focus groups was 45 minutes to reflect a school environment where change or relocation occurs after a similar time frame (Krueger and Casey, 2009), with the actual time being 35 minutes (fixed). Focus groups were planned as a scoping exercise to inform the topic guide for subsequent interviews (Kitzinger, 1995), for example specific foods identified as being difficult to eat by focus group participants were used as prompts in interviews. Focus groups were arranged for the same day as the orthodontic appointment thereby reducing disruption to school and work for participants and their parents. Recruitment to focus groups proved difficult due to a number of factors. Four to six participants were identified for each focus group, but failure to attend for focus groups was high. Some patients failed to attend for their routine orthodontic appointments, whilst others attended for their appointments but decided they were no longer willing to participate in the focus group as planned. For 2 scheduled focus groups only 1 patient attended and was willing to participate, and therefore an interview was conducted. .

The age range of 11-14 years aimed to reflect the age at which the majority of patients undergo orthodontic treatment, however the departmental waiting list was 2 years at the time; meaning that the majority of patients in treatment were over 14 years of age and could not participate. Increasing the upper age limit could have increased recruitment but may have introduced more variability as this is a time of change and maturity. Additionally, 11 year old children may have been uncomfortable and unwilling to participate in a focus group with 16 year olds, thereby requiring

separate groups for the different age ranges. Informal feedback from participants suggested that young people found the idea of a focus group with other unfamiliar participants daunting and potentially intimidating with a preference to participate in one to one interviews, although research evidence does not seem to support this (Heary and Hennessy, 2006). In a follow-up study currently being undertaken we are recruiting patients aged 11-16years and only using one-to-one interviews to overcome these issues.

Interviews proved to be logistically more straightforward and recruitment to these were less problematic. Interviews allow us to investigate views, experiences, beliefs and/or motivations of individuals on specific matters. Semi-structured interviews were used to ensure that a range of topics could be explored in some detail, whilst enabling the interviewer to pursue an idea or response further until saturation in the specific topic was reached (Gill et al., 2008). In this study a range of topics were planned for discussion, and the researcher was able to further explore aspects of interest which were not included in the topic guide. Participants in general were more willing to take part in interviews than focus groups, and the practical arrangements for fitting interviews around appointments was easier, resulting in a better recruitment and attendance rate. In order to make the interviews accessible, they were arranged around the orthodontic appointments of patients. The limitation with the interviews was the presence of the parents in 10 out of 16 cases. The participants may not have been as honest and truthful regarding compliance with food limitation in the presence of their parent which could introduce response bias. However, in some cases, parents influenced the discussion in a positive manner by reminding the participants of certain aspects which affected their eating ability. It is unclear why so many parents wanted to be present, this may have been at the request of their child or curiosity of the parents. Parents were given a canteen voucher to encourage them to go elsewhere and their presence was not encouraged, but it was felt to be unethical and may have affected recruitment had they been excluded.

All interviews took place in the dental school in a quiet non-clinical setting (seminar room) and were conducted by a trainee orthodontist (LT), although her identity as a dentist was not revealed to participants. The venue may have influenced participants responses as they may have responded in a manner they felt appropriate for a dental environment, or any anxieties they feel as patients may influence their response. A school setting may also not be ideal, as participants may behave like pupils (Gill et al., 2008). It has been suggested that dental interviews may be best undertaken in familiar environment such as the patients home, however this may not be appropriate for this age group.

The results are affected by a wide range of variables: time, venue and relationships. When considering time as a variable, both the length of time in treatment and the time of the interview in relation to the orthodontic appointment may have had an impact on the results. Participants who were further into treatment may have been more positive about their experiences. Length of time in fixed appliances was not formally measured, although this is now recognised as an important factor which it would have been useful to record. Several participants discussed past and present eating habits and how eating had changed during their treatment. As treatment progressed participants reported adapting to eating with their fixed appliance, in agreement with findings of Al Jawad et al., (2012) who reported changes in eating habits with a reduction of pain in the days / weeks after appliance placement. Fixed appliance patients also reported increased confidence about eating the foods for example chewing gum that they had been advised to avoid, with evidence of past tense associated with fear of breaking the appliance, which highlights the influence of time on this aspect. Unlike participants with fixed appliances, there was less adaptation to eating in the functional appliances group and therefore time was less of an influencing factor. This is likely to be associated with functional appliance patients having the option of removing them for eating. The type of functional appliance was unfortunately not recorded (although twin blocks are the appliances most commonly used at this institution) and this would have impacted on the

participants ability to eat, since twin-blocks can be kept in for eating, whereas other appliances (for example MOA) would need to be removed.

The venue at which the participant was having the meal had a great impact on the effect which wearing braces would have on the quality of life of the participant. A meal at school was the venue which most participants commented on; this could be due to the fact that meals are eaten with a large group of people including peers, the allocated time for eating is set and choice may be limited if school dinners are consumed. Some participants reported that they may eat less in order to keep up with their peers. Over time this could have nutritional implications and if nutritional requirements are not met then this could affect patients' school work due to a lack of concentration (Belot and James, 2011).

The relationship participants had with their peers also influenced the impact that eating had on their lives. All types of appliances resulted in anxiety or embarrassment when eating with people who were not familiar, with some issues discussed by participants similar to those previously reported by edentulous patients (Hyland et al., 2009). This feeling was reduced when they had eaten in front of these people before or if they also had braces. Both enacted stigma (discrimination because of a disease or condition) and felt stigma (the fear of enacted stigma), were highlighted in the results. Participants may have felt stigma because they took longer to eat and felt like they were being messy, resulting in them modifying their behaviour to reduce feeling different to their peers. For example, participants with fixed appliances reported avoiding speaking after eating because of the fear of food being stuck in their brace and removable appliance participants tried to camouflage brace removal at meal times.

This study provides preliminary insights into the impact that eating with orthodontic appliances that warrants further exploration in a wider group of patients with various age ranges, appliance types, ethnic groups and in larger numbers to allow formulation of evidence based dietary advice which can be tailored to the various different appliance types. Themes identified in this research are

currently being used to develop a questionnaire which can be implemented to obtain further data from a wider range of patients.

The British Orthodontic Society has recently produced an information leaflet for patients on “Teeth and Brace-Friendly Food and Drink” which contains helpful information about foods and drinks likely to damage teeth or braces (hard foods / sugary food and drink) but does not consider the wide ranging problems experienced by patients (British Orthodontic Society, 2012). Patients recollection of advice given by the orthodontist focused on avoidance of hard / sticky foods which may damage their appliance or sugary foods which can damage teeth, and these observations are supported by precious research (Al Jawad et al., 2012). Some patients perceived these restrictions as having a positive impact on their diet (Al Jawad., 2012) although previous work documented no detrimental change in BMI in a group of 11-14 year old fixed appliance patients at 3 months (Johal et al., 2013).

Successful orthodontic treatment is dependent upon good patient compliance (Bos et al., 2005). Levels of compliance are influenced by patients expectations and understanding of the orthodontic treatment process and sequelae (Zhang et al., 2007). This highlights the importance of informing patients about the impact that orthodontic treatment can have when eating. Well informed patients are more likely to overcome problems associated with non-compliance (Sergl et al., 1998).

The results of this study will help to contribute towards managing patient expectations regarding the impact that appliances have on eating and quality of life. Clinicians need to make it clear to patients that wearing appliances is likely to alter the food that they eat and the way that they eat it. Advice given should be specific to the appliance type.

Based on the results of this study we should advise patients with fixed appliances that they are likely to take longer to eat their meals (which may be particularly problematic at school), eating may be more messy and chewing can be difficult. Patients should expect restrictions in what they eat, both based upon advice given by their orthodontist to reduce breakages and decalcification (for example

hard, sticky and sugary foods) and foods which are more difficult to eat or become stuck in the brace (particularly meat and some vegetables). These problems will probably become less with time, although some problems will recur following each adjustment.

Patients with functional appliances should be advised that it will take them longer to eat, chewing will be difficult, taste may change and they may need to change the food they eat to softer food requiring less chewing. Some patients with functional appliances reported becoming quite distressed when trying to eat with it in place, this should be considered when advising patients about wear regimes, balancing maximum wear against potential upset. The embarrassment felt by patients with any kind of removable appliance on removal for eating / cleaning may warrant discussion.

A number of patients with different kinds of appliances reported that the biggest hurdle was eating at school with peers, and some found that eating a packed lunch rather than school dinners made this easier. Specific advice could be given to parents about brace friendly packed lunch foods, such as pasta and yoghurt, to ease this transition. Clearly all these issues are patient specific but an open discussion and detailed advice may help reduce subsequent problems, facilitate better coping and allow patients to make a more informed decision prior to commencing treatment.

Conclusion

This study suggests that patients aged between 11 and 14 years experience problems eating with orthodontic appliances, and the main influences are on the process of eating and restriction of food choice. Participants with fixed appliances reported that the important issues included the time taken to eat, being messy with food, difficulty chewing and more restricted food choice. Participants with functional appliances voiced similar concerns; they felt it took longer to eat, had difficulty chewing, taste alterations, restricted food choice and removing the appliance was considered messy.

The group with retainers also found that removal and cleaning was messy. The restriction of food choice was viewed positively by some 11-14 year olds.

Dietary advice which is provided prior to orthodontic treatment does not always include all the factors which have been highlighted in this study. It is therefore important that we adapt our advice prior to orthodontic treatment to fully prepare our patients. This should allow them to cope better whilst eating with appliances and make a more informed decision regarding orthodontic treatment.

Bibliography

Al Jawad FA, Cunningham SJ, Croft N, Johal A. A qualitative study of the early effects of fixed orthodontic treatment on dietary intake and behaviour in adolescent patients. *Eur J Orthod* 2012; 34: 432-6.

Anderson AS, Macintyre S, West P. Dietary patterns among adolescents in the west of Scotland. *Br J Nutr* 1994; 71: 111-22.

Belot M, James J. Healthy school meals and educational outcomes. *J Health Econ* 2011; 30: 489-504.

Bernabe E, Sheiham A, De Oliveira CM. Impacts on daily performances related to wearing orthodontic appliances. *Angle Orthod* 2008; 78: 482-6.

Bos A, Hoogstraten J, Prahl-Anderson B. Towards comprehensive model for the study of compliance in orthodontics. *Eur J Orthod* 2005; 27: 296-301.

Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol* 2006; 3: 77-101.

British Orthodontic Society. Patient Information Leaflet: Teeth and Brace Friendly Food and Drink. 2012.

Burnard P, Gill P, Stewart K, Treasure E, Chadwick B. Analysing and presenting qualitative data. *Br Dent J* 2008; 204: 429-32.

Gill P, Stewart K, Treasure E, Chadwick B. Methods of data collection in qualitative research: interviews and focus groups. *Br Dent J* 2008; 204: 291-5.

Heary C, Hennessy E. Focus Groups Versus Individual Interviews with Children: A Comparison of Data. *Irish J Psychol* 2006; 27: 58-68.

Hyland R, Ellis J, Thomason M, El-Feky A, Moynihan P. A qualitative study on patient perspectives of how conventional and implant-supported dentures affect eating. *J Dent* 2009; 37: 718-23.

Johal A, Al Jawad FA, Marcenes W, Croft N. Does orthodontic treatment harm children's diets? J Dent 2013; 41: 949-54.

Johnson F, Wardle J, Griffith J. The Adolescent Food Habits Checklist: reliability and validity of a measure of healthy eating behaviour in adolescents. Eur J Clin Nutr 2002; 56: 644-9.

Kreuger RJ, Casey, M. Focus Groups: A Practical Guide for Applied Research. 4th edn. Thousand Oaks, CA: SAGE Publications. 2008.

Kitzinger J. Qualitative research. Introducing focus groups. Br Med J 1995; 311: 299-302.

McNair A, Gardiner P, Sandy JR, Williams AC. A qualitative study to develop a tool to examine patients' perceptions of NHS orthodontic treatment. J Orthod 2006; 33: 97-106.

Riordan DJ. Effects of orthodontic treatment on nutrient intake. Am J Orthod Dentofacial Orthop 1997; 111: 554-61.

Ritchie J, Lewis J. Qualitative Research Practice. 1st edn. London: SAGE Publications. 2003.

Sayers MS, Newton JT. Patients' expectations of orthodontic treatment: part 1 -development of a questionnaire. J Orthod 2006; 33: 258-69.

Sergl HG, Klages U, Zentner A. Pain and discomfort during orthodontic treatment: causative factors and effects on compliance. Am J Orthod Dentofacial Orthop 1998; 114: 684-91

Siega-Riz AM, Carson T, Popkin B. Three squares or mostly snacks--what do teens really eat? A sociodemographic study of meal patterns. J Adolesc Health 1998; 22: 29-36.

Zhang M, McGrath C, Hagg U. Patients' expectations and experiences of fixed orthodontic appliance therapy. Impact on quality of life. Angle Orthod 2007; 77: 318-22.

Table 1 – Participant recruitment to focus group / semi-structured interviews.

Focus Groups	Semi structured interviews
<p>1 – Fixed appliances</p> <p>1 male (14y) / 2 female (2@14y)</p>	<p>1 - Fixed appliances</p> <p>5 male (2@13y, 3@14y) / 4 female (11y, 13y, 2@14y)</p> <p>2 - Functional / removable appliances</p> <p>5 female (11y, 2@13y, 2@14y), 1 male (12y)</p> <p>3 – Retainers</p> <p>1 female (14y)</p>

Table 2 - Major themes / sub themes identified the impact that eating with orthodontic appliances can have on the individual.

Major Themes	1. Restriction of food choice	2. Process of Eating
Associated sub themes	A. Negative Restrictions B. Positive limitations	A. Time taken to eat B. Being messy C. Chewing problems D. Alteration of taste