Patient expectations: Is there a typical patient?

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Abstract:	Objectives: To qualitatively explore, and analyse, patients’ expectations before the start of fixed appliance orthodontic treatment and determine whether typologies exist. Design: A prospective cross sectional qualitative study, which involved 13 patients (aged 12-15 years). Setting: NHS Hospital Orthodontic department (United Kingdom) Materials and methods: In-depth interviews were conducted with patients who consented to participate before the start of fixed appliance orthodontic treatment. The in-depth interview data was transcribed and then managed using a framework approach, followed by associative analysis. Results: The in-depth interviews revealed two major themes and associated subthemes which were firstly patients’ expectations about the treatment process and outcome, and secondly patients’ expectations of themselves during and after treatment. Three typologies related to patients’ expectations of the orthodontic treatment process were also identified. The first group of participants had minimal expectations of the treatment process, did not anticipate discomfort or pain and did not anticipate that treatment would cause disruption to their daily life. The second group of participants, had expectations that treatment would involve arch wire changes, dental extractions, and result in some discomfort/pain, which would cause some limited disruption to their daily life (moderate expectations). The third type of participant, had expectations of the treatment process involving arch wire changes and dental extractions, and anticipated that the discomfort and pain experienced would significantly affect their daily life (marked expectations). Conclusions: These results provide the clinician with information about patient typologies and provide the clinician with some direction when communicating with their patients and managing their expectations before the start of treatment.

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ABSTRACT

Objectives: To qualitatively explore, and analyse, patients' expectations before the start of fixed appliance orthodontic treatment and determine whether typologies exist.

Design: A prospective cross sectional qualitative study, which involved 13 patients (aged 12-15 years).

Setting: NHS Hospital Orthodontic department (United Kingdom)

Materials and methods: In-depth interviews were conducted with patients who consented to participate before the start of fixed appliance orthodontic treatment. The in-depth interview data was transcribed and then managed using a framework approach, followed by associative analysis.

Results: The in-depth interviews revealed two major themes and associated subthemes which were firstly patients' expectations about the treatment process and outcome, and secondly patients' expectations of themselves during and after treatment. Three typologies related to patients' expectations of the orthodontic treatment process were also **identified**. The first group of participants had minimal expectations of the treatment process, did not anticipate discomfort or pain and **did not anticipate** that treatment would cause disruption to their daily life. The second group of participants, had expectations that treatment would involve arch wire changes, dental extractions, and result in some discomfort/pain, which would cause **some** limited disruption to their daily life (moderate expectations). The third type of participant, had expectations of the treatment process involving arch wire changes **and** dental extractions, and anticipated that the discomfort and pain experienced would significantly affect their daily life (marked expectations).

Conclusions: These results provide the clinician with information about patient typologies and provide the clinician with some direction when communicating with their patients and managing their expectations before the start of treatment.

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INTRODUCTION

When investigating expectations, orthodontic research has generally considered two areas: expectations of the process of treatment and expectations of the outcomes of treatment. Previous research has shown that orthodontic patients and their parents share similar expectations about the process of treatment, although some differences do still exist. Sayers and Newton (2007) **found that** parents had more realistic expectations than patients about the duration of treatment and what would happen at the initial visit, whilst patients anticipated greater dietary restrictions **than their parents did**. Other research by Hiemstra and colleagues (2009) **found that** parents had fewer expectations, compared with their child, about treatment involving dental extractions and a positive public reaction to wearing fixed orthodontic appliances. Higher income parents have also been found to expect more treatment related inconveniences, including having to take time off work to bring their child to their orthodontic appointments (Bennett et al., 1997).

Some studies have also considered gender and ethnic differences. In general, boys and girls aged 10 to 14 years appear**ed** to have similar expectations of the orthodontic treatment process (Hiemstra et al., 2009). Investigation of orthodontic expectations of Black and White British children, and their primary carers revealed that carers differed in their expectations of the initial visit; White primary carers anticipated a checkup, diagnosis, discussion and impressions, in addition to treatment involving some sort of brace and removal of teeth. Black British children were **more likely to** expect to have a brace fitted at their initial visit compared **with** White British children (Sadek et al., 2015).

Other research has investigated expectations of the outcomes of orthodontic treatment. Some early research looking at this aspect found minimal differences between patients and parents with regard to their expectations of orthodontic treatment outcome, and these expectations included improved appearance, popularity, dental health, mastication, speech and career success (Shaw et al., 1979). Mothers placed a higher value on treatment benefits compared with fathers, with the exception of educated and higher income fathers (Bennett et al., 1997). Parents also expected greater improvements in their child's self-image than the patients themselves anticipated (Tung and Kiyak, 1998). Similarities have also shown in patients aged 9 to 12 years with regard

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to their expectations of treatment outcomes, including improved appearance and oral function, but also girls reported greater social expectations (Tung and Kiyak, 1998).

Ethnic differences have also been shown **with respect to** patients' expectations **of** treatment outcome. Latino and African American children reported higher expectations of social acceptance after orthodontic treatment, whilst White American children expected greater improvement in appearance ***per se*** (Reichmuth et al., 2005; Kiyak, 2006).

Prior knowledge of dental and medical treatment has been said to influence patients' expectations (Newton and Cunningham, 2013; Thompson and Sunol, 1995) **and information provided to patients may have a similar effect.** A prospective randomised controlled study **investigated patients who had** read information leaflets related to orthodontic treatment before their new patient consultation, and **found it** did not have an immediate impact on their expectations of orthodontic treatment. However, the study did not include other methods of accessible information delivery, such as the internet and smart phone apps, which could potentially have a greater influence on patients' expectations in the current digital age (Nsar et al., 2011).

Qualitative studies are extremely useful in studying subjective concepts such as expectations of treatment but there are few qualitative studies that have investigated this area in orthodontics. One study investigated patients' expectations of lingual orthodontic treatment using a qualitative approach (Hardwick et al., 2017) **and** identified 2 typologies which were: males aged less than 30 years, who wanted a hidden brace but were not certain about the type of orthodontic appliances available, and females who were aged 30 to 40 years who wanted a hidden brace, and had undertaken research about lingual orthodontic appliances. At present, there are no qualitative studies, which have investigated patients' expectations of **conventional** labial orthodontic treatment or studied patient typologies.

The aims of this study were **therefore** to qualitatively explore, and analyse, patients' expectations before the start of fixed orthodontic appliance treatment and determine whether typologies exist.

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MATERIALS AND METHODS

[redacted] Research Ethics Committee granted ethical approval16/LO/002, and [redacted] granted Research and Development approval [redacted] 16-025. Participants were treated according to the principles of the Declaration of Helsinki, and patients and their primary carer gave written consent before commencing the study. The participants were recruited to the study from new patient orthodontic clinics, if they fulfilled the criteria for National Health Service (NHS) treatment using the Index of Orthodontic Treatment Need, **and** were aged between 12 and 15 years inclusive, with no prior history of orthodontic treatment.

A topic guide was used to focus the semi structured in-depth interviews, and all interviews were undertaken by one researcher [redacted] who had undergone training in in-depth and qualitative methodology at the National Centre for Social Research (NatCen).

Purposive sampling was used as in previous orthodontic qualitative research (Ryan et al., 2012). This sampling was based on gender, age, ethnicity and type of malocclusion (Table 1) and ensured that participants were representative of the patient cohort of interest. As qualitative interviews do not require large numbers of participants, age was categorised into two groups, 12-13 years and 14-15 years and dental malocclusion was classified as Class I, II **or** III. In addition, ethnicity was classified into two groups, Major Ethnic Group (White British, White Irish and other White backgrounds) **or** Black and Minority Ethnicities (BME) in order to represent the referral demographic (Sayers and Newton, 2007; Sadek et al., 2015; Ritchie et al., 2014).

Interviews were undertaken prior to starting active treatment and were recorded digitally and transcribed verbatim immediately afterwards. Transcripts were assigned an identifier in order to ensure confidentiality. In keeping with qualitative methodology, the sample size was dictated by the information arising in the interviews, a**s guided by the sample frame so that the data collection was comprehensive and diverse (Ritchie et al., 2014).**

A form of thematic analysis using the 'framework' approach was implemented (Ritchie and Spencer, 1993) **and all three researchers are experienced in qualitative research and were involved in all parts of the analysis.** The interview transcripts were read several times and key themes were identified **by all three members of the team.** All members of

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the team **then** discussed, and agreed the thematic classification and data from the transcripts were organised into an Excel (Microsoft) spreadsheet framework based on the**se** agreed themes. Subthemes were subsequently identified from familiarisation with the data. The framework provided the initial resource for the thematic analysis phase of the data, where the analysis can **be** between participants, themes and subthemes whilst maintaining a close connection with the raw data.

Thematic analysis involved examining the data for the themes and subthemes across all participants. As part of the analysis, the themes and sub themes were grouped together to form categories which reflected similarities, or differences, using the participants' actual words and substantive content of their account in terms of descriptive coverage and assigned meaning. Associative analysis was then used to explore the data and identify patterns or linkages between the categories **and, again this** was undertaken by all three members of the research team. **Ritchie et al. (2014) described typologies as (i) simple single themed which segments data into discrete positions along a continuum (ii) complex single-linkage which locates phenomena in unique intersections between two or more themes and (iii) complex multiple-linkage, which contains clusters of two or more themes, where each typology is unique but the same theme may be found in more than one typology category.** Two main types of linkages were considered, firstly, connections between phenomena (experiences, behaviours and beliefs) and, secondly, subgroup connections (socio-demographic characteristics). Where sufficient linkages occurred, typologies were classified. As a result, any typologies identified were classifications in which categories were discrete and independent of each other. **Once the typologies had been identified they were checked to see if they worked across the whole data set, the robustness and fit of the typologies were individually verified on a case to case basis against the individual transcripts**

RESULTS

In-depth interviews were undertaken with 13 participants, 7 males and 6 females. All participants **were given the option of being interviewed by themselves or with their primary carer present; all interviewees** requested that their primary carer (12 mothers and 1 father) was present but carers did not contribute to the discussion. The in-depth interviews lasted up to 30 minutes in duration **and quotes from these interviews are included in Tables 2, 3, 4 and 5 to illustrate the themes and subthemes identified.**

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The interviews revealed two major themes and associated subthemes (Figures 1 & 2):

1. Patients' expectations about the treatment itself - process and outcome (Tables 2 & 3)
2. Patients' expectations of themselves during and after treatment (Tables 4, 5 & 6)

Patients' expectations of the treatment itself - Expectations of treatment process:

Participants discussed a range of expectations regarding the treatment process **and these are** shown in Table 2. The themes and associated subthemes identified in relation to treatment process **were 1. A**spects of care: practical (i) procedures with regard to arch wires, dental extractions and retention (ii) characteristics of appointments in relation to duration and frequency of visits; and **2. A**spects of care: experience with regard to discomfort and pain.

Patients' expectations of the treatment itself - Expectations of treatment outcome:

The themes and associated subthemes identified in relation to treatment outcomes **are shown in Table 3 and were** (i) psychosocial**, primarily** with regard to self-confidence, (ii) function in association with eating, talking, **and** chewing **and** (iii) social in relation to their family, school, career and society in general.

Patients' expectations of themselves during treatment: The themes and associated subthemes identified in relation to participants' expectations of themselves during treatment **are shown in Table 4 and were** (i) social in relation to sports, school, musical instruments and eating out, (ii) behavioural in association with oral self-care and diet choices, (iii) psychological **negative emotions and** (iv) functional **with respect to eating certain foods.**

Patients' expectations of themselves after treatment: Participants discussed a range of expectations of 'self' **and this was primarily related to** retainer wear following treatment (Table 5). Patients **tended to have** either limited knowledge about retention, **and the role of retainers** or, no knowledge at all of retention and the role of retainers after treatment.

Associative Analysis

The data was examined for the whole cohort of participants and then between individual participants, which allowed links between different concepts to be identified. Theories were

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then developed to explain the reasons for these links and associations. As a result, a **complex** multiple-linkage typology relating to participants' expectations of the treatment process **and impact on daily life** was evident (Table 6). There were three typologies: (i) Minimal expectations - **this group included** participants who had no real expectations of the treatment process with no anticipation of discomfort or pain and **did not** expect disruption to their daily life (ii) Moderate expectations - **including** participants who had realistic expectations regarding the treatment process, **and were** expecting some discomfort and pain but **did not think** that this would significantly interfere with their daily life (iii) Marked expectations - including participants who expected significant discomfort and pain and anticipated that this would have a real interference with their daily life.

DISCUSSION

Qualitative research helps to identify important influences and generate explanatory hypotheses by taking into account the views of the research participants however, they are considered by some authorities as 'lower status' then those studies involving statistical analyses (Ritchie et al., 2014). It is important to acknowledge the rich data, which this type of research can produce, **particularly for an area of research, which is very subjective, such as patient expectations.** A framework approach was used in this study, where evidence **wa**s systematically generated **and** analysed and interpretations are **therefore** well founded and trustworthy (Ritchie and Spencer, 1993).

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A sampling frame was used to ensure that the 13 participants represented the gender, age range, ethnicity and malocclusions of those patients **routinely** being treated **in the department** (Ritchie at al., 2014). There is potential for bias because of categorisation and classification, however the sampling frame helped to ensure that the in-depth interviews recorded a range of views. **Whilst it was feasible to recruit to all combinations of the sampling frame, the numbers within each category were small, thus limiting the generalisability and transferability to other population groups.** It is also important to acknowledge that the treatment was being carried out in a hospital where more difficult dental malocclusions are referred for treatment and this could have impacted on the results. Another potential bias is research bias because the researcher is also a clinician, and patients may have felt the need to give responses they felt the interviewer wished to hear. **However,** this **does** reflect the real life scenario where the clinician takes the orthodontic history, consent and undertakes the treatment too. This bias was minimised as

much as possible by the researcher explaining to the participant that any information they provided would be anonymised and would not affect their own treatment. This message was also re-iterated in the information leaflets and during the research consent process.

The study identified two main themes, and associated subthemes and these were patients' expectations of the treatment itself (process and outcome) and patients' expectations of themselves (during and after treatment). Some of these are aspects have previously been reported in the literature (Sayers and Newton, 2006; Sayers and Newton, 2007; Hiemstra et al., 2009; Duggal and Bansal, 2010) **but others were new additions**.

In terms of the patients' expectations of the treatment process participants identified arch wire changes, dental extractions, frequency of visits and retention as part of their expectations. Interestingly these topics have not been covered in detail in previous research into expectations. Some participants **also** expected the treatment process to be associated with discomfort and pain and perhaps not surprisingly, this has been reported in previous studies (Firestone et al., 1999; Sayers and Newton, 2007; Hiemstra et al., 2009; Sadek et al., 2015).

Participants' expectations of the treatment outcome were identified in terms of increased self-confidence, improved function in relation to eating, talking and, chewing and improved social interactions in terms of society, career, friends and family. **These expectations were similar to** motivations of adolescent orthodontic patients which **were identified** in a previous study **and** includ**ed** improved appearance, to feel better about themselves and to improve career opportunities (Prabakaran et al., 2012). Interestingly other studies **have** found that some participants did not expect improvement in mastication, speaking, career success or increase in self-confidence due to treatment **and this** conflicts with what was found in the current study (Sayers and Newton, 2007; Hiemstra et al., 2009).

The second main theme identified **was** expectations of the patient themselves, in particular the changes which participants anticipated **they would need to make** during and after treatment. During treatment, **patients** expected that they would need to undertake personal changes both psychologically **by not focusing on the negative aspects of treatment,** and **also** functionally **by making changes to their diet and eating habits.** A previous qualitative study showed that some participants were worried about wearing fixed appliances because of teasing **and** because of the negative effect it may

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have on speaking and eating (Sayers and Newton, 2006; Sayers and Newton, 2007). However, **the current study showed that** participants **appeared to be** willing to adapt to accommodate the treatment process and the anticipated treatment outcomes.

Participants in the current study also identified changes they would need to make **during treatment** in relation to oral hygiene, diet, chewing, sports, and playing musical instruments. They expected a change in their diet during treatment but this related mainly to **a reduction in sugary** foods and not drinks. This differentiation is interesting because similar studies **have** reported anticipated restrictions in both food and drink (Sayers and Newton 2007; Hiemstra et al., 2009; Duggal and Bansal, 2010). However, this may be because the questionnaire used in these studies asked about eating and drinking restrictions using a **single** combined question, whereas the interviews in the current study allowed the two aspects to be **explored** separately; **this is one of the benefits of using qualitative techniques when looking at such topic areas.**

The majority of participants discussed the importance of good oral hygiene, with the exception of one participant. This is in agreement with a previous study, which, reported that patients and their parents anticipated problems with cleaning their teeth when wearing fixed orthodontic appliances (Sayers and Newton, 2006).

Interestingly, male participants **discussed** sports in relation to patients' expectations of themselves during orthodontic treatment more frequently than females; in fact, only one female participant mentioned this. It is interesting though that the male participants **did not expect orthodontic treatment to interfere with their sporting activities**. A previous study, found that males anticipated significantly less influence of pain on their leisure activities compared with females (Firestone et al., 1999).

The study also highlighted participants' expectations of themselves with regard to retention after treatment. There were some participants who had a limited knowledge about retention but **of concern is that** others had no knowledge at all. Previous research has shown that patients reported that retainers interfered with speech and eating and they were embarrassed about wearing them in public (Bennett et al., 1999). As a result, these findings may help to explain the compliance issues that patients face with wearing retainers **and are important to consider when discussing retention with patients.**

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The in-depth interviews highlighted three typologies regarding expectations in relation to the orthodontic treatment process. The first typology was participants who had no expectations of the treatment process, including no anticipation of discomfort or pain, and **no expectations of** disruption to their daily lives. **Interestingly,** a previous study **also highlighted** that patients underestimate the dietary changes required in response to pain after insertion of the initial arch wires (Firestone et al., 1999). The second typology was participants who had realistic expectations regarding the treatment process, including some discomfort and pain but did not think this would significantly interfere with their daily life. The third group of participants expected significant discomfort and pain and anticipated that this would have a real interference with their daily life including social activities and school. Expectations of pain and discomfort with eating, drinking and embarrassment have also been reported in other studies with patients' wearing fixed orthodontic appliances (Bennett et al., 1997; Zhang et al., 2007).

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These typologies were classified as complex, or multiple linkage typologies which represent patterns of association (linkages) between categories derived from the transcriptions. These findings may be limited by the characteristics of the participants who were young people attending for fixed orthodontic appliance treatment, which was free at the point of delivery, within a secondary care setting located in the [redacted]. These multiple linkage typologies and themes could, **however,** be used to identify types of patients' expectations before the start of their treatment. **For example the clinician could ask the patient 'what do you think is going to happen during treatment?' to help in identifying the patient's typology category. This open question will allow the orthodontist to identify what the patient expects from the treatment process, and whether they expect dental extractions, arch wire changes, discomfort or pain, and how much they anticipate that orthodontic treatment will impact on their daily life (as detailed in Table 4). The authors suggest that the use of a proforma may help to identify patients' expectations and gauge the patient's typology category (Appendix 1).** This enables the orthodontist to personalise the information they then provide to their patients, and in doing so, **this may hopefully contribute to** meeting patients' expectations and improvi**ng** patient satisfaction.

CONCLUSIONS

The use of qualitative in-depth interviews with associative analysis has highlighted two major themes and their subthemes: patients' expectations of the actual orthodontic treatment (process and outcome) and patients' expectations of themselves during and after fixed **appliance** orthodontic treatment.

The study also revealed three multiple linkage typologies related to patients' expectations of the orthodontic treatment process; these have not previously been reported in the literature. These findings help to explain the nature of patients' expectations and provide the orthodontist with **the** knowledge to help individualise the information provided at the start of treatment, and to assist the consent process, in the hope of improving post-treatment patient satisfaction and quality of life.

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Table 1: Sampling Frame for In-depth Interviews

	Males N = 7	Females N = 6
Age		
12-13 years	1	4
14 -15 years	6	2
Ethnicity		
Majority ethnic group	5	4
BME= Black and minority	2	2
Malocclusion		
Class I	1	1
Class II	4	4
Class III	2	1

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Table 2: Expectations of the treatment process

Themes and Subthemes	Participants comments
ASPECTS OF CARE: PRACTICAL	
PROCEDURE	Some participants did know details about what would happen before and during treatment whilst others were unsure of any details.
Arch wires	Interviewees talked about what they thought would happen during orthodontic treatment including arch wire changes '…Oh the wire I think they have to change the wire every now and then'.
Dental extractions	Others discussed dental extractions with comments such as '*I'll get my tooth removed ... uh quite scared.*'
Retention	Some participants had no knowledge of retainers being required but others expected to wear retainers *'...I think I will get a retainer so my teeth stay straight.'* One interviewee's expectations were based on a friend's experience 'My friend wears them but I am not really sure what they do ...apart from it kind of affects your speech.'
CHARACTERISTICS OF APPOINTMENTS	Participants discussed their expectations about the length and number of visits required for their orthodontic treatment.
Duration	A range of expectations were discussed regarding the treatment duration from *'Not really sure'* to *'Three to four years.'*
Frequency of visits	The frequency of treatment visits anticipated ranged from 'Unsure' to 'Two to three months.'

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Table 2: Expectations of the treatment process

Themes and Subthemes	Participants comments
ASPECTS OF CARE: EXPERIENCE	Anticipation of the treatment experience was often related to discomfort and pain.
Discomfort/pain	This did not appear to concern some participants '...If it was painless then it would be brilliant but I don't mind so much because pain, only temporary and worth it, in my opinion.' In contrast others were worried '...Truthfully I'm not that excited because like it's going to be quite painful ... removing teeth like straight from my mouth ... you have to get it tightened to close the gap ... perhaps, um screwdriver.'

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Table 3: Expectations of treatment outcome

Themes and subthemes	Participants comments
PSYCHOLOGICAL-SELF CONFIDENCE	'...If I had straight teeth I'd have better confidence.' One participant's reason for straight teeth was '… it gives me a bit more confidence as the teeth will look better.' Another participant felt that straight teeth would result in an '... increase in confidence I think if I feel like my teeth are in good condition I wouldn't have any fears about them…'
FUNCTION	Participants expected positive functional changes with eating, talking and chewing. One participant stated '…I want to be able to speak because my words are not really clear at times...' Another interviewee expected orthodontic treatment to provide them with improved eating and chewing, '...It's quite hard to eat chewy foods and it might be easier to eat like hard chips, hard potato and that.'
SOCIAL	Some participants expected improvements socially in relation to school, career, society and family. 'It will be easier to speak to people... which could be a better career ... well I want a good job and for people to walk up to me and say oh she has lovely teeth and a nice smile.'

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Table 4: Expectations of 'self' during treatment

Themes and subthemes	Participants comments
SOCIAL	
Sports	In general, it was male patients who discussed sports in relation to orthodontic treatment, with the exception of one female patient. One participant who played rugby stated that 'Rugby would be affected because we have to wear gum shields.'
School	Some interviewees expected disruption at school due to their appointments 'I will have some learning time taken because like all my appointments can't be after school so it will affect a bit of my learning time.' In contrast, others did not anticipate any real disruption to school attendance '...Will either be out of school or in lessons that don't really affect, physical education or something that isn't like a big effect on academic subjects.'
Musical instruments	Another interviewee who played the clarinet and saxophone hoped that they would not be required to make major changes with their playing and said *'...You have to bite it quite hard in order to reach high notes so I hope that it wouldn't be any harder ... or too hard to get used to it.*'
Eating out	Participants anticipated no issues with eating out in public. One participant said *'It will be like eating normally'*. Another interviewee expected that they would need to carefully choose the food they eat in public *'I will be unable to get Kentucky Fried Chicken . . . the chicken night get stuck in my brace'*.

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Table 4: Expectations of 'self' during treatment

Themes and subthemes	Participants comments
BEHAVIOURAL	
Oral Self Care	The majority of interviewees expected that they would need to make changes to their oral hygiene regimens and dietary behavior with comments including *'By brushing your teeth more than once a day and trying not to eat food that gets stuck in your teeth or could cause that sort of problem.'*
Diet Choices	Some participants anticipated specific restrictions for certain drinks and foods 'Things like Coke, Fanta and like apple juice because of how acidic it is and then maybe fast foods like chips ...McDonalds and Kentucky Fried Chicken.' However, others did not anticipate any obvious restrictions regarding what they could drink 'I don't think drinks would really affect it, obviously sugar will affect my teeth but I don't think it will affect my brace at all so I think drink will be fine.'
PSYCHOLOGICAL	Participants anticipated some negative emotions associated with wearing braces. One interviewee was fearful about wearing braces but self-motivated to wear them to gain straight teeth. *'I am a bit nervous about the time it will take to get them done … I am not sure I will be happy with them on…at least I will have straight teeth.'*
FUNCTIONAL	A number of participants expected a functional change in how they eat and anticipated some issues when eating some foods '...Like I think have to change your way of biting ... like I can't bite any food, it will have to be in small pieces … quite annoying because I always like biting my apple and I will have to cut it down into small pieces and then eat it.'

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Table 5: Expectations of 'self' after treatment

Themes and subthemes	Participants comments
No knowledge of retention	When one interviewee was asked if they anticipated wearing retainers, they replied *'No, I don't think so; just a few people have to do that.'*
Limited knowledge of retention	A number of participants had some limited knowledge '... You wear them when you go to bed; sometimes people have to wear them in the daytime but I know you can't wear them when you eat or drink because you will not be able to do it.' Compliance issues were anticipated by a participant in relation to wearing their retainers *'... I will probably forget most nights to put them in.*

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Table 6: Multiple-linkage Typology: Expectations of the Treatment Process

Typology category	Dimensions included in the typology		
	Treatment process	Discomfort and pain	Impact on daily life
Minimal Expectations N=3	No expectations of the treatment process	No expectations of discomfort or pain	Treatment will cause minimal disruption to daily life
Moderate Expectations N=6	Expectations of the treatment process to include arch wire changes / dental extractions	Expectations of discomfort and pain	Treatment will cause minimal disruption to daily life
Marked Expectations N=4	Expectations of the treatment process to include arch wire changes / dental extractions	Definite expectations of discomfort and pain	Treatment will disrupt daily routine: school & social activities

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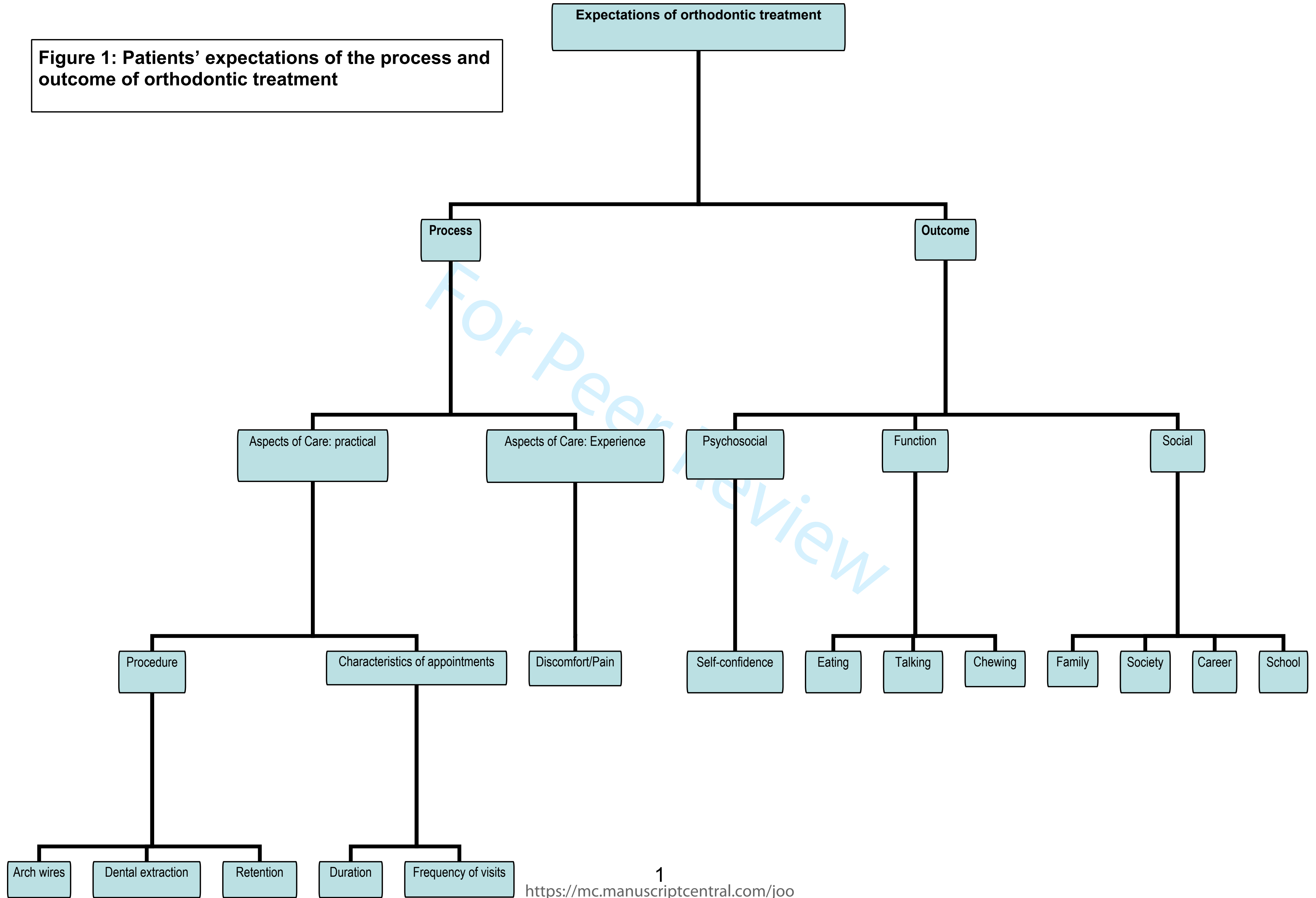

Figure 1: Patients' expectations of the process and outcome of orthodontic treatment

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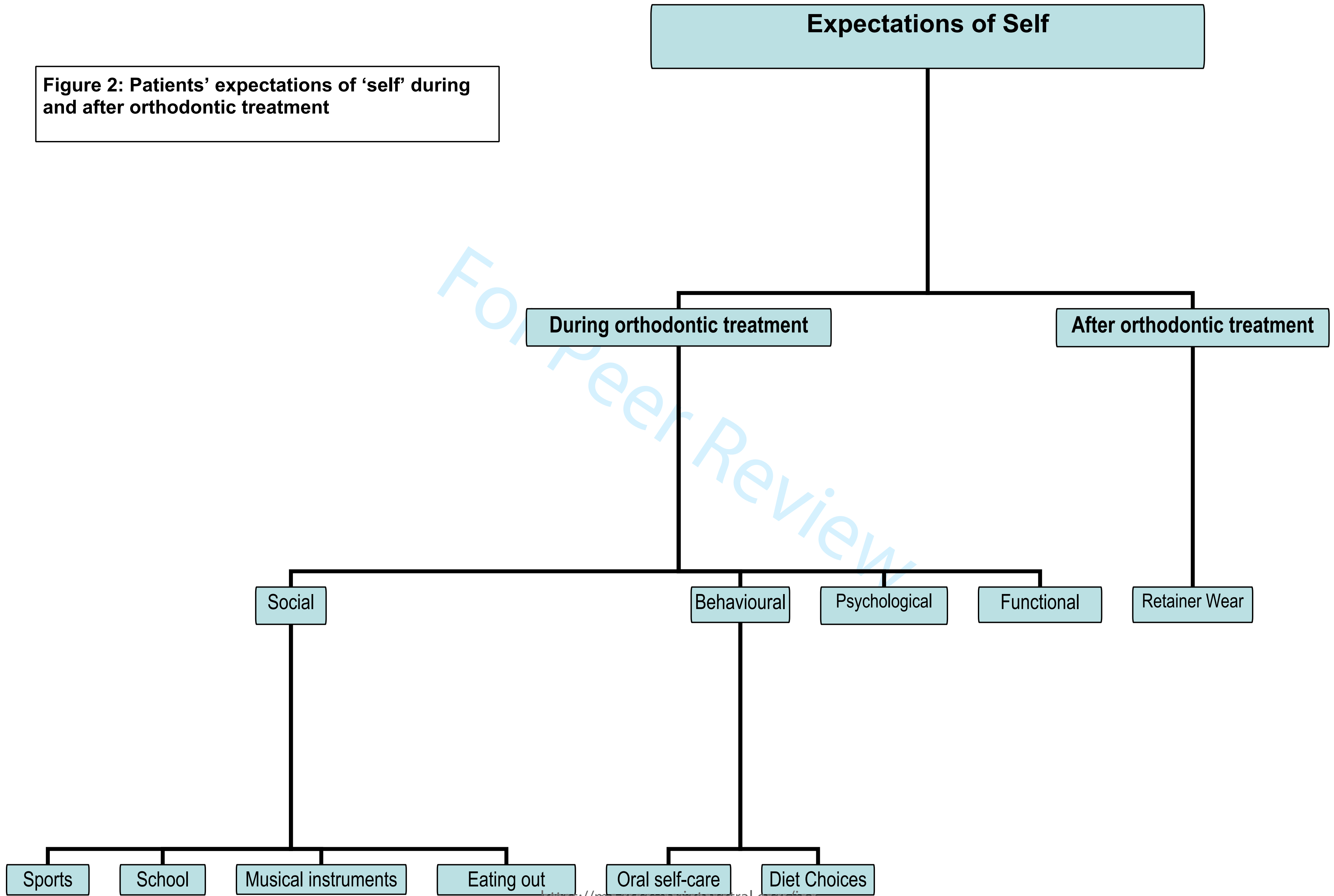

Figure 2: Patients' expectations of 'self' during and after orthodontic treatment

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APPENDIX 1:

Expectations of Orthodontic treatment – Assessment Proforma

1. Outcome expectations

Why does the patient want treatment now?

What does the patient hope will change as a result of having orthodontic treatment ?

	Unprompted	**Prompted**	**Proportion of overall concern (out of 100%)**
Improved dental appearance	❑	❑	
Improved facial appearance	❑	❑	
Functional improvements (biting, chewing)	❑	❑	
Increased self-confidence/ ability to socialise	❑	❑	
Improved dental health/ ability to care for teeth	❑	❑	
Improvements in temporomandibular joint dysfunction	❑	❑	
Improvements in speech	❑	❑	
Ability to have other dental treatment undertaken (e.g. orthodontics to allow restorative treatment to be undertaken etc.)	❑	❑	
Other, please state: Any comments, please include here:			

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8 Are the expectations specific, clear and easily described?
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11 Yes ❑
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13 No ❑
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15 Any comments:
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20 Do the expectations seem reasonable given the malocclusion?
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23 Yes ❑
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25 No ❑
26
27 Uncertain ❑
28
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30 What is the extent of the distress caused to the patient by their concerns?
31
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33 None at all Highly
34
35 Distressed
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43 In your opinion is the degree of distress reported, reasonable given the malocclusion ?
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45
46 Yes ❑
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48 No ❑
49
50 Uncertain ❑
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55 ***2. Expectations of treatment process***
56
57 Does the patient have previous experience of orthodontic treatment?
58
59
60 No ❑

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Yes ❑ Give details

Does the patient have friends or family with experience of orthodontic treatment?

No ❑

Yes ❑

Is the patient aware that treatment will involve the following?

	Patient aware	Patient informed
Assessment appointment: Impressions X-rays Check up Oral hygiene assessment	❑ ❑ ❑ ❑	❑ ❑ ❑ ❑
Frequency of visits	❑	❑
Duration of treatment	❑	❑
Teeth extracted (where applicable)	❑	❑
Discomfort wearing braces	❑	❑
Need for enhanced oral hygiene	❑	❑
Need for changes to diet	❑	❑
Retention following completion of treatment	❑	❑

Summary

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No concerns about outcome expectations: appear realistic/ appropriate	❑
No concerns re expectations of process of treatment	❑
Concerns about patient expectations – refer to GMP for psychological / psychiatric assessment	❑
Information sheets given	❑

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ABSTRACT

Objectives: To qualitatively explore, and analyse, patients' expectations before the start of fixed appliance orthodontic treatment and determine whether typologies exist.

Design: A prospective cross sectional qualitative study, which involved 13 patients (aged 12-15 years).

Setting: NHS Hospital Orthodontic department (United Kingdom)

Materials and methods: In-depth interviews were conducted on patients who consented to participate before the start of fixed appliance orthodontic treatment. The in-depth interview data was transcribed and then managed using a framework approach followed by associative analysis.

Results: The in-depth interviews revealed two major themes and associated subthemes which were firstly patients' expectations about the treatment process and outcome, and secondly patients' expectations of themselves during and after treatment. Three typologies about patients' expectations of the orthodontic treatment process were also identifirevealed. The first group of participants had minimal expectations of the treatment process, did not anticipate discomfort or pain and did not anticipate felt that treatment would cause little disruption to their daily life. The second group of participant, had expectations that treatment would involve arch wire changes, dental extractions, and result in some discomfort/pain, which would cause some limited disruption to their daily life (moderate expectations). The third type of participant, had expectations of the treatment process involving arch wire changes and, dental extractions, and anticipated that the discomfort and pain experienced would significantly affect their daily life (marked expectations).

Conclusions: These results provide the clinician with information about patient typologies and provide the clinician with some direction when communicating with their patients and managing their expectations before the start of treatment.

Keywords: Patients' expectations, Qualitative research, Orthodontic treatment

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INTRODUCTION

~~In healthcare, there is no single definition of expectations because patients' expectations are defined within broad typologies related to the patient characteristics and experiences (Newton and Cunningham, 2013). However, Thompson and Sunol (1995) defined four types of patients' expectations, which may be applied in a healthcare setting. Firstly, ideal expectations were defined as a person's preferred outcome originating from an idealistic state of beliefs. Predicted expectations were described as realistic or anticipated outcomes. Normative expectations represented those expectations which patients felt "should happen" and finally, unformed expectations described when a person is unwilling or unable to communicate their expectations.~~

When investigating expectations, orthodontic research has generally considered two areas: expectations of the process of treatment and expectations of the outcomes of treatment. Previous research has shown that orthodontic patients and their parents share similar expectations about the process of treatment, although some differences do still exist. Sayers and Newton (2007) found that p~~P~~arents had more realistic expectations than patients about the duration of treatment and what would happen at the initial visit, whilst patients anticipated greater dietary restrictions than their parents did. ~~(Sayers and Newton, 2007)~~. Hiemstra and colleagues (2009) found that ~~P~~parents had fewer expectations compared with their child about treatment involving dental extractions and a positive public reaction to wearing fixed orthodontic appliances ~~(Hiemstra et al., 2009)~~. Higher income parents also expected more treatment related inconveniences, including having to take time of work to bring their child to their orthodontic appointments (Bennett et al., 1997).

ISome studies have also considered gender and ethnic differences. In general, boys and girls aged 10 to 14 years appeared to have similar expectations of the orthodontic treatment process (Hiemstra et al., 2009). Investigation of orthodontic expectations of Black and White British children, and their primary carers revealed that carers differed in their expectations of the initial visit; White primary carers anticipated a checkup, diagnosis, discussion and impressions in addition, to treatment involving some sort of brace and removal of teeth. Black British children were more likely to expect to have a brace fitted at their initial visit compared with White British children (Sadek et al., 2015).

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2 No major differences were found between patients and parents with regard to their
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4 expectations of orthodontic treatment outcome, and – Other research has investigated
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6 expectations of the outcomes of orthodontic treatment. Some early research looking at this
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8 aspect found minimal differences between patients and parents with regard to their
9 expectations of orthodontic treatment outcome, and these included improved appearance,
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11 popularity, better dental health, mastication, speech and career success (Shaw et al.,
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13 1979). Mothers placed a higher value on treatment benefits compared with fathers, with
14 the exception of educated and higher income fathers (Bennett et al., 1997). Parents also
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16 expected greater improvements in their child's self-image than the patients themselves
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18 anticipated (Tung and Kiyak, 1998). Similarities were also shown in patients aged 9 to 12
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20 years with regard to their expectations of treatment outcomes, including improved
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22 appearance and oral function, but girls reported greater social expectations (Tung and
23 Kiyak, 1998).
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30 orthodontic treatment process (Hiemstra et al., 2009). Similarities were also shown in
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34 including improved appearance and oral function, but girls reported greater social
35 expectations (Tung and Kiyak, 1998).
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38 Ethnic differences have also been shown with respect to in patients' expectations of with
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40 regard to treatment outcome. Latino and African American children reported higher
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42 expectations of social acceptance after orthodontic treatment, whilst White American
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44 children expected greater improvement in appearance *per se* (Reichmuth et al., 2005;
45 Kiyak, 2006).
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48 Investigation of orthodontic expectations of Black and White British children, and their
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50 primary carers revealed that carers differed in their expectations of the initial visit; White
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52 primary carers anticipated a checkup, diagnosis, discussion and impressions in addition, to
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54 treatment involving some sort of brace and removal of teeth. Black British children
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56 expected to have a brace fitted at their initial visit compared to White British children
57 (Sadek et al., 2015).
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Prior knowledge of dental and medical treatment has been said to influence patients' expectations (Newton and Cunningham, 2013; Thompson and Sunol, 1995) and information provided to patients may have a similar effect. A prospective randomised controlled study investigated patients who had read ~~revealed that~~ information leaflets related to orthodontic treatment ~~given to the patient to read~~ before their new patient consultation, and found it did not have an immediate impact on their expectations of orthodontic treatment. However, the study did not include other methods of accessible information delivery, such as the internet and smart phone apps which could potentially have a greater influence on patients' expectations in the current digital age (Nsar et al., 2011).

Qualitative studies are extremely useful in studying subjective concepts such as expectations of treatment but there are few qualitative studies that have investigated this area in orthodontics. ~~In dentistry, qualitative studies are not common and there are few qualitative studies that have investigated orthodontic patients' expectations, or described typologies derived from an associative analysis.~~ One study investigated patients' expectations of lingual orthodontic treatment using a qualitative approach (Hardwick et al., 2017)~~.~~ and identified T~~he study revealed~~ 2 ~~simple, single dimensional~~ typologies which were:~~included~~ males who were aged less than 30 years, who wanted a hidden brace but not certain about the type of orthodontic appliances, and females who were aged 30 to 40 years who wanted a hidden brace, and had researched about lingual orthodontic appliances. At present, there are no qualitative studies which have investigated patients' expectations of conventional labial orthodontic treatment ~~and revealed~~ or studied patient typologies. ~~This type of analysis involves looking at the data in general and between participants, in order to identify links between different concepts. It is then possible to build theories about the reason for these links below (Ritchie et al., 2014)~~

~~1. Simple single themed typology: this segments data into discrete positions along a continuum.~~

~~2. Complex single-linkage typology: locates phenomena in unique intersections between two or more themes.~~

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~~3. Complex multiple-linkage typology: contains clusters of two or more themes, where each typology is unique but the same theme may be found in more than one typology category.~~

The aims of this study were therefore to qualitatively explore, and analyse, patients' expectations before the start of fixed orthodontic appliance treatment and determine whether typologies exist.

MATERIALS AND METHODS

[redacted] Research Ethics Committee granted ethical approval16/LO/002, and [redacted] granted Research and Development approval [redacted] 16-025. Participants were treated according to the principles of the Declaration of Helsinki, and patients and their primary carer gave written consent before commencing the study. The participants were recruited to the study from new patient orthodontic clinics, if they fulfilled the criteria for National Health Service (NHS) treatment using the Index of Orthodontic Treatment Need, and were aged between 12 and 15 years inclusive, with no prior history of orthodontic treatment.

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A topic guide was used to focus the semi structured in-depth interviews, and all interviews were undertaken by one researcher [redacted] who has undergone training in in-depth and qualitative methodology at the National Centre for Social Research (NatCen).

Purposive sampling was used as in previous orthodontic qualitative research (Ryan et al., 2012). This sampling was based on gender, age, ethnicity and type of malocclusion (Table 1) and ensured that participants were representative of the patient cohort of interest. As qualitative interviews do not require large numbers of participants, age was categorised into two groups, 12-13 years and 14-15 years and dental malocclusion was classified as Class I, II ~~and~~ or III. In addition, ethnicity was classified into two groups, Major Ethnic Group (White British, White Irish and other White backgrounds) ~~and~~ or Black and Minority Ethnicities (BME) in order to represent the referral demographic (Sayers and Newton, 2007; Sadek et al., 2015; Ritchie et al., 2014).

Interviews were undertaken prior to starting active treatment and were recorded digitally and transcribed verbatim immediately afterwards. Transcripts were assigned an identifier in order to ensure confidentiality. In keeping with qualitative methodology, the sample size was dictated by the information arising in the interviews as guided by the sample frame so that the data collection was comprehensive and diverse (Ritchie et al., 2014)~~and interviews continued until no new themes arose.~~

A form of thematic analysis using the 'framework' approach was implemented (Ritchie and Spencer, 1993)~~.~~ and all three researchers are epereimced in qualitative research and were involved in all parts of the analysis. The interview transcripts were read several times and key themes were identified by all three members of the team. All members of the research team then discussed, and agreed the thematic classification and data from the transcripts were organised into an Excel (Microsoft) spreadsheet framework based on these agreed themes. Subthemes were subsequently identified from familiarisation with the data. The framework provided the initial resource for the thematic analysis phase of the data, where the analysis can ~~occur~~ be between participants, themes and subthemes whilst maintaining a close connection with the raw data.

Thematic analysis involved examining the data for the themes and subthemes across all participants. As part of the analysis, the themes and sub themes were then grouped together to form categories which reflected similarities, or differences, using the participants' actual words and substantive content of their account in terms of descriptive coverage and assigned meaning. Associative analysis was then used to explore the data and identify patterns or linkages between the categories,~~.~~ and again ~~T~~this was undertaken by all three members of the research team.~~,~~ ~~all of whom are experienced in qualitative analysis.~~ Ritchie et al., (2014) described typologies as (i) Simple single themed which segments data into discrete positions along a continuum (ii) Complex single-linkage which locates phenomena in unique intersections between two or more themes (iii) Complex multiple-linkage, which contains clusters of two or more themes, where each typology is unique but the same theme may be found in more than one typology category. Two main types of linkages were considered, firstly, connections between phenomena (experiences, behaviours and beliefs) and, secondly, subgroup connections (socio-demographic characteristics). Where sufficient linkages occurred, typologies were classified. As a result, typologies are classifications in which categories are discrete and independent of each other (Ritchie at al., 2014). Once the typologies had been identified they were checked to

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see if they worked across the whole data set, the robustness and fit of the typologies were individually verified on a case to case basis against the individual transcripts.

RESULTS

In-depth interviews were undertaken with 13 participants, 7 males and 6 females. All participants were given the option of being interviewed by themselves or with their primary carer present; all interviewees requested that their primary carer (12 mothers and 1 father) was present during the interview but carers did not contribute to the discussion. The in-depth interviews lasted up to 30 minutes in duration and quotes from these interviews are included in Tables 2, 3, 4 and 5. ~~.~~

The interviews revealed two major themes and associated subthemes (Figures 1 & 2):
1. Patients' expectations about the treatment itself - process and outcome (Tables 2 & 3)
2. Patients' expectations of themselves during and after treatment (Tables 4, 5 & 6)

Patients' expectations of the treatment itself - Expectations of treatment process:

Participants discussed a range of expectations regarding the treatment process ~~which~~ and these are shown in Table 2. The themes and associated subthemes identified in relation to treatment process were 1. ~~are a~~Aspects of care: practical (i) procedure with regard to arch wires, dental extractions and retention (ii) characteristics of appointments in relation to duration and frequency of visits; and 2. ~~a~~Aspects of care: experience with regard to discomfort and pain.

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Patients' expectations of the treatment itself - Expectations of treatment outcome:

The themes and associated subthemes identified in relation to treatment outcomes are shown in Table 3 and were (i) psychosocial, primarily with regard to self-confidence, (ii) function in association with eating, talking, and chewing and (iii) social in relation to their family, school, career and society in general (Table 3).

Patients' expectations of themselves during treatment:
The themes and associated subthemes identified in relation to participants' expectations of themselves during treatment are shown in table 4 (i) social in relation to sports, school,

musical instruments and eating out, (ii) behavioural in association with oral self-care and diet choices, (iii) psychological negative emotions and (iv) functional with respect to eating certain foods (Table 4)

Patients expectations of themselves after treatment:

Participants discussed a range of expectations of 'self' and this was primarily related ~~with regard~~ to retention following treatment (Table 5). ~~Overall, two types of p~~Patients tended to have either ~~were revealed with regard to retention: patients with a~~ limited knowledge about retention, and the role of retainers or, ~~the role of retainers and their effects and those with~~ no knowledge at all of retention and the role of retainers after orthodontic treatment.

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Associative Analysis

The data was examined for the whole cohort of participants and then between individual participants, which allowed links between different concepts to be identified. Theories were then developed to explain the reasons for these links and associations. As a result, a complex multiple-~~-~~linkage typology relating to participants' expectations of the treatment process and impact in daily life was evident (Table 6).

~~The in-depth interviews highlighted three typologies in relation to expectations of process of orthodontic treatment and impact on daily life. These~~ There were three typologies (i) Minimal expectations- this group included participants who had no real expectations of the treatment process with no anticipation of discomfort or pain and did not expect~~ed~~ ~~minimal~~ disruption to their daily life (ii) Moderate expectations - including participants who had realistic expectations regarding the treatment process, ~~which included~~ and were expecting some discomfort and pain but did not think ~~they thought~~ that this would not significantly interfere with their daily life (iii) Marked expectations - participants who expected significant discomfort and pain and anticipated that this would have a real interference with their daily life.

DISCUSSION

Qualitative research helps to identify important influences and generate explanatory hypotheses by taking into account the views of the research participants however, they are

considered by some authorities as ‘lower status’ then those studies involving statistical analyses (Ritchie et al., 2014). It is however, important to acknowledge the rich data which this type of research can produce particularly for an area of research, which is very subjective, such as patient expectations. A framework approach was used in this study, where evidence is systematically generated~~,~~ and analysed and interpretations are therefore well founded and trustworthy (Ritchie and Spencer, 1993).

A sampling frame was used to ensure that the sample of 13 participants represented the gender, age range, ethnicity and malocclusions of those patients routinely being treated in the department (Ritchie at al., 2014)· There is potential for bias because of categorisation and classification, however the sampling frame helped to ensure that the in-depth interviews recorded a range of views. Whilst is is feasible to recruit to all combinations of the sampling frame, the numbers within each category are small, thus limiting the generalisability and transferability to other population groups. It is also important to acknowledge that the treatment was being carried out in a hospital where more difficult dental malocclusions are referred for treatment and this could have impacted on the results. Another potential bias is research bias because the researcher is also a clinician, and patients may have felt the need to give responses they felt the interviewer wished to hear. However, ~~T~~this does reflect~~s~~ the real life scenario where the clinician takes the orthodontic history, consent and undertakes the treatment too. This bias was minimised as much as possible by the researcher explaining to the participant that any information they provided would be anonymised and would not affect their own treatment. This message was also re-iterated in the information leaflets and during the research consent process.

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The study identified two main themes, and associated subthemes and these were patients’ expectations of the treatment itself (process and outcome) and patients’ expectations of themselves (during and after treatment). Some of these are aspects have previously been reported in the literature (Sayers and Newton, 2006; Sayers and Newton, 2007; Hiemstra et al., 2009; Duggal and Bansal, 2010) but others were new additions.

In terms of the patients’ expectations of the treatment process participants’ identified arch wire changes, dental extractions, frequency of visits and retention as part of their expectations. Interestingly these topics have not been covered in detail in previous research into expectations. Some participants also expected the treatment process to be associated with discomfort and pain and perhaps not surprisingly, this has been reported

in previous studies (Firestone et al., 1999; Sayers and Newton, 2007; Hiemstra et al., 2009; Sadek et al., 2015).

Participants' expectations of the outcome of the treatment process were identified in terms of increased self-confidence, improved function in relation to eating, talking and, chewing and improved social interactions in terms of society, career, friends and family. ~~This was in agreement with some of the~~ These expectations were similar to motivations of adolescent orthodontic patients which were identified in a previous study and includ~~ing~~ed improved appearance, to feel better about themselves and to improve their career opportunities (Prabakaran et al., 2012). Interestingly other studies have found that some participants did not expect improvement in mastication, speaking, career success or increase in self-confidence due to treatment ~~which~~ and this conflicts with what was found in the current study (Sayers and Newton, 2007; Hiemstra et al., 2009).

The second main theme identified was expectations of the patient themselves, in particular the changes which participants anticipated they would need to make ~~from themselves~~ during and after treatment. During treatment, patients ~~they~~ expected that they would need to undertake personal changes both psychologically by not focusing on the negative aspects of treatment, and also functionally by making changes to their diet and eating habits. A previous qualitative study showed that some participants were worried about wearing fixed appliances because of teasing and because of the negative effect it may have on speaking and eating (Sayers and Newton, 2006; Sayers and Newton, 2007). However, the current study showed that participants ~~were~~ appeared to be willing to adapt ~~their chewing and speech~~ to accommodate the treatment process and the anticipated treatment outcomes ~~in this study~~.

Participants in the current study also identified changes they would need to make during treatment in relation to oral hygiene, diet, chewing, sports, and playing musical instruments during treatment. They expected a change in their diet during treatment but this related mainly to a reduction in sugary foods and not to drinks. This differentiation is interesting because similar studies have reported anticipated restrictions in both food and drink (Sayers and Newton 2007; Hiemstra et al., 2009; Duggal and Bansal, 2010). However, this may be because the questionnaire used in these studies asked about eating and drinking restrictions using a single combined question, whereas the interviews in the current study

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allowed the two aspects to be discussed separately~~.~~; this is one of the benefits of using qualitative techniques when looking at such topics.

The majority of participants discussed the importance of good oral hygiene, with the exception of one participant. This is in agreement with a previous study which, reported that patients and their parents anticipated problems with cleaning their teeth when wearing fixed orthodontic appliances (Sayers and Newton, 2006).

Interestingly ~~M~~male participants discussed ~~mentioned~~ sports in relation to patients' expectations of themselves during orthodontic treatment more frequently than females; in fact, only one female participant mentioned this. It is interesting though that the male participants did not expect orthodontic treatment ~~sports~~ to interfere with their sporting activities ~~orthodontic treatment~~. A previous study, found that males anticipated significantly less influence of pain on their leisure activities compared with females (Firestone et al., 1999).

The study also highlighted participants' expectations of themselves with regard to retention after treatment. There were some participants who had a limited knowledge about retention but of concern is that others had no knowledge at all. Previous research has showed that patients reported that retainers interfered with speech and eating and they were embarrassed about wearing them in public (Bennett et al., 1999). As a result, these findings may help to explain the compliance issues that patients face with wearing retainers~~.~~ and are important to consider when discussing retention with patients.

The in-depth interviews highlighted three typologies regarding expectations in relation to the orthodontic treatment process. The first typology was participants who had no expectations of the treatment process, including no anticipation of discomfort or pain, and no expectationsed of ~~minimal~~ disruption to their daily lives. Interestingly ~~A~~ a previous study ~~showed~~ also highlighted that patients underestimate the dietary changes required in response to pain after insertion of the initial arch wires (Firestone et al., 1999).

The second typology was participants who had realistic expectations regarding the treatment process, including some discomfort and pain but did not think this would significantly interfere with their daily life.

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The third group of participants expected significant discomfort and pain and anticipated that this would have a real interference with their daily life including social activities and school. Expectations of pain and discomfort with eating, drinking and embarrassment have also been reported in other studies with patients' wearing fixed orthodontic appliances (Bennett et al., 1997; Zhang et al., 2007).

These typologies were classified as complex, or multiple linkage typologies which represent patterns of association (linkages) between categories derived from the transcriptions. These findings may be limited by the characteristics of the participants who were young people attending for fixed orthodontic appliance treatment, which was free at the point of delivery, within a secondary care setting located in the South East of England. These multiple linkage typologies and themes could, however, be used to identify types of patients' expectations before the start of their treatment. For example the clinician could ask the patient 'what do you think is going to happen during treatment?' to help in identifying the patient's typology category. This open question will allow the orthodontist to identify what the patient expects form the treatment process, and whether they expect dental extractions, arch wire changes, discomfort or pain and how much they anticipate that orthodontic treatment will impact on their daily life (as detailed in Table 4). The authors suggest that the use of a proforma may help to identify patients' expectations and gauge the patient's typology category (Appendix 1). ~~Each typology classification consists of a distinctive linear combination of two or more dimensions and the position of a dimension may appear in more than one typology category (Ritchie et al., 2014). The sequence of the three dimensions are unique for each typological category and these findings have not been reported previously in the current literature with regard to labial fixed orthodontic appliance treatment. These findings may be limited by the characteristics of the participants who were young people attending for fixed orthodontic appliance treatment, which was free at the point of delivery, within a secondary care setting located in the South East of England. These multiple linkage typologies and themes could be used to identify types of patients' expectations before the start of their treatment.~~ This enables the orthodontist to personalise the information they provide to their patients and, in doing so, this may hopefully contribute to~~help~~ meeting ~~their~~ patients' expectations and improing~~ve~~ patient satisfaction.

CONCLUSIONS

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The use of qualitative in-depth interviews with associative analysis has highlighted two major themes and their subthemes: patients' expectations of the actual orthodontic treatment (process and outcome) and patients' expectations of themselves during and after fixed appliance orthodontic treatment.

The study also revealed three multiple linkage typologies related to patients' expectations of the orthodontic treatment process; these have not previously been reported in the literature. These findings help to explain the nature of patients' expectations and provide the orthodontist with the knowledge to help individualise the information provided at the start of treatment, and to help with the consent process, in the hope of improving post-treatment patient satisfaction and quality of life.

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Table 1: Sampling Frame for In-depth Interviews

	Males N = 7	**Females** N = 6
Age		
12-13 years	1	4
14 -15 years	6	2
Ethnicity		
Majority ethnic group	5	4
BME= Black and minority	2	2
Dental Malocclusion		
Class I	1	1
Class II	4	4
Class III	2	1

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Table 2: Expectations of the treatment process

Themes and Subthemes	Participants comments
ASPECTS OF CARE: PRACTICAL	
PROCEDURE	Some participants did know details about what would happen before and during treatment whilst others were unsure of any details.
Arch wires	Interviewees talked about what they thought would happen during orthodontic treatment including arch wire changes *'…Oh the wire I think they have to change the wire every now and then'.*
Dental extractions	Others discussed dental extractions with comments such as '*I'll get my tooth removed ... uh quite scared.*'
Retention	Some participants had no knowledge of retainers being required but others expected to wear retainers *'...I think I will get a retainer so my teeth stay straight.'* One interviewee's expectations were based on a friend's experience *'My friend wears them but I am not really sure what they do ...apart from it kind of affects your speech.'*
CHARACTERISTICS OF APPOINTMENTS	Participants discussed their anticipations about the length and number of visits required for their orthodontic treatment.
Duration	A range of expectations were discussed regarding the treatment duration from *'Not really sure'* to *'Three to four years.'*
Frequency of visits	The frequency of treatment visits anticipated ranged from '*Unsure' to 'Two to three months.*'

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Table 2: Expectations of the treatment process

Themes and Subthemes	Participants comments
ASPECTS OF CARE: EXPERIENCE **Discomfort/pain**	Anticipation of the treatment experience was often related to discomfort and pain. This did not appear to concern some participants *'...If it was painless then it would be brilliant but I don't mind so much because pain, only temporary and worth it, in my opinion.'* In contrast others were worried *'...Truthfully I'm not that excited because like it's going to be quite painful ... removing teeth like straight from my mouth ... you have to get it tightened to close the gap ... perhaps, um screwdriver.'*

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Table 3: Expectations of treatment outcome

Themes and subthemes	Participants comments

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Table 3: Expectations of treatment outcome

Themes and subthemes	Participants comments
PSYCHOLOGICAL-SELF CONFIDENCE	*'...If I had straight teeth I'd have better confidence.'* One participant's reason for straight teeth was *'… it gives me a bit more confidence as the teeth will look better.'* Another participant felt that straight teeth would result in an *'... increase in confidence I think if I feel like my teeth are in good condition I wouldn't have any fears about them…'*
FUNCTION	Participants expected positive functional changes with eating, talking and chewing. One participant stated '*…I want to be able to speak because my words are not really clear at times...'* Another interviewee expected orthodontic treatment to provide them with improved eating and chewing, *'...It's quite hard to eat chewy foods and it might be easier to eat like hard chips, hard potato and that.'*
SOCIAL	Some participants expected improvements socially in relation to school, career, society and family. *'It will be easier to speak to people... which could be a better career ... well I want a good job and for people to walk up to me and say oh she has lovely teeth and a nice smile.'*

Table 4: Expectations of 'self' during treatment

Themes and subthemes	Participants comments

Table 4: Expectations of 'self' during treatment

Themes and subthemes	Participants comments
SOCIAL	
Sports	In general, it was male patients who discussed sports in relation to orthodontic treatment, with the exception of one female patient. One participant who played rugby stated that *'Rugby would be affected because we have to wear gum shields.'*
School	Some interviewees expected disruption at school due to their appointments '*I will have some learning time taken because like all my appointments can't be after school so it will affect a bit of my learning time*.' In contrast, others did not anticipate any real disruption to school attendance *'...Will either be out of school or in lessons that don't really affect, physical education or something that isn't like a big effect on academic subjects*.'
Musical instruments	Another interviewee who played the clarinet and saxophone hoped that they would not be required to make major changes with their playing and said *'...You have to bite it quite hard in order to reach high notes so I hope that it wouldn't be any harder ... or too hard to get used to it*.'
Eating out	Participants anticipated no issues with eating out in public. One participant said *'It will be like eating normally'*. Another interviewee expected that they would need to carefully choose the food they eat in public *'I will be unable to get Kentucky Fried Chicken . . . the chicken night get stuck in my brace'*.

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Table 4: Expectations of 'self' during treatment

Themes and subthemes	Participants comments
BEHAVIOURAL	
Oral Self Care	The majority of interviewees expected to make changes to their oral hygiene regimens and dietary behavior with comments including *'By brushing your teeth more than once a day and trying not to eat food that gets stuck in your teeth or could cause that sort of problem.'*
Diet Choices	Some participants anticipated specific restrictions for certain drinks and foods *'Things like Coke, Fanta and like apple juice because of how acidic it is and then maybe fast foods like chips ...McDonalds and Kentucky Fried Chicken.'* However, others did not anticipate any obvious restrictions regarding what they could drink *'I don't think drinks would really affect it, obviously sugar will affect my teeth but I don't think it will affect my brace at all so I think drink will be fine.'*
PSYCHOLOGICAL	Participants anticipated some negative emotions associated with wearing braces. One interviewee was fearful about wearing braces but self-motivated to wear them to gain straight teeth. *'I am a bit nervous about the time it will take to get them done … I am not sure I will be happy with them on… at least I will have straight teeth.'*
FUNCTIONAL	A number of participants expected a functional change in how they eat and anticipated some issues when eating some foods *'...Like I think have to change your way of biting ... like I can't bite any food, it will have to be in small pieces … quite annoying because I always like biting my apple and I will have to cut it down into small pieces and then eat it.'*

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Table 5: Expectations of 'self' after treatment

Themes and subthemes	Participants comments
No knowledge of retention	When one interviewee was asked if they anticipated wearing retainers, they replied *'No, I don't think so; just a few people have to do that.'*
Limited knowledge of retention	A number of participants had some limited knowledge *'... You wear them when you go to bed; sometimes people have to wear them in the daytime but I know you can't wear them when you eat or drink because you will not be able to do it.'* Compliance issues were anticipated by a participant in relation to wearing their retainers *'... I will probably forget most nights to put them in.*

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Table 6: Multiple-linkage Typology: Expectations of the Treatment Process

Typology category	**Dimensions included in the typology**		
	Treatment process	**Discomfort and pain**	**Impact on daily life**
Minimal Expectations N=3	No expectations of the treatment process	No expectations of discomfort or pain	Treatment will cause minimal disruption to daily life
Moderate Expectations N=6	Expectations of the treatment process to include arch wire changes / dental extractions	Expectations of discomfort and pain	Treatment will cause minimal disruption to daily life
Marked Expectations N=4	Expectations of the treatment process to include arch wire changes / dental extractions	Definite expectations of discomfort and pain	Treatment will disrupt daily routine: school & social activities

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