Using photo-elicitation to explore young people's short-term experience of orthodontic retainers

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Submitted in accordance with the requirements for the degree of Master of Science by Research

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September 2022

The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

1 Acknowledgements

This research has been carried out by Kelly Smorthit, supported by a supervisory team which has included:

Sophy Barber, Clinical Lecturer and Honorary Consultant in Orthodontics
Simon Littlewood, Consultant Orthodontist and Honorary Senior Clinical Lecturer
Simon Pini, Senior NIHR Research Fellow, Leeds Institute of Health Sciences

I would like to express my gratitude to my supervisors, Sophy Barber, Simon Pini and Simon Littlewood for their ongoing guidance and support in this research project. The experience has been invaluable for my professional development, particularly in understanding patients' unique lived experiences. I have enjoyed the opportunity to design and undertake a comprehensive research project, a process from which I have learned a great deal.

I would also like to thank the staff, primarily the orthodontic therapists, at Leeds Dental Institute and Bradford Royal Infirmary for their selfless support of my project, particularly in relation to participant recruitment and clear communication with me throughout. This project would not have been possible without their involvement.

I would like to acknowledge that the original protocol for this study was developed by Lucy Brown, a previous student, in conjunction with Sophy Barber and Simon Littlewood. I am grateful to have been given the opportunity to put their initial ideas into practice and to undertake the project.

Finally, I would like to express my sincere gratitude to the young people who participated in this research project. Their experiences have been extremely insightful for me, both as a researcher and a clinician, and I am optimistic that the findings of this study will be of benefit to the orthodontic profession.

2 Abstract

Background: Adherence to retainer wear following orthodontic treatment is known to prevent relapse, if worn as advised. However, non-adherence is a persistent and widespread problem for young people.

Aim: To investigate young people's lived experience of retainer wear and the factors affecting adherence in the immediate term following completion of their orthodontic treatment.

Design: Qualitative study using photo-elicitation, underpinned by a relativist ontology, constructivist epistemology and an interpretivist methodology.

Methods: 12 participants aged 13-18 were recruited from two teaching hospitals, Leeds Dental Institute and Bradford Hospitals NHS Teaching Trust, using a purposive sampling approach. Data collection occurred through one-to-one, virtual, photo-elicitation interviews. Recruitment continued until it was deemed that data saturation had been reached.

Analysis: Interpretative phenomenological analysis (IPA).

Results: Three overarching themes were developed to describe young people's experience, including their immediate experience and expectation of retainers, the process of adaptation and motivating factors. Challenges to adherence were mostly ascribed to day-time wear, despite normalisation of retainers in young people's lives. Interventions to help individuals overcome the initial adaptation phase and self-manage their foreseen problems of forgetfulness include routines, reminders and compensatory changes in behaviours. Internal motivation, external motivation and self-determination significantly contribute to retainer adherence immediately following treatment completion.

Conclusions: Factors associated with young people's immediate experience of orthodontic retention are complex and multifaceted, comprising a web of influential factors that overlap. Thoughtful consideration of young people's capability, opportunity and motivation toward retainer wear may enable orthodontists to understand the nuances of their behaviour whilst optimising and co-constructing strategies for adherence on an individual basis.

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6 Literature Review

The first chapter will introduce the discipline of orthodontics and address the rationale for providing treatment for patients. Understanding how orthodontic services are delivered and the implications of these services on retainer adherence will be discussed. This chapter will also review the literature regarding orthodontic retention, adherence and behaviour change as well as the qualitative methodolgies that pertain to this study.

Orthodontics is a specialist branch of dentistry concerned with growth, diagnosis and treating malocclusion. Malocclusion can be defined as malposition or deviation around the bite, beyond the range of what is considered normal (Angle, 1899; Jacobson, 1987). In addition to correcting malocclusion, orthodontics is also concerned with maintaining the corrected tooth position in the long-term.

The prevalence of malocclusion in children and adolescents is highly variable, estimated to be between 30% and 95% (Mtaya et al., 2009; Kerosuo et al., 1991; Silva and Kang, 2001; Behbehani et al., 2005). There are a wide range of causal factors which contribute to malocclusion, such as variation in growth, pathology, developmental, and dental anomalies. However, the most predominat aetiological factors are due to genetic variation and environmental factors (Proffit et al., 2006).

6.1 Rationale for Orthodontics

Orthodontic treatment is shown to improve occlusal relationships, dento-facial appearance (Turpin, 2007) and psycho-social wellbeing (Shaw, W.C. et al., 1980). In cases where dental health is compromised due to malocclusion, orthodontic treatment can optimise the long-term health of the teeth and surrounding periodontium (Roberts-Harry and Sandy, 2003). Failure to diagnose and treat features of the malocclusion may cause damage to neighbouring structures,

complicate future treatment, and compromise aesthetics. The fundamental aims of orthodontic treatment, therefore, are to restore harmony of the occlusal relationship and eliminate features of malocclusion that are detrimental to dental health (Roberts-Harry and Sandy, 2003). Orthodontic treatment also improves function and aesthetics, both of which are important to young people (Bernabé et al., 2006). For instance, treatment can reduce the likelihood of trauma to prominent teeth (Batista et al., 2018; Nguyen et al., 1999), eliminate displacements and reduce deep overbites (Seehra et al., 2009).

In addition to these physical health benefits of orthodontic treatment, there may also be social and psychological advantages for young people. For instance, individuals with malocclusion can be subjected to bullying and negative comments (Shaw et al., 1980; Johal et al., 2007). Treatment during childhood and adolescence has been shown to improve social well-being (Javidi, H. et al., 2017; Brignardello-Petersen, 2017) and increase self-esteem (Turpin, 2007; Mohlin et al., 2002). Whilst some research suggests that an improvement in malocclusion positively correlates with improved oral health-related quality of life (Jamilian et al., 2016; de Oliveira and Sheiham, 2004; Javidi, Hanieh et al., 2017), researchers have yet to reach a consensus about this (Taylor et al., 2009).

The provision of orthodontic treatment must always be in the patient's best interests, whereby the benefits outweigh any detrimental effects or risks (Travess et al., 2004; Jawad et al., 2015). Part of this process involves educating young people about their role in the treatment process and the potential risks of treatment, as well as informing them of the ongoing commitment required for retainer wear and the consequences of non-adherence. (Abdelkarim and Jerrold, 2015).

6.1.1 Delivery of orthodontic services

There are many reasons why people may 'want' orthodontic treatment, but the extent to which they 'need' it depends on the complexity of their malocclusion

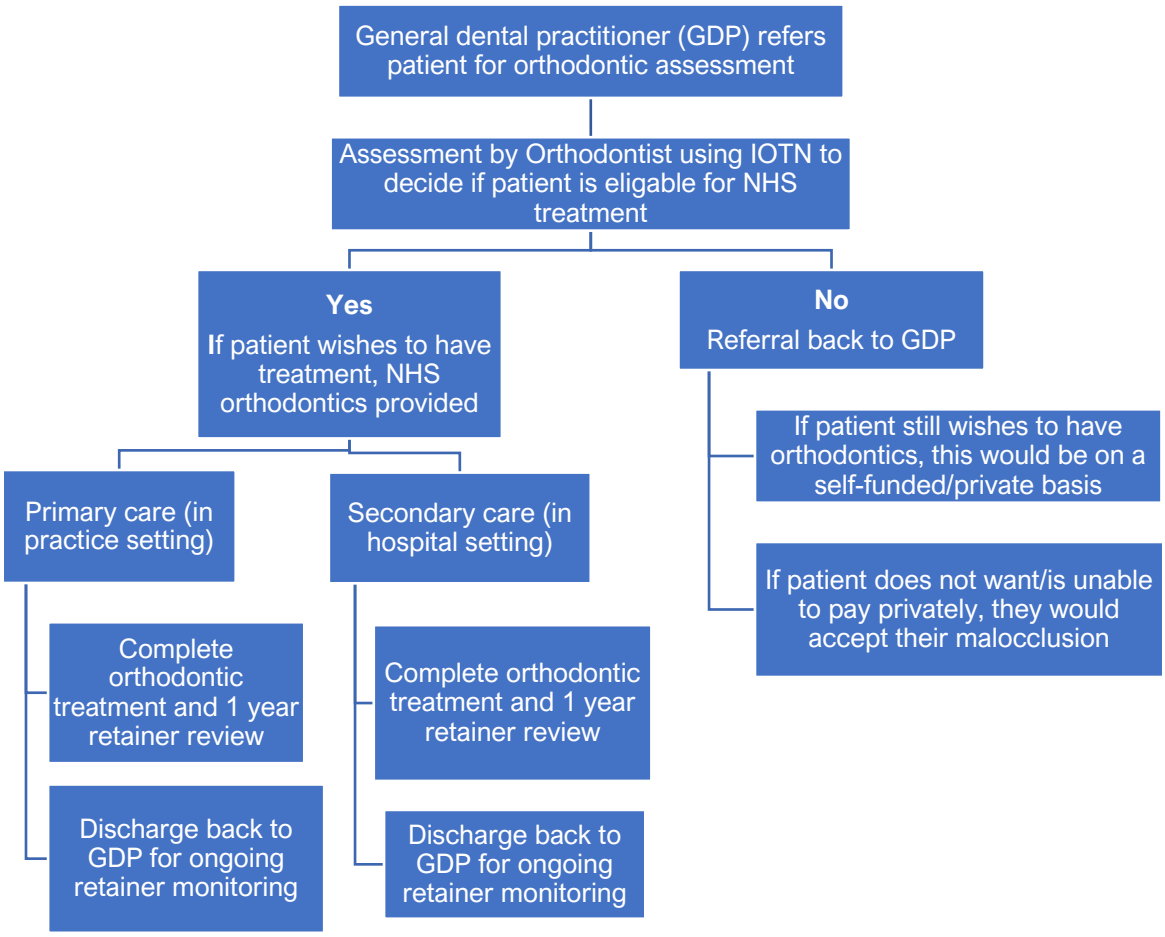
and the degree to which it may affect their dental health (Jawad et al., 2015). Consequently, in order to qualify for treatment through the National Health Service (NHS), individuals will need to meet the required threshold, irrespective of their desire for treatment. Prospective patients seeking treatment are assessed against the metrics outlined by the Index of Treatment Need (IOTN), which aims to priortisie those who would benefit most from treatment (Shaw, W. et al., 1995). In light of the high demand for NHS orthodontic treatment, the IOTN provides an objective measure of 'need' and thus allocation of orthodontic services (Brook and Shaw, 1989; Willmot et al., 1995; Holmes and Willmot, 1996).

Although orthodontic treatment can increase function, improve oral health and enhance general well-being (FDI World Federation, 2020), many people seek orthodontic treatment solely based on aesthetic improvements (Samsonyanová and Broukal, 2014). Despite the outcomes of orthodontic treatment being closely tied with social and psychological benefits, a potential limitation of the IOTN is that it does not account for the social and psychological implications of malocclusion as part of its eligability criteria.

6.1.2 Long-term maintenance of retainers

Following completion of orthodontic treatment, the corrected malocclusion must be maintained in the long-term because, if the net-benefits of treatment are outweighed and undone, then NHS-provided orthodontic treatment could be perceived as a misuse of limited resources. Patients are usually reviewed for one year by their treating clinican, where monitoring and the cost of loss or repair of retainers is incurred by the NHS (Figure 1). After this time, patients return to their general dental practitioner (GDP) for long-term dental and orthodontic monitoring. Beyond this, future loss or replacement of retainers has additional financial cost to the individual. The successful transition of responsibility to GDP's and the prioritisation of retainer monitoring varies amongst dental clinicans. Clear communication with GDP's is necessary to improve this process of transition, and optimise long-term outcomes for patients (Molyneaux, C et al., 2021).

Figure 1: Patient journey of NHS orthodontics



Issues relating to long-term maintenance of retainers include; physical access to the dentist, the repair or replacement of retainers, and taking time off work or school to attend appointments. The impact of COVID-19 has futher complicated access to NHS healthcare, particularly dental care (Goyal et al., 2021), which has led to increased waiting times, lack of availability for appointments and fewer NHS practices taking on new patients (Knights et al., 2021).

6.2 Stability and post treatment changes

Although orthodontics is effective in correcting malocclusion (Cunningham et al., 2000), the outcome is not stable for the majority of patients (Steinnes et al., 2017). Orthodontic treatment can carry several risks to the surrounding tissues and impact on long-term dental health. One significant risk of orthodontics is post-treatment changes including relapse (Littlewood et al., 2017; Littlewood et al.,

2016). Teeth move for a range of reasons and the pattern is unpredictable (Little et al., 1988; Little et al., 1981). Prevention of relapse is promoted through indefinite wear of retainers (Littlewood et al., 2016)

Tooth movement following orthodontic treatment is dependent on the periodontium, occlusal factors and the newly established soft tissue interface (Bondemark et al., 2007; Proffit et al., 2006). Unwanted tooth movement is categorised into two components: firstly, true orthodontic relapse, which encompasses periodontal, occlusal and soft-tissue components, and, secondly, normal age-related changes (Littlewood et al., 2017). In the immediate phase, wearing retainers addresses true orthodontic relapse, whilst long-term wear of retainers addresses both relapse and normal-age related changes.

In addition to orthodontic retainers, a procedure termed pericision can serve as an adjunct to reduce relapse for individuals with a high susceptibility for tooth movement (Edwards, 1988; Walsh, 1975). This procedure involves severing the dento-gingival fibres of individual teeth surgically following orthodontic treatment to overcome their elastic nature (Pinson and Strahan, 1974).

The risk of relapse reduces the overall net benefit of having orthodontic treatment. Those who fail to wear their retainers are likely to experience true orthodontic relapse. Nevertheless, there are cases whereby individuals follow no retention regime and exhibit relatively stable occlusal outcomes post orthodontic treatment (Little et al., 1981). Provided that the position of the lower incisors are not excessively changed during treatment, it has been shown that reasonable levels of stability can occur without the use of retainers (Tynelius et al., 2013). For those who have completed orthodontics, and for people who have not had orthodontic treatment, normal age-related changes of their dentition will occur throughout life (Johnston and Littlewood, 2015; Tsiopas et al., 2013). Therefore, due to the highly variable and unpredictable nature of orthodontic relapse, all patients must be warned that lifetime retention is the only reliable way to maintain stability and prevent the teeth moving unfavourably (Little, 2009).

Retainers are prescribed generically to everyone because it is difficult to asertain the extent to which non-adherence to retention regimes contributes to relapse, or whether the relapse was caused by physiological factors (Lin et al., 2015). There are no objective indicators as to which individuals may experience relapse and, as a result, indefinite retention is advised to all patients.

6.3 Retention

6.3.1 Types of Retainers

There are different types of retainers available (Table 1) which all have the same overarching purpose of preventing orthodontic relapse. Despite their differing features and appearance, all types of retainers have been shown to effectively prevent relapse if worn as prescribed (Al-Moghrabi et al., 2021). Contemporary evidence advises indefinite part-time wear, but does not recommend one type of retainer above another as their effectiveness overall is equivocal (Littlewood et al., 2016; Al-Moghrabi et al., 2021). The choice of retainer type is often based on the clinical indication, the experience and personal preferences of the treating orthodontist, and the patient's preference (Molyneaux et al., 2021).

Table 1: Summary of retainers

Type	Advantages	Disadvantages
Hawley retainer	Maintain transverse correction Allow occlusal settling Addition of prosthetic teeth Addition of minor tooth corrections Addition of bite planes	Aesthetically inferior Breakage Risk of loss Speech difficulties
Clear plastic retainer	Aesthetic Easy to fabricate Cost effective Increased stability in lower arch compared to Hawley	Breakage and loss Wear Less occlusal settling

Bonded retainer	Well tolerated Less need for compliance Aesthetic Increased stability in lower arch compared to clear plastic	Plaque retentive Technique sensitive to fit Bond failure Fractured wire Tooth movement if active Occlusal interference Cost

6.3.1.1 Hawley Retainers

One type of removable retainers are acrylic based with metal components called Hawley retainers (Alassiry, 2019). The key indication for Hawley retainers is when prosthetic teeth are required to replace missing teeth. Teeth can be incorporated into the retainer and patients can safely wear them during the daytime. These retainers also have the ability to maintain transverse relationships (Singh et al., 2009), and the lack of occlusal coverage allows settling of the occlusion (Ramazanzadeh et al., 2018).

6.3.1.2 Clear plastic retainers

The most widely used removable retainers are clear plastic retainers, sometimes referred to as vacuum-formed retainers, pressure-formed retainers, Essix or thermoplastic retainers. These terms describe a clear plastic retainer that covers all surfaces of the teeth with a clear and low-profile appearance. This type of retainer is highly effective at maintaining the corrected lower labial segment position (Rowland et al., 2007), maintaining upper arch alignment and retaining arch length compared to Hawley retainers (Ramazanzadeh et al., 2018). Clear plastic retainers are relatively inexpensive to make and can be fabricated immediately following appliance removal (Ramazanzadeh et al., 2018).

6.3.1.3 Bonded retainers

There is sometimes a need for increased orthodontic retention such as; spaced dentition cases, rotated teeth, compromised periodontal support and when teeth are deliberately put into an unstable position (Meade and Millett, 2020). Retainers

that are fixed in place, known as bonded retainers, are permenantly cemented lingually or palatally to the anterior teeth and cannot be removed (Littlewood et al., 2006).

Bonded retainers are flexible enough to allow for the physiological movement of the teeth. They have been shown to retain lower incisor alignment (O'Rourke et al., 2016) and have also been shown to maintain inter-canine and inter-premolar distances effectively (Egli et al., 2017). Additionally, bonded retainers are more effective in retaining mandibular anterior segment alignment compared with clear plastic retainers (Al-Moghrabi, D. Et al., 2018).

In the private field, bonded retainers have gained popularity due to their permenant and invisable nature, reducing the need for patient adherence when compared to removable retainers. They are prescribed more commonly for patients who pay for their orthodontic treatment (Meade and Millett, 2013). This method of bonded retention makes the clinician responsible for the maintenance of the fixed retainer, whilst adherence to removable retainers is predominately the responsibility of the patient.

In recent years, technological developments have meant that bonded retainers can be manufactured using CAD–CAM systems with materials such as Memotain. These retainers are closely adapted to the tooth surface anatomy with accuracy, and demonstrate durability and less susceptibility to plaque formation and corrosion (Kravitz et al., 2017). No superiorty over coventional retainers has been shown in terms of survival rate or periodontal outcomes, but Memotain retainers have been found to be less plaque retentive and cause less gingival inflammation (Alrawas et al., 2021; Kartal et al., 2020).

Dual retention refers to the process of using both a bonded and removable retainer in cases requiring increased retention due to their high relapse potential, and to provide a “back-up” for the patient if the bonded retainer fails (Wouters et al., 2019). Although bonded retainers are gaining popularity, the advantages of

removable types continue to make them the most commonly prescribed retainers for preventing relapse (Singh et al., 2009).

6.3.1.4 Challenges with removable retainers

Due to the removable nature of these types of retainers, and the responsibility of the patient to wear them, relapse caused by simply not wearing them is a significant challenge. In addition, technical failure of the retainers can cause unwanted tooth movement.

There are numerous reasons why removable retainers might be said to fail; if the retainer no longer fits due to relapse, if it fractures, develops holes in its surface due to wear, or is lost entirely (Sun et al., 2011). Due to their material properties, clear plastic retainers are more prone to wear, cracks and splits leading to the need for replacement (Anbuselvan et al., 2012). As the occlusal surface of a clear plastic retainer is covered during wear, there is potential for a lack of occlusal settling (Sauget et al., 1997). This may be regarded as a disadvantage compared to Hawley retainers which allow for optimal interdigitation during wear time. The anticipation is that settling may be possible during the day when the clear plastic retainers are not worn. Part-time wear has been shown to be important to increase opportuity for settling in these cases (Işık aslan et al., 2013). Other problems caused by removable retainers include speech difficulties, soreness caused by the retainer and claims of the retainers having a bad taste (Jäderberg et al., 2012).

6.3.1.5 Challenges with bonded retainers

Due to their known disadvantages, bonded retainers are only indicated for specific individual cases. Failure of bonded retainers have been reported to be as high as 53% (Störmann and Ehmer, 2002) with failure in the maxilla found to be twice as likely compared to the mandible (Little, 2009; Dahl and Zachrisson, 1991). Failure may occur between the wire and composite, at the composite-enamel interface, or the wire may itself fracture or unravel leading to unwanted tooth movement (Butler and Dowling, 2005). These failures may occur unnoticed

by the patient, leading to relapse at the site, and increase the risk of plaque accumulation or caries beneath the retainer (Bearn, 1995). If the retainer untwists, deforms or is placed actively, it has the potential to cause unwanted root torque which also leads to unwanted tooth movement, poor aesthetics and possible gingival recession (Shaughnessy et al., 2016). Bonded retainers are the most expensive to fit, repair and replace, with increased biological cost to the gingival tissues when oral hygiene is suboptimal.

Fracture of the wire usually occurs due to occlusal trauma (Dahl and Zachrisson, 1991) and, in addition to localised relapse, may cause mucosal irritation and trauma to the soft tissues (Luther and Nelson-Moon, 2012). With regard to technique sensitivity, placement of a bonded retainer may be seen as time-consuming and relies entirely on high quality bonding procedures (Dahl and Zachrisson, 1991).

Although bonded retainers require less compliance from the patient due to their fixed position on the teeth (Forde et al., 2018), relapse is still possible (Abudiak et al., 2011). Bonded retainers have been shown have increased effectiveness at preventing relapse but have a higher failure rate than clear plastic retainers (Forde et al., 2018).

Although harder to maintain plaque control around the retainer, bonded retainers were reported to cause less interference with speech and were more comfortable to wear than clear plastic retainers. Maintaining oral hygiene around a bonded retainer can be difficult leading to accumulation of plaque and calculus (Millett et al., 2008), which may lead to gingivitis (Rody et al., 2016). Bonded retainers are associated with increased levels of plaque and calculus than removable retainers (Storey et al., 2018; Pandis et al., 2007).

6.3.2 Responsibility of retainer maintenance

Orthodontists have a professional and ethical duty to educate patients on the importance of effective retainer wear, how to recognise damage to their retainers

and understand the need for retainer review and maintenance (Littlewood et al., 2017). It is the patient's responsibility to acknowledge the consequence of not wearing their retainers and the risk of relapse, maintain good levels of oral hygiene and adhere to retention regimes in the long-term. As patients cannot monitor their bonded retainers as easily as removable retainers, it could be argued that the responsibility of monitoring and maintaining bonded retainers places more emphasis on the GDP.

6.3.3 Recommended retainer regimes

A Cochrane review investigating various types of retainers and retention regimes reported that there was insufficient high-quality evidence to claim superiority of a one retainer over another and was unable to recommend a specific retention regime (Littlewood et al., 2016). Due to their ability to maintain dental stability even less than full time (Gill et al., 2007; Shawesh et al., 2010; Thickett and Power, 2010), recommendations have been made to wear removable retainers indefinitely on a part-time basis.

6.3.3.1 Variation with different wear regimes

Controversy remains regarding wear regimes with removable retainers, specifically when and how often they should be worn. Shawesh et al. (2010) compared 1 year of night-only wear of Hawley retainers against a wear regime of 6 months full-time, followed by 6 months night-only Hawley wear. Both retention regimens demonstrated equal effectivness during the 1 year retention period, and therefore night-time wear alone was deemed acceptable.

In a randomised control trial, Thickett and Power (2010) similarly looked at clear plastic retainer wear 6 months into the retention phase, and found no difference in stability of the overjet, arch length, intermolar width or intercanine width between full-time and part-time wear. Full time wear of vacuum formed retainers offers no clinical or statistical advantages in terms of incisor irregularity, inter canine width and overjet correction (Atack et al., 2007). Gill et al. (2007) compared part-time and full-time clear plastic retainer wear regimens on study

models at 6 months following appliance removal. They concluded that night-time wear would be an acceptable retention regimen.

Some orthodontists prescribe 6 months of full-time wear of a removable retainer followed by part-time wear indefinitely (Valiathan and Hughes, 2010), with others suggesting that for a Hawley retainer a wear regimen of 6 months full-time and 6 months of night-time only wear is acceptable (Destang and Kerr, 2003). However, most if not all orthodontics now advocate long-term, life-long retention to be the only reliable way to prevent relapse (Littlewood et al., 2009) due to the uncertainty involved in determining which patients will remain stable following orthodontic treatment (Zachrisson, 2008).

6.3.3.2 Challenges around information provision

For patients seeking retainer wear advice online, there is an overwhelming amount of information available from many different sources. Despite the current academic literature providing guidance on indefinite part-time wear (Littlewood et al., 2016a), orthodontic clinicans, practices and hospitals continue to offer a range of differing orthodontic wear regimes and advice to their patients. The British Orthodontic website presents clear information regarding retainers and long-term care, but in line with current guidance does not explicitly state any favoured wear regime. Patients' may often reach to the internet and social media for further information, where sources regarding orthodontics may be incorrect or misleading (Alkadhimi et al., 2022). The existing information online is of variable quality and provides differing advice about wear regimes. One study found that just 22% of websites online advised indefinite use of removable retainers, and just 14% advised indefinite use of bonded retainers (Doğramacı and Rossi-Fedele, 2016).

6.3.4 Patient experience of retention

There has been a wealth of research exploring the clinical effectivness of retainers and orthodontists preference of retention regimes (Pratt et al., 2011a; Kartal and Kaya, 2019; Andriekute et al., 2017; Tynelius et al., 2013), with less

research focused soley on the patient experience. Two randomised control trials included patient satisfaction questionnaires as secondary outcomes in their study (Rowland et al., 2007; Forde et al., 2018), whilst a systematic review has also investigated patient experience (Bondemark et al., 2007). Qualitative researchers have used questionaires to explore patient adherence to retainers (Wong and Freer, 2005; Vig, 2012), with more recent studies using in-depth interview methods to further understand the lived experience of young people (Al-Moghrabi et al., 2019; Kettle et al., 2020; Frawley et al., 2022).

The patient experience of orthodontic retention is varied. Adherence with removable orthodontic appliances during active treatment has been shown to be limited even whilst under care of the orthodontist (Al-Moghrabi et al., 2017). This raises questions about how such patients may fair with their removable retainers when discharged from orthodontic services, when the responsibility of continued maintenance is with the patient.

In a study exploring patient satisfaction during the first 6 months into retention, it was suggested that patients show a preference for clear plastic retainers compared with Hawley's due to the increased comfort, improved aesthetics and perception that they may not break as frequently (Hichens et al., 2007). Patients using clear plastic retainers were found to be significantly more likely to be 'very satisfied' compared to those with Hawley or fixed bonded retainers (Mollov et al., 2010). Interestingly, some patients describe retainers in general as being more inconvenient than their fixed appliances (Travess et al., 2004), and harder to tolerate than headgear (Vig, 2012), whereas other individuals found them to be generally acceptable (Frawley et al., 2022).

Forde et al. (2018) reported that patients found bonded retainers more comfortable than clear plastic retainers and required less compliance. They found that bonded retainers caused less interference with speech which was seen as advantageous. When comparing bonded to clear plastic retainers, patient satisfaction with bonded retainers was also found to be higher and more

acceptable to wear (Millett et al., 2008). More recently, research investigating bonded retainers found that patients prefer bonded retainers that are only bonded to canines, compared to those which are bonded to every tooth because they are more comfortable to use (Ferreira et al., 2019). Wong and Freer (2005) likewise found that patients preferred bonded retainers due to their appearance and the fact that they were more comfortable. They reported that more than 50% of patients admit that they did not wear retainers as advised. Discomfort and forgetfulness were suggested to be main reasons for non-adherence. For patients who paid for their treatment, forgetfulness was highlighted as the main reason for not wearing their retainers. Interestingly, a higher proportion of patients treated in a dental school setting found retainers unaesthetic and more uncomfortable to wear in comparison to patients who paid for treatment. Krämer et al. (2021) also compared clear plastic to bonded retainers. The findings from this study showed that patients reported more pain and discomfort with clear plastic retainers in the mandible and that patients found it easier to get used to the bonded retainers.

Rowland et al. (2007) found that participants wearing clear plastic retainers were more likely to report being able to wear the retainer than those wearing Hawley retainers and were less likely to feel embarrassed. There was no reported difference in whether they experienced discomfort wearing either the clear plastic retainers or Hawley retainers. Despite this, it was found that patients wearing both types of retainers reported limited aesthetic concerns (Pratt et al., 2011b). The relevance of difficulty speaking with the retainer may be disputed, as clear plastic retainers are usually only prescribed for night-time wear where speech is unlikely to be an issue.

Contemporary qualitative research by Kettle et al. (2020) exploring orthodontic appliances and retention, gained detailed accounts of patient experiences. Comments from patients wearing retainers covered a range of physical, practical and emotional responses. Physical issues regarding retainers related to aching, rubbing, feeling tight and feeling weird, although many claimed they got used to their retainers quickly. Cleaning their retainers, speaking and forgetfullness to

wear their retainers were experienced by the participants. Emotional responses included feeling annoyed and self-concious of the retainers.

6.4 Adherence and Behaviour Change

Adherence refers to the continous, dynamic process of commitment to mutually agreed recommendations with a healthcare provider (Chakrabarti, 2014). There are important differences regarding terminology for the concepts of adherence and compliance. For the purpose of this study, patients and clinicans are viewed as partners, working together toward a common goal involving shared commitment and motivation (Sabaté and Sabaté, 2003). Replacing the term compliance with adherence may help to change perceptions and behaviour from the paternalistic past into a more collaborative future, with an effort to place the clinician-patient relationship in its proper perspective (Chakrabarti, 2014; Al-Moghrabi et al., 2021). Compliance is a passive behaviour in which patients simply follow the clinician's instructions, which has connotations of an authoritarian nature. Adherence is an active behaviour, whereby patients undergo lifestyle and behaviour change with the assistance of a clinician, which depicts a more collaborative approach to care.

In the context of this study, adherence primarily refers to an individual's retainer wear regime. However, attendance at retainer review appointments, general retainer care and maintaining oral hygiene are also important aspects of adherence (Fleming et al., 2007). Non-adherence includes situations where little or no attention is paid to diet advice, appliance care or oral hygiene measures (Vig, 2012).

6.4.1.1 Patients' reported adherence to retainer wear

In the immediate term, young people's adherence to retainer wear is suboptimal, with a significant proportion of patients also failing to adhere to the advised retention regimes in the longer term. At 10-year follow up of patients who had

previously completed orthodontic treatment, 70% had experienced relapse to the extent where they needed re-treatment (Little, 1990).

Schott et al. (2013) investigated German adolescents' adherence to retainer wear over a 15 month period. The research found that adherence between individuals varied significantly from no wear to 12 hours daily. The research suggests that most individuals adhered up to 7 hours per day at 3 months, with 25% wearing their retainers between 8 and 10 hours a day, and 15% for more than 10 hours. However, overall 60% of people wore their retainers for less than 8 hours. This study suggested that participants usually maintained the same wear behaviours as demonstrated during the first 3 months of retainer wear, with wear times fluctuating by just 1.7 hours. This suggests that optimising adherence behaviours immediately following brace removal may be significant in understanding people's ability to sustain adherence behaviours in the longer term.

Kacer et al. (2010) conducted a descriptive study in America and found that, in the immediate term following brace removal, adherence to retainer wear was suboptimal with 70% of people wearing them as prescribed on a night-time basis. At a 2-year follow up, 81% of participants still wore their retainers once a week, and 19% did not wear them at all. The overall response rate of the study was of 36% from patients treated at four private orthodontic clinics, which may reduce generalisability of the results to a UK population. What these statistics do not reveal are the factors leading to these figures, with limited insight into the motivators, drivers and barriers to adherence.

A 4-year follow up from a previous randomised controlled trial based in the UK found that retainer wear decreases over time (Al-Moghrabi et al., 2018). Adherence in the immediate term was highest at 6 months, 80% at 6-12 months and approximaly 50% at 2 years. Thereafter, 67% of participants reported that they no longer wear their retainers at all (Al-Moghrabi et al., 2018). Due to a high number of drop-outs, the study may demonstrate attrition bias limitting the validity of the findings. This study was also limited by a relatively small sample size of 42

individuals, which reduces the statistical power of the results and increases the risk of a type 2 error.

Adherence to wearing removable retainers has been shown to be better in the immediate term, with clear plastic retainers, but greater with Hawley retainers in the longer term (Vig, 2012). Pratt et al. (2011b) found that adherence to Hawley retainers in the longer time was greater as adherence decreased at a faster rate with clear plastic retainers. Vagdouti et al. (2019) found that particpants had higher adherence to clear plastic retainers compared with the Hawley group, with patients from private practice having an increased potential to adhere when compared to participants treated in a university hospital.

6.4.2 Motivators and barriers to retainer adherence

Quantitative research of a German population by Schott et al. (2013) found that the type of retainer had no bearing on retainer adherence but instead location of treatment, age and health insurance status were more important. Age has been shown to influence removable retainer wear, with younger patients more likely to adhere than older patients (Tsomos et al., 2014). Conversely, other research suggests that age, as well as sex and type of retainer does not influence adherence to retainer wear (Kacer et al., 2010; Mirzakouchaki et al., 2016).

The study participants of qualitative research by Al-Moghrabi et al. (2019) described a number of factors influencing their adherence to vacuum-formed retainer wear. Participant beliefs concerning the physical and social impact of wearing retainers and the risk of relapse influenced their adherence. The burden of retainers on participants' lives was also a percieved barrier to adherence. Establishing wear patterns and the influence of network support were all significant factors to overcoming barriers to adherence. Other barriers included long-term maintenance, inaccesibilty, a lack of follow-up appointments and the varying maturity levels of indiviuals.

The most recent peer-reviewed qualitative research exploring young people's experiences of adherence to retainers was by Frawley et al. (2022). They found a range of influencing factors on retainer adherence, including: discomfort and sleep disturbance, risk of relapse, a waste of personal effort, the patient-clinican relationship, a change in social circumstance and parental support. They concluded that transient negative impacts of their retainers, particularly in relation to day-time wear, were quickly overcome and that people believed that they should have been more involved in the decisions about retainer wear.

6.4.3 Improving adherence

Suggested ways of improving adherence in orthodontics include shared decision making from the outset (Barber, 2019), motivational interviewing (Rigau-Gay et al., 2020), reminder services (Anglada-Martinez et al., 2015), monitoring wear (Ackerman and Thornton, 2011) and mobile applications (Al-Moghrabi et al., 2017).

Shared decision making (SDM) is a collaborative process in which a healthcare professional works *with* a patient to reach a decision about their care (Elwyn et al., 2010), bringing together professional expertise and patient preferences. The NHS have developed a summary guide with a clearly defined implementation checklist to aid SDM in healthcare. It is argued that SDM is a useful process which aims to increase adherence and satisfaction, improve health outcomes and facilitate sustained behaviour change (Barber, 2019). However, SDM is yet to be proven to be successful in orthodontics or retainer wear. As with all healthcare decisions, the process is multifaceted and ought to be shared with the support of the clinican, parents and in alignment with the patient's developing values as an adolescent (Krist et al., 2017). Researchers have reported the potential value of patient involvement within a shared decision-making framework (Al-Moghrabi, D. et al., 2021). From the outset, patients should understand the need for retainers and be willing to commit to wearing them, otherwise the net benefit of orthodontic treatment could be hindered. Although young people may not have the adequate

knowledge to judge the type of retainer that would benefit them clinically, they should appreciate the importance of wearing a retainer indefinitely.

Patient reminder services to encourage patients improve their health have been used (Anglada-Martinez et al., 2015). In orthodontics, attempts have been made to use text reminders to encourage patients to wear elastics during treatment (Pinchani et al., 2016) and to improve oral hygiene (Abdaljawwad, 2016). Reminders through WhatsApp may increase adherence in wearing removable retainers (Zotti et al., 2019), but the implications of this method alone for indefinite retention may be challenging and impractical.

Attempts have been made to enhance adherence by establishing a secure therapeutic alliance with patients through effective communication, respect of the patient's decicions and values, and building professional relationships with parents and patients (Mehra et al., 1998). Face-to-face interactions to review retainer wear may be beneficial in improving adherence (Al-Moghrabi, Dalya et al., 2021), but the extent to which long-term review actually improves adherence is unknown and may be dependant on the patient's internal motivation. Recognising problems early is beneficial, but face-to-face retainer reviews have become less common in light of COVID-19 (Littlewood et al., 2021).

In an effort to improve adherence to retainer wear, the British Orthodontic Society developed the 'Hold that Smile' campaign in 2017 to improve patient knowledge about retention. In a multicentre audit, Bharmal et al. (2020) reported an increase in knowledge and awareness of retainer wear, with 96.4% of all respondents claiming that, following additional knowledge, they would now wear their retainers long-term. Other attempts such as education and behavioural interventions involving cognitive–behavioural techniques, counselling and home-visits have been tried in medicine to improve adherence, with varied outcomes (Clarkesmith et al., 2017). Such methods are yet to be tried in Orthodontics.

Monitoring retainer wear and adherence can be challenging. Estimating hours of wear is usually informed by the parent or patient themselves or through other subjective measures such as diaries or calendars, which are usually overestimated (Al-Moghrabi et al., 2020b). Monitoring retainer wear objectively has also been tried through embedded micro-electronic sensors, but with limited success (Brierley et al., 2017).

6.4.4 Behaviour change

For orthodontists to implement successful adherence strategies, an understanding of the processes involved with adolescent behaviour change is required (Asimakopoulou and Daly, 2009). Due to the extensive literature and complexities around adolescent behaviour change, a comprehensive review is beyond the focus of this study. However, considering some aspects of adolescent behaviours and the influence they may have specifically on retainer wear could be useful for clinicians to begin understanding adherence. This section will also discuss potential models of behaviour change as well as the role of parents in adherence.

6.4.4.1 Consideration of adolescent behaviour

Behaviour change refers to the process of relieving barriers and supporting change in people's individual beliefs, habits and attitudes. Adolescence is a physically, psychologically and socially complex period of time during transition from childhood to adulthood (Casey et al., 2010). This is a period where peers, social influence and parents can play a pivotal role in decision-making (Van Hoorn et al., 2017), with adolescents usually striving to develop independence. Understanding these social complexities is important for clinicians and researchers alike, because these behaviours may influence young people’s adherence to retainer wear, their ability to change behaviours and sustain the change.

The relationships between young people, peer connections within friendship groups and second level connections can be significant for young people

(Roudsari et al., 2021). As adolescents may experience influence from external sources, such as their parents, some choices they make may arise to satisfy others. In comparison to adults, adolescents may also demonstrate greater flexibility in adjusting their intrinsic motivations and priorities (Crone and Dahl, 2012), which could impact on retainer adherence.

Some adolescents may engage in risk taking behaviours (Blakemore and Mills, 2014), which have been shown to stem from an imbalance between reward-driven behaviour and the ability to self-regulate (Maslowsky et al., 2019; Casey et al., 2008). Some adolescents may be more impulsive and less able to consider delayed gratification and long-term gains (Romer et al., 2010), but this is not a universal characteristic of adolsecents.

6.4.4.2 Models of behaviour change

Behaviour and behaviour change is of interest to a range of disciplines including healthcare and dentistry, and is a complex, multifaceted issue. There are a plethora of frameworks, theories and models of behaviour change to increase understanding of behaviour and facilitate consideration of implementation strategies. Application of behaviour change models to the retainer adherence problem may enable orthodontists and researchers to develop approaches or intervention strategies to improve adherence for the patients they treat.

The transtheoretical model of behaviour change, developed by Prochaska and DiClemente in the 1970s (Prochaska et al., 1992) was developed to understand how individuals progress toward establishing and maintaining a positive health behavior change (Prochaska, 2008). This model suggests that when choosing to adopt a healthy behaviour, individuals progress through stages of precontemplation, contemplation, preparation, action, maintenance and termination, where movement between stages is dependent upon decisional balance and self-efficacy (Prochaska and Velicer, 1997). Being able to recognise

where a patient is on this continum may help clinicans facilitate patients toward a positive behaviour change.

Self-Determination theory (SDT) is a concept related to the motives behind behaviours. It looks at the extent to which behaviour may be autonomous, whereby individuals make decisions based on choice, their own needs and values, or controlled, where individual behave a certain way due to external pressures, coercion or to gain short term rewards (Deci and Ryan, 2008). SDT has previously been researched in education (Cate et al., 2011), social psychology (Van den Broeck et al., 2016) and healthcare (Patrick and Williams, 2012).

There has been a recent uptake in the application of the Theoretical Domains Framework (TDF) and the COM-B behaviour change model. These have been applied in dental research, particularly in relation to behaviours around prescribing antibiotics (Thompson et al., 2020), dental attendance (Holloway, 2021), periodontal disease (Renz et al., 2007) and oral health promotion (Gallagher et al., 2020).

The TDF was originally developed as a collaboration between researchers and behavioural scientists with the view to establish a theory-informed approach to identify causes of behaviour (Atkins et al., 2017) and is now a widely utilised theoretical model in qualitative healthcare and intervention research (French et al., 2013; Dyson et al., 2013). Over time, the TDF has been refined to include 14 domains used to identify the influence of behaviour, as well as considering useful intervention techniques and design strategies to change behaviours. The development of the COM-B model described by Michie et al. (2011) suggests that, in order for behaviour to occur, individuals must have the capability, opportunity and motivation toward behaviour change (Richardson et al., 2019). Clinicians can develop a theory-led intervention strategy by integrating the theoretical aspects of TDF with the real-world actualities of COM-B (Tapper, 2021).

The 14 domains of the TDF sit within the 3 core domains of COM-B and help to explain the complexity and influential factors affecting behaviour in a practical way. These 3 domains form the central hub of the Behaviour Change Wheel described by Michie et al. (2011).

The three overlapping and integrated components of this wheel illustrate the complexity of behaviour change: at the centre, the 'sources of behaviour' are the biopsychosocial factors that can either give rise to or obstruct desired behaviours; the first outer layer describes the 'intervention functions', which outline the various and purposeful methods of intervening to facilitate behaviour change; finally, the 'policy categories' highlights how behaviour change can be initiated or sustained at the macro-level. Any attempt to facilitate behaviour change must consider one or more of these domains (Michie et al., 2005). For instance, understanding the 'sources of behaviour' should directly serve to inform 'intervention functions', and so too must the development of 'policy categories' be compatible with these preceding health determinants. Understanding the nuances of young people's capability, opportunity and motivation can lead to better-informed interventions, such as training, education, and modelling which can in turn influence policymaking, such as guidelines, regulation and service provision (Michie et al., 2011). Any orthodontist prescribing retainers should aim to assess each individual's capability, opportunity and motivation behind wearing their retainers, and target their advice based on this.

6.4.4.3 Role of parents in adherence and behaviour change

Parents can play an important role in supporting retainer adherence for young people (Lin et al., 2015). Involving parents in the decision-making process might impact behaviour change and reduce decisional conflict amongst parents (Boland et al., 2017). If parents feel involved in treatment planning and have a positive and supportive attitude, they may in turn have a positive influence on the adolescent's decision-making (Mann et al., 1989).

Greater parental agreement and motivation for treatment is associated with higher pre-adolescents' cooperation (Brumini et al., 2020), with the input of family members and friends increasing behaviour change and adherence (Middleton et al., 2013). Building positive relationships and rapport with patients and increasing their confidence and self-efficacy may also be valuable.

6.5 Methodology

This section of the literature review will discuss the qualitative methodology employed for this study, with particular reference to the use of photo-elicitation, interviews and interpretative phenomenological analysis (IPA).

6.5.1 Research Methodology

Selecting the appropriate methodology and methods is a fundamental aspect of all research, and decisions about which approaches and strategies to use should be based on their appropriateness for the study (Silverman, 2020). The methodology is underpinned by the researcher's ontological and epistemological positions (Bradshaw et al., 2017). Ontology is a branch of philosophy dedicated to understanding the nature of existence and reality. Epistemology is the study of knowledge and is concerned with the basis upon which an individual can justify a claim to knowledge (Scotland, 2012). Researchers' ontological, episteomological and methodological positions are generally regarded as their research paradigm (Denzin and Lincoln, 2018) and each of these worldviews can have significant implications for research.

A key decision in the formation of a research methodology is whether to employ quantitative, qualitative or mixed methods approaches (Archibald et al., 2015). While qualitative and quantitative studies might investigate similar research areas, each will address different types of questions and produce different kinds of data (Al-Busaidi, 2008). The research question itself is also central to the decision about which methodologies to employ (Korstjens and Moser, 2017). Qualitative research titles usually aim to explore or describe individual phenomena,

compared to quantitative which seek to prove or disprove a hypothesis. The title of this research lends itself to a qualitative methodology. Patients' lived experiences are uniquely individual and qualitative methods are more appropriate for uncovering the rich, in-depth insights that quantitative methods seldom reach (Silverman, 2020).

6.5.1.1 Qualitative Research

Qualitative research seeks to explore and understand different phenomena, processes and perspectives (Caelli et al., 2003), and to provide rich, nuanced data that is grounded in the personal accounts and lived experiences of the research participants (Barrett and Twycross, 2018). Qualitative studies generally use inductive, or bottom-up methods which seek to develop theory from the ground up (Masood et al., 2010), however they can also use deductive or theory driven methods. Qualitative researchers seek to illuminate the intricacies and nuances of social life and situate their knowledge claims in socially derived data. Researchers of this pursuasion might adopt a constructivist ontology and an interpretivist epistemology, meaning there are multiple realities, because reality is socially constructed and knowledge is inherently subjective. Understanding adolescents' perspectives, rooted in their own lived experiences, requires a qualitative approach.

There are various theoretical approaches commonly associated with qualitative research, such as grounded theory, ethnography and phenomenology (Grossoehme, 2014). Phenomenology is primarily concerned with the uniqueness of individuals' experiences, told from their own perspectives. Research underpinned by phenomenology seeks to explore the perspectives of participants, allowing them to describe their truth (Rodriguez and Smith, 2018). The phenomenological method seeks to interpret, understand and describe the meanings associated with participants' unique lived experience. Given the uniqueness of adolescents' experiences of non-adherence to wearing retainers following orthodontic treatment, interpretive phenomenological analysis (IPA) was deemed the most appropriate for this study.

6.5.1.2 Qualitative Methods

There are a wide range of data collection strategies within qualitative research (Table 2), which are chosen based on their appropriateness to the research question, the aims, and their consistency with the ontological and epistemological positions. Common examples include interviews, focus groups, participant observations, narrative accounts and surveys (Gill et al., 2008)

Interviews are the most frequently chosen qualitative data source in health care research (DeJonckheere and Vaughn, 2019) and conversations with participants may be structured, semi-structured or unstructured in nature (DiCicco-Bloom and Crabtree, 2006). An interview allows the researcher to delve deeply into personal or complex issues and concentrates on that participant's own perspective. In one-to-one interviews, there is an opportunity to develop a rapport with the participant, discuss sensitive topics and pick up on non-verbal cues including body language, all amounting to rich data. However, in-depth conversations with individual participants can bring about certain challenges such as their willingness to build rapport, engage or elaborate (Watkins, 2012). Furthermore, the recruitment, transcription and data analysis of one-to-one interviews can be time consuming, particularly if the interviewer is novice and lacks experience themselves (McGrath et al., 2019).

Table 2: Qualitative Methods

Qualitative Methods	Advantages	Disadvantages
Interviews	Discussion about personal/complex/sensitive issues Focus on individual perspective Avoid influence of others perspective Ability to build rapport and personal interaction	Unwilling or unable to engage or explain Intensity of conversation can be overwhelming Expensive to conduct Time limited
Focus groups	General and diverse discussions between	Difficult to arrange

	individuals with shared experience Influence of others stimulates further discussion Efficient method of gaining perspectives	Presence of others can affect response of participant/distraction Lack of personal/sensitive information Varying personalities in one focus group Not as in depth as one-to-one Expensive to conduct Disproportionate speaking time
Observations	Directness- report solely on what is observed Captures essence of the setting and environment Captures non-verbal cues No interruption of opinion of others Reduced cost Reduced time	Lack of control No opportunity to learn about people's experiences/perceptions/view points No opportunity to learn about historical events or future thoughts Missed opportunities if not observed specific key moments

Some alternative interview techniques aim to be more creative, improve participation, and offer an alternative stimulus for discussion and insight during data collection (Glaw et al., 2017). Such alternatives include the use of art, for example drawing, sculpture and drama during interviews. These methods can be used to explore the experience of individuals and hard to reach communities (Goopy and Kassan, 2019). Another novel approach to interviewing is walking or 'go-along' interviews, where the research is conducted and data collected whilst on the move with the participant (Garcia et al., 2012).

The use of visual aids in qualitative research have been shown to add additional stimuli for discussion within interviews or focus groups, generating rich, multidimensional data (Balmer et al., 2015). They can evoke a deeper level of consciousness from the participants, which can potentially result in unpredictable and new information being elicited (Harper, 2002). Utilising visual stumuli during

interviews may unlock rich stories and deep insights which may not have surfaced through traditional methods (Thomson, 2008). Furthermore, visual methods are recognised as being effective in addressing the power relations between the researcher and the researched (Packard, 2008). In seeking to address any preconcieved power relations and stay true to the inductive methodology, this study will utilise *participant*-chosen photographs as a visual stimulus for discussion.

6.5.2 Photo-Elicitation

Terminology regarding photo-elicitation methods is varied, encompassing photovoice, photonovella, photo-imaging interviewing and autophotography (Glaw et al., 2017). The use of photographs can enable the researcher to explore topics in a novel way whilst being responsive to the participant's own meanings (Bagnoli, 2009). Photo-elicitation can be a useful method when used in conjunction with interviews or focus groups because the photographs can trigger memories and elicit rich insights into an individual's experiences. This approach is aligned with the inductive methodology and phenomenological principles.

Photo-elicitation uses photographs taken by the researcher or by research participants as a stimulus or guide to obtain personal accounts of psychosocial phenomena (Frith and Harcourt, 2007), which centre around images that represent key experiences and issues that matter to them. Where the focus is on participant-chosen photographs, participants are invited to to take photographs to stimulate conversation regarding their individual accounts and experiences with the researcher during interviews (Harper, 2002). This approach acknowledges participants as best placed to describe their experiences, they can discuss their photographs in an order they wish, for any length of time (Packard, 2008). This process provides an opportunity for people to plan what they want to convey through photographs (Loeffler, 2005), meaning the participant has an active role in leading the interview (Meo, 2010). Although there will still be power imbalance, these methods address the issue to a greater extent than traditional interviews.

The researcher has a facilitative role during this dynamic process of interviewing, using probing questions to support the participant to frame and formulate their own answers (Shaw, 2020). This has a number of benefits including an improved researcher-participant relationship by building rapport and empowering the participant, facilitating expression, and enables capture of meaningful data by providing an visual aid memoir for prompting discussion in the interview (Edmondson and Pini, 2019; Pini et al., 2015).

Photo-elicitation has been employed in various disciplines including nursing (Riley and Manias, 2003; Edmondson and Pini, 2019), social work (Laws et al., 2018), psychology (Salmon, 2001) and education (Coussens et al., 2020). In mental health research, photo-elicitation has captured the lived experiences of participants who became authors of their own narratives, enabling them to reflect on their photographs (Erdner et al., 2009).

Research using photo-ellicitation has featured in a range of healthcare settings and occurred in all age groups covering cystic fibrosis management (Denford et al., 2019), oncology (Balmer et al., 2015; Pini et al., 2015), chronic disease management (Drew et al., 2010), end of life care (Tishelman et al., 2016), developmental disabilities (Coussens et al., 2020) and mental health conditions (Han and Oliffe, 2016) including eating disorders (Saunders and Eaton, 2018). Qualitative research in healthcare has provided a wealth of data related to the health service and policy, provided insight into the dynamics of interprofessional relationships and aspects of care delivery (Chafe, 2017). The importance in qualitative research in understanding meaning behind experiences makes it particularly valuable when exploring quality assessment and quality improvement in healthcare (Pope et al., 2002).

The overarching aim of this methodology is to bring the worlds of the participant and researcher closer together (Drew et al., 2010). The inclusion of photographs could bridge the gap between the social and cultural worlds of the researcher

and participants whilst providing an opportunity to challenge participants and explore new perspectives (Epstein et al., 2006). Photo-elictation has been shown to be a viable and worthwhile method many disciplines including medicine. Since this is a novel method for retainer adherence, the hope is that using photographs for the participants in this study will contribute to the existing literature surrounding retainer adherence.

6.5.3 Interviewing adolescents

Qualitative research with adolescents can be challenging for several reasons. Due to their stage of development, young people may struggle to articulate their experience clearly and power relations may be more pronounced (Råheim et al., 2016). Whilst many adolescents may have confidence, their maturity levels and willingness to cooperate inevitably varies. The use of photographs during interviews may serve as an additional pathway for communication, helping stimulate relevant dialogue.

Photo-elicitation may offer a entertaining and positive experience for children and young people in research. Using a methodology which empowers and values young peoples' contributions have been shown to be beneficial (Whiting, 2015) and help to build rapport. Photo-elicitation offers a unique opportunity to gain insights into the lives of young people, enhancing health professionals understanding of their perspectives (Whiting, 2015). This method encourages children to engage, share their experiences and express themselves freely (Ford et al., 2017).

6.5.4 Analysis

Identifying, analysing and reporting emerging patterns or themes for qualitative data requires an ordered and thorough methodological approach (Braun and Clarke, 2006). In general, analysing qualitative data involves extensive scrutiny, reading and familiarisation of the transcripts before seeking similarities within the manuscripts, finding patterns in responses and highlighting developing concepts

or themes. Data should derive directly from the participants themselves, as getting as close to the truth of the participants reality is fundamental to analysing qualitative data.

6.5.5 Interpretive Phenomenological Analysis

Originally developed by Jonathan Smith, IPA involves an explicit commitment to the extensive examination of individuals' experiences and perspectives whilst recognising the importance of context (Biggerstaff and Thompson, 2008; Smith, 2003; Smith, 2004). IPA is concerned with the personal account of an event or phenomena, seeking to ensure that the participants voices are given primacy. The use of IPA can be particularly valuable when exploring topics with a high degree of complexity, ambiguity or emotional connotations (Larkin et al., 2011)

Participants' individual experiences are forgrounded throughout the research process and any themes or patterns of meaning are understood against the backdrop of their personal contexts (Smith and Osborn, 2015). Researchers using IPA situate their analysis at the micro level in order to gain rich insights into participants' lived experiences (Pietkiewicz and Smith, 2012). Beginning with individuals' experiences and developing inductive theory from the ground up demonstrates a commitment to methodological congruence.

One strength of IPA is its versatility and idiographic nature (Smith and Osborn, 2015). It is versatile in that researchers respond to the diverse realities of participants' experiences and is idiographic in that it enables data to emerge from an emic perspective (Tuffour, 2017). Through this emic perspective, participants' voices are front and centre, whereby the researcher suspends judgement to allow for the phenomena to speak for itself. This suspension of judgment in phenomenological research is known as bracketing (Pietkiewicz and Smith, 2012). It has been argued, however, that bracketing out values and beliefs is neither possible nor desirable in qualitative research (Tufford and Newman, 2012). With the researcher acting as the instrument for data collection and

interpretation, it is impossible for them to divorce themselves from their values and beliefs, therefore data is co-constructed.

Some criticisms of IPA include whether it can accurately capture the meanings of experiences rather than opinions (Tuffour, 2017), whether the focus is realistically more descriptive that interpretive (Larkin et al., 2006) and whether its use is appropriate in focus group settings due to difficulty in extrapolating idiographic accounts (Love et al., 2020).

6.5.6 Sampling

Recruiting the participants themselves is an essential aspect of the research. The size of a sample should be flexible and responsive, depending on the quality of information gained from the interviews and the homogeneity of the participants (Malterud et al., 2016). For example, if the initial interviewees provide minimal information, more interviews may be useful to elicit quality data. This could be understood as a 'rolling sample size'. Interviewing a homogenous cohort, for instance one ethnic group or one gender, might only give a partial understanding of a particular phenomenon, and may not account for socio-cultural, racial, ethic, socio-economical and gender diversities.

There are various methods of sampling involving non-probability sampling, that encompasses purposive, snowball, convenience and quota sampling, and probability sampling such as simple random, cluster, stratified and systematic sampling (Palinkas et al., 2015). Non-probability sampling is useful in qualitative research as representing the population is not the aim of the research (Feild et al., 2006). Purposive sampling can be used to select participants with a specific purpose in mind, for example those with shared characteristics or shared experience of the phenomenon in question (Côté and Turgeon, 2005; Tong et al., 2007). Purposive sampling can also be used to gain maximum diversity in characteristics that may influence the experience. The aim of purposively choosing a diverse range of participants is to gain as much insight as possible

into a shared phenomenon, meaning the participants may be uniquely placed to answer the research question.

The sample is not necessarily predetermined because saturation of the data or themes may be reached before all of the intended participants are interviewed (Guest et al., 2020). Thematic saturation is said to have been reached when no new codes or themes can be analysed from the data, wheras data saturation describes the case where no further interviews are required to yeild new information or insights about a particular topic (Saunders et al., 2018). There are no objective means of quantifying when data or thematic saturation has been reached (Lowe et al., 2018), instead it is interpretative of the researcher to judge when they believe no further data is required to explain the phenomena. Despite its recognition as a useful tool, the terminology around data saturation and how it is used in qualitative resrearch is a controversial issue. It is unrealistic to expect or assume that any indepth interview will extensively explain the breadth and depth of every participants specific lived experience. Researchers should aim to clearly explain the form of saturation adopted in the context of their study, explain how they achieved it and how they decided that data saturation was determined (Sebele-Mpofu, 2020).

6.5.7 Research Integrity

The nature and purpose of the quantitative and qualitative methods are so different that it may be erroneous to apply the same criteria as to whether it is a high quality, valid piece of research (Krefting, 1991). Qualitative research does not arrive at data that can be statistically analysed or quantified numerically. Qualitative researchers are less concerned with generalisable data, but instead are committed to research intergrity, reflexivity and transparancy (Al-Busaidi, 2008). Reliability and validity in a qualitative context relate more closely to terms such as trustworthiness and transparency. Researchers need to be clear about what they are doing and why, the assumptions that may have informed their analysis and to include detail on their analytical methods (Attride-Stirling, 2001).

The term trustworthiness encompasses the quality, authenticity, and truthfulness of findings from the original research question (Cypress, 2017). Trustworthiness may also be assessed through credibility, transferability and dependability. These ideas are based on consistency, rigor and care when using the chosen methodology. Researchers should strive to reflect this through in an open and transparent account of the data findings whilst remaining mindful of the potential limitations of the research findings (Davies and Dodd, 2002). Transparancy in qualitative research is critical and in line with best practice (Tuval-Mashiach, 2016). It involves letting the study be data and participant led, enabling the pariticpants to do the talking, with a requirement of the methods and procedures to be explicit, clear and open (Shaw et al., 2019). The researchers role is to be a conduit for the voice of the participants to the intended audience.

To overcome potential of the analysis lacking validity or trustworthiness, it is important for the researcher to bring emerging ideas to supervisory meetings, and discuss them with colleagues. Transcripts may be shown to other members of the supervisory team, and discussed to ensure similar themes and interpretation of the data occurs. Member checking may also a tool utilised to ensure the researchers interpretation of participants views accurately reflects the participants points and may enhance trustworthiness (Birt, Linda et al., 2016).

6.5.8 Reflexivity

Reflexivity denotes a researcher's commitment to self-analysis and reflective evaluation of ones' own values and beliefs throughout the research process, and recognition that their values will inevitably permeate the study (Dodgson, 2019). As the researcher is a prime instrument in data collection, they must be acknowledged as a co-creator of the data with the participant. Paradigmatic, epistemological and ontological assumptions inescapably inform data collection and analysis (Braun and Clarke, 2021), with different researchers interpreting themes or events differently based on their own unique subjectivities.

Reflexivity improves the credibility of the research findings (Giacomini and Cook, 2000; Mays and Pope, 2000). Personal reflexivity can be demonstrated through self-analysis and reflective evaluation of ones' own values and beliefs during the research process (Clarke and Braun, 2013), for example through reflective logs and reflexive journaling.

7 Methods

This chapter will provide an overview of the aims and objectives, methodology and methods as well as discuss ethics and data analysis.

7.1 Aim

The study aims to explore young people's experience of orthodontic retention immediately after completion of orthodontic treatment.

7.2 Objectives

The objectives are to investigate how young people's experience of wearing retainers might affect adherence to retention and identify potential mechanisms for improving adherence.

7.3 Study design

The study design is a interpretatavist qualitative study using photo-elicitation to facilitate data collection and interpretative phenomenological analysis to analyse the data.

7.4 Qualitative approach and research paradigm

The researcher in this study adopts a relativist ontology, constructivist epistemology and interpretivist methodology. Individuals' reality and knowledge of the world is both unique to them and socially constructed, therefore the interpretative methodology was deemed the most appropriate as it is sympathetic to individuals' lived experience.

7.5 Sample

The population of interest was young people aged 13-18 years old who were due for completion of orthodontic treatment and almost ready for provision of orthodontic retainers. Eligibility criteria included adolescents aged 13-18 years, English speaking, of any gender, treated at either unit, for any duration of time.

All ethnicities were included, and use of any type of retainers (bonded, vacuum-formed, Hawley or a combination). Exclusion criteria included young people with craniofacial abnormalities and those undergoing cleft or orthognathic treatment.

Table 3: Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
• 13-18 years old • English language • Any gender • Completed orthodontic treatment • Any type of retainer (bonded, VFR, Hawley or combination)	• Non-fluent in English • People with craniofacial abnormalities • People with cleft-lip and/or palate • People undergoing orthognathic treatment

Purposive sampling with a maximum variation sampling framework was used to gain diversity in characteristics that may influence the experience of orthodontic retention, these included: age, gender, ethnicity, type of appliance and type of retainer. This sampling technique was required due to the necessity to access a particular subset of people who had experienced orthodontic treatment within a week of interview.

Initially the sample chosen was of consecutive people due for appliance removal, based on the inclusion criteria. However, as the study progressed, it was clear males were less inclined to consent for interviews. Therefore, there was a deliberate attempt to identify male participants to take part in the study.

7.6 Setting

Study participants were identified from two teaching hospitals in Yorkshire, Leeds Dental Institute and Bradford Hospitals NHS Teaching Trust. Bradford Hospitals NHS Teaching Trust is responsible for providing services for the people of Bradford and local communities, whilst Leeds Dental Institute look after patients

from Leeds and the surrounding region. They both serve a large population and may take referrals outside of the region from other consultants.

As of 2021, Leeds was the fourth most densely populated area of Yorkshire and Humber, with reported dental disease being significantly high (Public Health England, 2021). In Leeds, 65% of young people will have experienced tooth decay in some of their adult teeth by the age of 14 years. Comparisons of children from different ethnic groups in Leeds have shown that children from a Pakistani or Bangladeshi background have the poorest levels of dental health, including high levels of tooth decay (Public Health England, 2021). Compared to the UK average, Leeds and Bradford have higher proportions of the population living in the lower two quintiles of deprivation with Leeds being 45-55% and Bradford even higher at 63.3%. Dental decay is closely associated to social deprivation, with Leeds recording more 3-year-old children with tooth decay than the UK average. Children in Bradford have the highest prevalence of decay amongst 5-year-olds, significantly higher than Yorkshire and Humber, or nationally (Public Health England, 2015). The experience of the participants of this study may differ to those in other socio-economic groups (Arpey et al., 2017).

The population treated at Leeds includes various cultural and ethnic backgrounds, half reporting white ethnicities and the remaining half reporting Asian, Black and Mixed ethnic groups (Office for National Statistics, 2021). The department at Bradford Hospitals NHS Teaching Trust treats a population that is more ethnically and culturally diverse, with Bradford's demographic having the largest proportion of people of Pakistani ethnic origin in England (Office for National Statistics, 2021).

Most people accepted for specialist care are those requiring a hospital-based consultant-led treatment plan and are usually children with a high need for treatment. Both orthodontic units involved in the study primarily treat complex and high need patients who are either unsuitable to be treated in primary care or

who are appropriate for postgraduate training. The experience of the participants will vary to those treated in specialist practice or on a private basis.

7.7 Ethical approval

The research was conducted in accordance with the principles outlined in the Helsinki Agreement (World Medical Association, 2013). NHS ethical approval for the research was granted in June 2018 (IRAS number: 240992). An amendment was requested in 2020 following a change from face-to-face to virtual data collection as a result of the Covid-19 pandemic. Ethical approval was granted in January 2021 by the HRA (East of England - Cambridgeshire and Hertfordshire Research Ethics Committee [18/EE/0140].

7.8 Recruitment and Consent

Figure 2: Stages of recruitment and consent

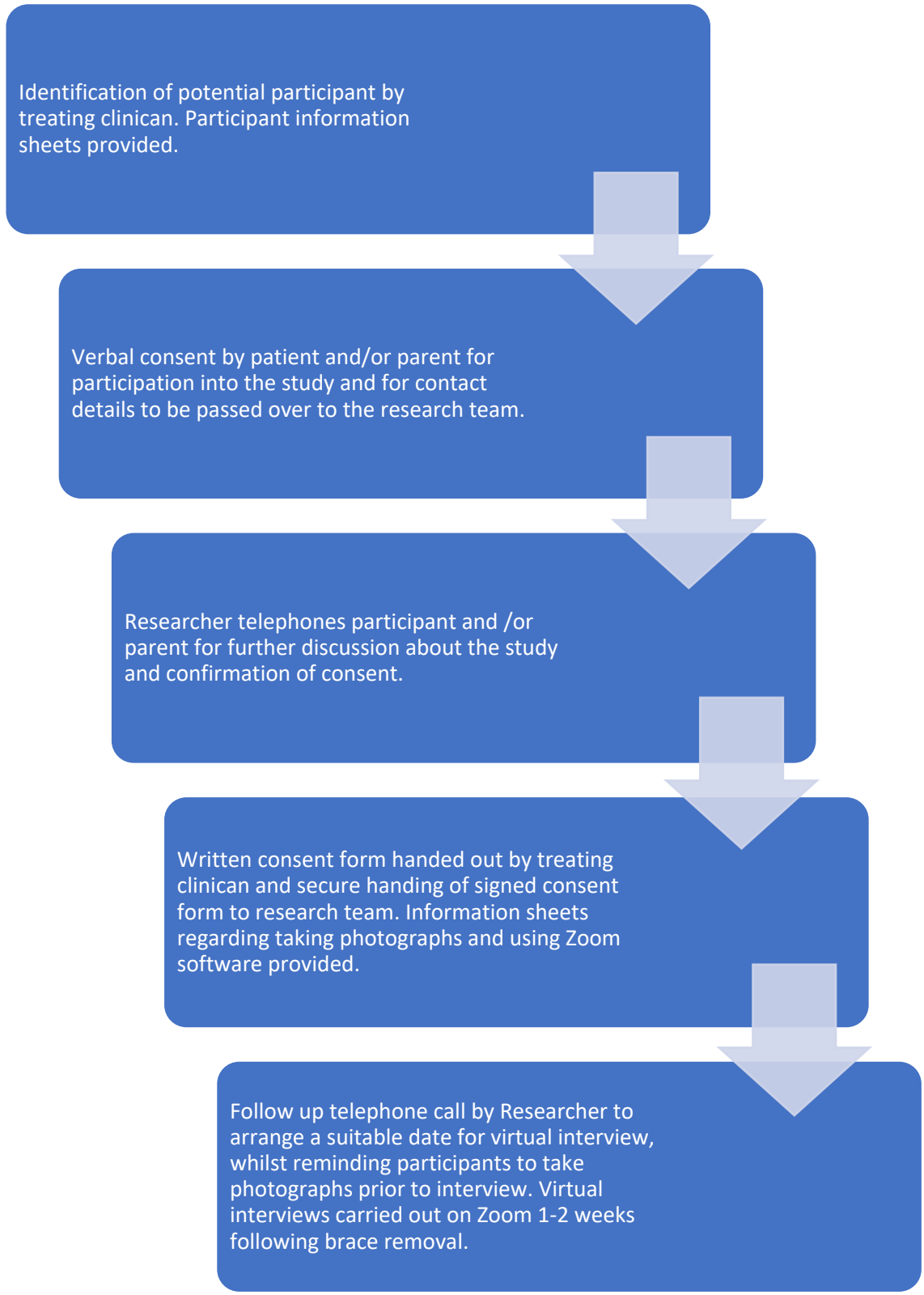


Figure 2 shows how participants moved through the stages of recruitment and data collection. The primary researcher did not work at Bradford Hospitals NHS Teaching Trust, and rarely had any clinical interaction with patients close to appliance removal at Leeds Dental Institute as she was in the early stage of her training. The researcher did not recruit any participants she had treated herself. Clinicians involved in recruitment included orthodontic therapists, consultants, and specialty registrars. The fact the researcher was removed from the clinical experience of the patient is potentially advantageous to this study as it may remove the barriers regarding freedom of expression.

7.9 Data collection

Data was collected through individual interviews using photo-elicitation. Interviews were undertaken 1-2 weeks after completion of orthodontic treatment and provision of retainers. The primary researcher was solely responsible for carrying out the interviews.

7.9.1 The photo-elicitation interview process

Semi-structured, one-to-one interviews were the principal means of data collection. Due to COVID-19 restrictions, interviews were undertaken by the primary researcher using a virtual platform, Zoom. This was to protect both patients and staff during the pandemic. Photo-elicitation was used, which involved the participant taking their own photographs and sharing them during the interview to aid conversation. Prompt questions were used where necessary. The next section will describe the photo-elicitation interview process in further detail.

7.9.1.1 Photographs

The young person was given clear, standard written instruction and verbal explanation regarding taking their photographs (Appendix 1). Understanding of these instructions was checked by the researcher and further information provided as necessary. Participants were asked to request verbal consent from

other people who they wish to be in a photograph. If the researchers wish to use photographs with other people in for uses outside the interview, additional written consent will be sought. The participant was able to use any personal device such as a camera, phone, or tablet to take the photographs. The photographs were stored on their device until the time of the interview.

The participant was asked to take photographs over a one-week period prior to interview of *'anything that they think is important to them about their retainers'*. This included any object, setting or person they felt helped to explain their experience. The participant was asked to email their photographs to a secure email address prior to the interview.

During the interviews, these photographs were shared on screen so that the researcher and participant could both view them. They could be discussed in any order at the participants discretion. The photographs were only used as a visual aid to enhance the discussion during interviews. Image content was not analysed, just described, as their purpose in the study was to support engagement and enhance conversation.

7.9.1.2 Interviews

The nature of the interviews was informal, open and conversational. Questions were not limited to the available prompt questions, instead questioning was participant-led and flexible. Parents were permitted to join the Zoom interview if the participant felt it was necessary.

Prompt questions used in relation to the photographs included:

- Can you tell me what is in this photo?
- Why have you chosen this particular image?
- What did you want to show me with this photo?
- What else could have been included in this photo?
- In what way is this photo linked to your retainers?
- Are there any photos you'd like to have taken that you weren't able to?

7.10 Data management

All data was collected and processed in accordance with the University of Leeds Data Protection Code of Practice. Personal data and research data were stored securely with close attention paid to anonymity and confidentiality.

7.10.1 Personal Data

Contact details included telephone numbers and email addresses depending on participant preference. Contact details were transferred to the researcher by the direct clinical care team using secure nhs.net email addresses. Contact details were stored for the duration of the research only, using the University of Leeds secure drive in a database that is separate to all other research data.

On entering the study, participants were given a unique study identifier. This was used on all study documentation to ensure anonymity and was kept separately to name and contact details. Only the researcher was able to link the study identifier to the participant's name and contact details.

Written consent forms from Leeds and Bradford with participant name and signature were stored in a locked drawer in a password protected room in the University of Leeds School of Dentistry. This office is a shared office with other NHS staff and had restricted access.

7.10.2 Research Data

The study identifier was used to label audio-recordings. Transcription of video and audio-recordings were performed using the autotranscription function on Zoom. These video files, audio-recordings and transcriptions were stored on the encrypted University of Leeds secure OneDrive. Video and audio-recordings were only accessible to the research team and will be deleted at the end of the study.

The photographs were stored on a secure OneDrive of University of Leeds. Only the research team has access to the photographs. The photographs will be stored for the duration of the study (approximately 2.5 years from commencement). Photographs were collected, processed and stored in accordance with the Data Protection Act 1998. For anonymity, participants have been provided with pseudonyms.

7.11 Data analysis and method

The analysis method used to interpret the data was IPA, as described by Jonathan Smith (Smith, 2003). The verbal content of the interview constituted the data for analysis. Photographs were not analysed for content, but simply used as an interview prompt.

Phrases such as ‘themes’ and ‘sub-themes or superordinate themes’ are commonly used and well reported in qualitative literature. New phrasing for IPA described by Smith (2007) suggests the term ‘experiential statements’ instead of ‘themes’ and prefers the term ‘Personal Experiential Themes’ instead of ‘subthemes’. However, for the purpose of this study, the term ‘themes’ supported with rich description will be used to describe the data.

Researchers try to immerse themselves in the data, observing and reflecting on the individual accounts and language used. The focus is on analysing the individual transcripts before synthesizing interpretations. The interviews were read several times and coded by the researcher. Developing codes were cross checked with supervisors within the research team and discussion had on the developing codes. This allowed varied perspective of the interviews and ensured the developing codes were in line with the data and demonstrates credibility. Codes were grouped into broader themes with paralleling reflexive comments made from each transcript. The analytical process was conducted alongside on-going interviews, meaning that interviews were coded before other interviews had

started. This allowed the researcher to determine when data saturation was reached.

7.11.1 Analytical process

1. **Management of the data, familiarisation with transcripts and noting initial analytic observations [primary researcher- from home].**

The researcher listened and re-listened to the audio recordings numerous times, read and re-read the transcriptions and started to make sense of the data. The researcher highlighted sentences, phrases or words that explained young peoples' experience.

Reflexive Box 1: Step 1 of analytical process

Immediately following each interview, I made initial notes based on my early interpretations of the key issues and nuances raised during the interview. This was done prior to transcribing the audio recordings. The fact I already had some bullet points written down allowed me to begin the analysis in real time and in parallel with data collection. It provided some immediacy of data analysis against which I could compare my more detailed analysis later.

2. **Reading, note- taking and identifying emerging ideas to form initial codes [primary researcher, input from supervisors: SB and SP- during virtual meetings and independently at home].**

The researcher read each line of each transcript in turn, making notes as 'comments' beside the sentences where appropriate. She reflected both on her style of questioning and on the participant's responses. The researcher highlighted interesting phrases, language and phenomena that the participants described.

Reflexive Box 2: Step 2 of analytical process

Critically reflecting on my line of questioning and prompts was helpful in improving my self-awareness. With each interview I conducted, I had a heightened awareness of my capacity to influence the data. As a result, I

tried to keep my questioning as open as possible to increase the space for the participant to express themselves. For example, I used fewer guiding questions and fewer prompts, giving the participant to think and respond in a more authentic way.

3. **Describe and generate themes from each data set in turn [primary researcher, input from supervisors: SB and SP- during virtual meetings and independently from home]**

The researcher collated the codes and started to group them together without any specific title. After approximately 5 interviews, the research team discussed codes and potential subthemes to understand the essence of the participants data.

Reflexive Box 3: Step 3 of analytical process

By the 5th interview some early themes were developed, and this seemed like an appropriate point in time to raise these with my supervisors. Although there were a wide range of codes, I was starting to notice some shared commonalities between the issues they raised, such as fear of relapse and the need for routines.

4. **Developing and defining subthemes [primary researcher, input from supervisors: SB and SP- during virtual meetings and independently from home]**

In conjunction with the supervisors, the researcher developed themes from the initial codes. These themes comprised groupings of various codes belonging to the same phenomena where possible. The aim was to develop a conceptual map based on the wide variety of codes.

Reflexive Box 4: Step 4 of analytical process

As a researcher, I struggled initially to amalgamate the codes into overarching themes, in part this is due to being a novice researcher, but also as I was sensitive about not diluting any of the nuanced codes. I struggled to know what constitutes a code, and what aspects of the young

peoples' experiences should overlap. Communicating the complexity of data into a manageable document was challenging, and inevitably required data reduction, which I struggled with. Reducing over 100 codes into 3 overarching themes went against my initial instincts to report detail.

5. **Interpretation of themes [primary researcher- at home]**

Development of the themes occurred toward the end of recruitment. Giving the themes titles took significant thought due to the overlap between different phenomena. Some ideas were considered as part of other themes before eventually finding their final place. For example, when first generating themes, there was four in mind, with 'perceived challenges to retainer adherence' being an additional theme being considered. Following further analysis, the theme and associated concepts within it were thoughtfully distributed within the other themes.

Reflexive Box 5: Step 5 of analytical process

When it came to deciding on the specific titles of themes, the title 'internal motivation' was considered as well as 'intrinsic motivation'. Upon discussion with my supervisor, we felt that 'internal' encompasses the factors that drive the individual, which could be influenced by environmental and social factors as well as more innate motivation. The term 'intrinsic' is well-described in the motivation literature, but describes a motivation that is more innate, describing something you are born with. Individuals may not have an innate drive to wear retainers, but they may have an innate motivation to have straight teeth and a good appearance. When considering aspects of the theme 'motivators', the concept of self-determination was developed to describe an individuals' ability to make choices and manage their own lives. Before this, phrases such as self-management, attitudes, behaviour and trade-offs were considered.

6. **Representing the data and writing up findings [primary researcher- at home]**

This research project has been undertaken over the course of two years, beginning in 2020. The initial literature review started prior to the recruitment of any participants and whilst awaiting ethical approval. During this time, the researcher has developed a much more comprehensive understanding of the essence of qualitative research.

Reflexive Box 6: Step 6 of analytical process

I tried to start broad with my literature review, focusing on what I anticipated the reader would need to know. I attempted to provide contextual information based on the title of my study. Undertaking the literature review not only enabled me to provide a logical dissertation report but this process also formed the foundation of my learning. Having never studied qualitative approaches before, I felt there was knowledge gap which I filled through professional training and perseverance. As a practice-oriented clinician, I have found the academic side of research both rewarding and challenging. I have since developed a keen interest in qualitative methodologies, as it is an underutilised approach in orthodontics. I am convinced that the patient voice is invaluable in enhancing future clinical practice.

7.12 Training and reflexivity

7.12.1 Training

The researcher undertook additional formal training with the Social Research Association (SRA) and had one-to-one informal training by one of the research supervisors Simon Pini (Qualitative Researcher), in preparation for undertaking this study. During this training, two mock interviews were facilitated, one where the researcher adopted the role of a participant and another where she adopted the role of the interviewer. Feedback from these mock interviews helped to prepare the researcher for the actualities of conducting qualitative interviews in the virtual environment.

Reflection of SRA training

I attended a course by SRA titled 'Interpreting and writing up qualitative research' in August 2021, which was provided remotely. There was plenty of discussion around needing to understand the participant's lived experiences and teaching about how to write in a way that is meaningful to the audience whilst remaining faithful to the participants' truth. This was something I really wanted to achieve, to be the bridge between the participants voice and the reader. Recognising this responsibility was an exciting challenge, however, trying to understand how I would be able to convey the voice of the participants onto paper in a way that is academic style was quite overwhelming to me. To achieve higher level analysis, we were advised to go beyond coding, focusing on analytic codes, theoretical codes and looking as deep into phenomena as possible.

Reflection of mock interview

To test out the functions on Zoom and the process of arranging the interviews, I chose to do a practice run with my nephew who was 14. The title I gave him was 'How do you cope with lockdowns and COVID-19". I gave him a week to take photographs on this topic and then using the exact methods above, I went through the entire process with him as if I was doing it for real. I had some initial issues with the auto-transcription service on Zoom and the place in which the audio and video files were saving. Being able to pause the interview to sort issues out during the conversation was helpful. My nephew is quite introvert and shy, even during this mock interview, I found that using the photos did help him to share his experience a lot more, but that open questioning was more challenging than I thought with a teenager.

Re-watching our video helped me to reflect on my body language, my style of questioning and enabled me to reflect on how to improve my technique for the real interviews. I was also able to get some feedback from my nephew on the ease of the process from his side. We concluded that sharing the photos on a word document, with numbers by the side, meant he could choose to talk about

the photos in any order by saying the number, rather than me driving the discussion by me asking 'tell me about your photo of X'.

7.12.2 Reflexivity

For qualitative studies, it is essential that the researcher identifies and reflects on their position relative to the data, to recognise the inevitability that their own personal circumstances or preconceived ideas will influence the entire research process.

My personal attributes and position of being a trainee orthodontist would have had an influence on, data collection, the participants and their responses during interviews and the data analysis process. My knowledge of retainer wear and adherence has been socially constructed, much like the participants' experiences have been shaped by ongoing dialogue with the world around them. Although I entered the research process with an open mind, my interpretation of the results will unavoidably pass through my own subjective lens. The idea of reflexivity is not to counteract the subjectivity but embrace it as an inevitable feature of qualitative research. The themes have been developed through my interpretation of the dialogue between myself and the participants. Therefore, the data was co-constructed.

The only interaction I had with the participants was via telephone or virtually on Zoom. As a novice researcher, learning about qualitative research alongside clinical training posed challenges. I kept a reflective and reflexive log, with monthly supervisory meetings providing ample opportunity for discussion on progress. Immediately after each interview, I made notes on the key content and initial findings, as well as reflections on how I had "performed" as an interviewer, focusing on what I had learned and how I could improve future interviews. Prior to any subsequent interviews, I reviewed the notes from previous interviews to remind me, for example, about keeping questions more open-ended and affording participants the time to respond without feeling rushed. My confidence and ability to probe participants with more open questions developed over time

and with experience. This may have meant that the young people in latter interviews may have benefitted from my increased competence and confidence, meaning questions were explored in more detail.

My role as a clinical practitioner, qualified dentist and someone who has worn retainers in the past would have influenced data collection and data analysis. For instance, due to my own lived experience of wearing retainers, I may have been more empathic towards participants' experiences of discomfort and may have been more agreeable and sensitive to the points they raised. During the virtual interviews, I chose to wear non-clinical clothing and introduced myself as a researcher rather than clinician, with the view to maximise participants' comfort levels (Longstaff et al., 2021). For instance, if I had worn scrubs it is conceivable that the participants may have viewed me as a clinician, which could have hindered participants' openness. Participants might have been less confident to reveal their true experiences due to feeling like they are being interviewed and potentially judged by a clinician. Instead, participants were made aware that I was learning to become an orthodontist and completing the research as part of my training.

One of the challenges of conducting this study was that I had full-time clinical work commitments and the participants had various extra-curricular activities after school or college. This left a small window of opportunity to conduct the interviews during the evenings. Conducting interviews for young people during a pandemic and fitting these around their personal and social commitments was challenging.

In addition to reflexivity, qualitative researchers also use other techniques to demonstrate trustworthiness. Qualitative studies must show research integrity and demonstrate that data analysis has been conducted consistently and comprehensively, disclosing a detailed account of the methods of analysis. In this study, credibility of data analysis was enhanced through discussion and peer-debriefing with the supervisory team, as well as reflective journaling throughout.

8 Results

This chapter highlights the participant characteristics, discusses the researcher's and participants' experience of photo-elicitation and introduces the three themes developed in the analysis including: (1) Experience of wearing retainers, (2) Adapting to retainers and (3) Motivators for retainer wear adherence.

8.1 Participant characteristics

Table 4 shows the participant characteristics. A total of 23 people were initially approached to take part in the study, from which 12 agreed to take part and were interviewed. Reasons potential participants gave for not wishing to take part included a disinterest to engage in communication with the research team and changing their mind following further information that they did not want, or have time, to be interviewed.

All participants were aged 16-18 years old, except for one participant who was 14. The majority of participants were female (75%) and, whilst the high proportion of females does not represent the gender distribution of UK adolescent orthodontic patients (Chestnutt et al., 2006), this ratio is consistent with other research findings that females are more likely than males to participate in health research (Lobato et al., 2014; Curtin et al., 2000). Longstaff et al. (2021) similarly found that females were more likely to participate in qualitative interviews related to orthodontics.

The respondents had some variation in ethnic backgrounds. This may not reflect the diverse demographics of people who receive orthodontics in Leeds and Bradford, or those who are willing to participate in research. The evidence around research participation based on ethnicity varies, some studies found no racial differences (Wendler et al., 2006). Cottler et al. (2013) however, found black ethnic groups to have high willingness to participate in health research and Shavers et al. (2002) found white ethnicities to be highest. A significant

percentage of young people interviewed were of Asian background, for which there is limited research on the participation of these groups in qualitative research.

Interviews were conducted between September 2021 to March 2022, and interviews typically lasted from around 30 to 50 minutes. During two of the interviews, the participants' mothers were present intermittently for parts of the conversation (Lydia and Ava). Participants have been provided with pseudonyms, which have been created to reflect their gender and ethnicity (Allen and Wiles, 2015).

Table 4: Participant Characteristics

Name	Hospital	Gender	Age	Ethnicity	Number and type of retainer
Rosie	Leeds	Female	18	White	1x upper and lower clear plastic retainers (2 in total)
Charlotte	Leeds	Female	17	White	1 x lower bonded retainer 1x upper and lower clear plastic retainers (3 in total)
Jade	Leeds	Female	16	Mixed race (White/Chinese)	1x upper and lower clear plastic retainers (2 in total)
Lucy	Bradford	Female	16	White	2 x upper and lower clear plastic retainers (4 in total)
Lydia	Leeds	Female	14	White	1x upper and lower clear plastic retainers (2 in total)

Ava	Bradford	Female	18	White	2 x upper and lower clear plastic retainers (4 in total)
Sabrina	Leeds	Female	17	White	1x upper and lower clear plastic retainers (2 in total)
Theo	Leeds	Male	18	White	1x upper and lower clear plastic retainers (2 in total)
Harshini	Bradford	Female	17	Indian	2 x upper and lower clear plastic retainers (4 in total)
Jahan	Leeds	Male	16	Indian	2 x upper clear plastic retainers (2 in total)
Uditi	Bradford	Female	18	Indian	2 x upper clear plastic retainers (2 in total)
Matthew	Leeds	Male	16	White	1x upper and lower clear plastic retainers (2 in total)

8.2 Photo-elicitation and participant experience

Participants' engagement with the photo-elicitation opportunity was positive. Of the 12 young people interviewed, 11 bought their own photographs to the virtual interview, and were all able to discuss them with the researcher. There was 1 individual who did not bring any photographs, an 18-year-old male. A summary of the respondents' photographs is evidenced in the appendices.

Overall, the photographs effectively stimulated discussion and were useful as a prompt for conversation during virtual interviews. In addition to encouraging people to elaborate on the photographs they had taken, participants were also encouraged to discuss potential imaginary photographs they may have taken had they had more time. This strategy was particularly useful when interviewing participants who had brought a small number of photographs, as highlighted below:

> Researcher: So, talk to me about any other photos that you thought of sending, if I gave you another week to take more pictures, what would you want to take photos of?
> Participant: I know it sounds silly but KFC, because it's my favourite, I had that every single day after college, it's my go to like comfort food, and you know like if I had my retainer in, in then that would stop me. I would take pictures… of hard candy, like sweets and stuff like that, because I wouldn't be able to eat that either. I'd take pictures of my water bottle because I feel like that's the only safe kind of drink that I could have with my retainers, milk as well. I'd take a photo of hot drinks and stuff like that because obviously I'd have to take it off to drink it.

In this case, although there was no direct conversation specific to actual photographs taken by the participant, talking about imaginary photographs in this way still stimulated meaningful discussion and illustrated the participant's lived experience. Only 1 participant did not bring any photographs to the interviews. When politely questioned about why he chose not to bring any photographs, he commented that he might feel unsure what to take photographs of:

> Researcher: Do you find it like a bit of an unusual request from me to ask you to take photos?
> Theo: No, I can clearly understand why you're asking for those, to see what's what, but I don't know why, I personally… I wouldn't know what to take a photo of. You'd just be getting some type of cheesy smile I think!
> Researcher: Why would you take a picture of your cheesy smile, like what would be the reason you took that photo, to say what?

Theo: That they work.

Researcher: That the retainers work?

Theo: That if you wear them, they keep your teeth in line. So, it just proves that actually, if you're wearing it, your sorted.

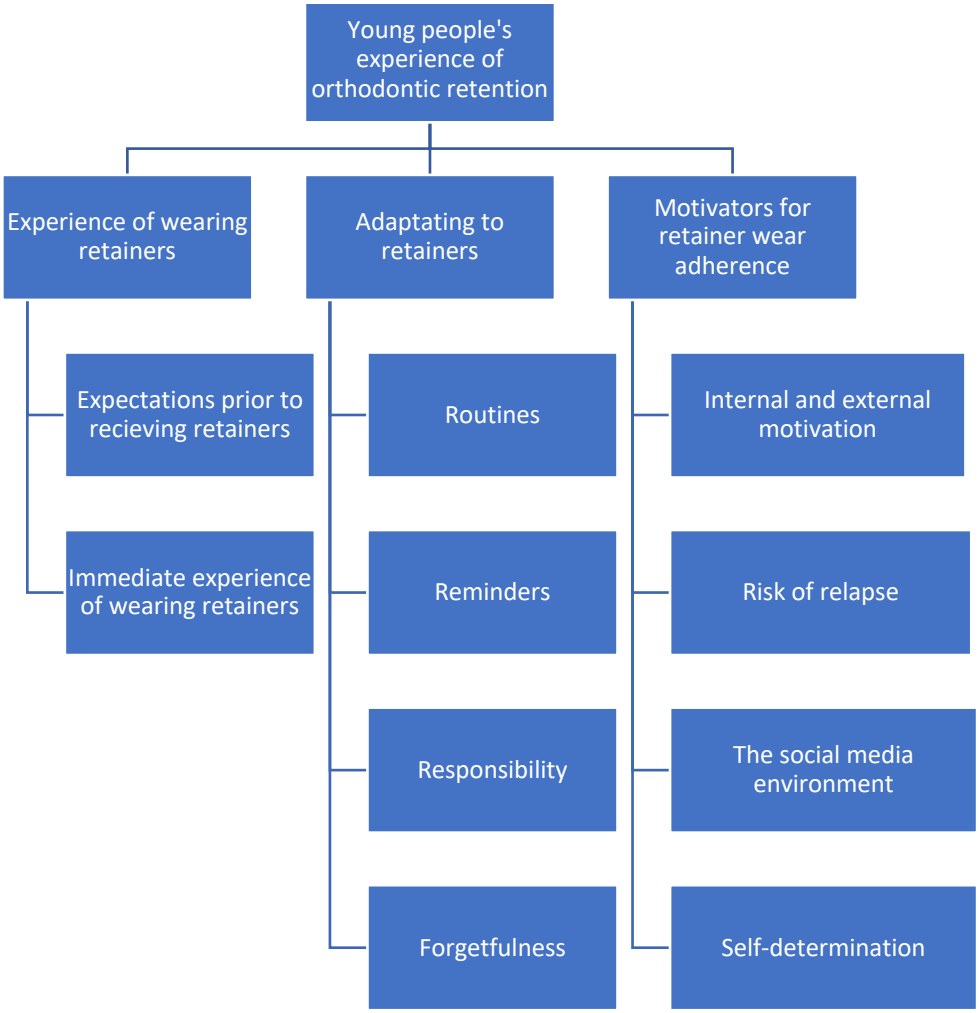
It is unknown whether discussing self-taken photographs may have helped to explore the discussed phenomena in more depth. This participant was an 18-year-old male healthcare worker. He worked long shifts and our interview was late into the evening.

8.3 Themes

Three overarching themes were developed to describe young people's immediate term experience of orthodontic retention (Figure 3) and will be described alongside verbatim quotes.

Factors associated with young people's experience of orthodontic retention are complex and multifaceted. Despite Figure 3 presenting these factors as conceptually discrete, they invariably overlap. For example, the process of adapting to retainers using 'reminders' and 'routines' helps young people to avoid the 'risk of relapse' which, in turn, leads to changes in their 'attitudes and behaviours'. From the outset, it is important to note that each of the factors identified in Figure 3 contribute to young people's experiences. This figure depicts a 'web of influential factors' that do not occur in isolation.

Figure 3: Summary of the themes



8.3.1 Theme 1: Experience of wearing retainers

The first theme describes young people's experience of wearing retainers. This theme presents issues pertaining to young people's expectations, which was a combination of their own experience and the experience of others. Also presented within this theme are young people's immediate physical and social experiences of retainers and how these correlated with their expectations.

8.3.1.1 Expectations of retainers

Young people's expectations about retainers developed from their own and their peers' experience of orthodontic treatment, as well as parental assumptions about retainer wear.

For the young people in this study, prior experience with orthodontic appliances had a direct impact on their expectations of what it might be like to wear retainers. For example, Jahan explained that, because he had previously worn a functional brace, he felt comfortable with the idea of wearing retainers and confident that he *"could use them straight away",* explaining that his previous experience with removable functional appliances made retainers seem straightforward to wear. Similarly, Harshini compared her experiences of orthodontic treatment to her retainers, with her retainer feeling less bulky and "*much more convenient*". She elaborated on the ease of using retainers during the night as opposed to full-time, and explained the key differences between the two:

> *I don't have anything big in my mouth or anything, like you could see it from afar, cause in the blocks you could tell that I had something in my mouth, and it was quite hard to talk with and then my jaw would hurt from it. So, I feel like even though they are both removable, with my twin blocks I was advised to wear them all the time, 24 hours. But obviously with the retainers it's half the time. That time I'm asleep so it doesn't really cause it any inconvenience for me- Harshini*

Reflexive Box 7: Harshini

Getting a balance between building rapport and developing a new researcher-patient relationship with a teenager through virtual means was challenging. I found it testing to be relatable, but not too over familiar with Harshini, as it was our first encounter meeting face to face through the screen. Upon reflection I perhaps contributed to the fast-paced nature of the conversation and instead of speaking at the same rate as her, I could have tried to slow myself down so that she could instead model my pace. I also made the mistake of asking multiple small questions within one question. Instead, I need to develop the skills to break down each individual question and probe a bit more around the details to unpick phenomena further.

Charlotte's experience of wearing fixed appliances meant she had some understanding of what to expect when wearing a bonded retainer: *"I think maybe if food gets behind it, but I mean I've had braces, so I know how to deal with that".* Having used removable appliances previously, Jahan found his experience prepared him for his retainers:

> *When I had my removable ones, for like a month, I went to Australia, so I know what it was like, I just had to make sure I put in at night. So, it just would be the same experiences with my retainers- Jahan*

On the contrary, Theo reported feeling apprehensive about wearing his retainers on the first night despite having worn fixed appliances. He felt his prior experience of wearing fixed appliances had not prepared him for removable retainers:

> *Yeah, the first night, you know, didn't expect to know what to do, what to expect putting them in and the rest of it, but it is alright, second night you have, you know, you're expecting to know more about what is going to happen- Theo*

The information provided by the Orthodontist is important and building on previous knowledge helps young people to manage their expectations, as Jahan explained:

> *[The Orthodontist] explained them in like, with real detail, so I knew what they were going to be like. He just he just said to me, they're gonna be like when you first had removable ones. So that made me feel comfortable with them when I first had them- Jahan*

Young people reported that their expectations of retainers are informed by their peers' reported experience of retainer wear. For instance, based on what Rosie had heard from others, she was concerned that getting used to retainers would take longer than it did:

> *It's gone better than what I thought it was going to, because I did think that from what I've heard that people said, it did take like a couple of weeks to get used to them, but I've seems to have got used to them a lot quicker- Rosie*

Rosie explains how her expectations were shaped by her previous wear of a removable appliance, however, her peers' experience helped her to manage her expectations in preparation for retainers:

> *Because most of my friends have had them like before for me so. If I'd not seen other people have them, I would have assumed it was like what I had before I had my train tracks, which were like a red plate with like metal wires around- Rosie*

Apprehensions about retainer wear based on the reported experience of their peers did not always correspond with their own lived experiences. For example, Harshini had been informed by others that she would develop a lisp whilst wearing retainers, but did not experience this herself:

> *A lot of people have told me that, like, you get at lisp when you have you your retainers in, but I haven't experienced that- Harshini*

Other people's experiences appeared to be mostly helpful for young people in this study. Harshini was given some advice by her friend who did not wear her retainer:

> *One of my friends, she didn't wear her bottom retainer. She wore a top retainer because she lost it for a while. The teeth had started moving and she was like, 'I really regret not wearing them cause my teeth have gotten quite crooked now so just, like, keep them in, like, I would just suggest for the first two weeks in, it is really important for you just, like, have them in your mouth'- Harshini*

Ava explained that she did not have the support of others who had experienced wearing retainers, which led to feelings of isolation:

> *I'm the first one to go through it and nobody knows what it was like to have braces. So, I kind of already feel like a bit alone because nobody, nobody's got any advice- Ava*

There seemed to be some unfamiliarity surrounding retainer wear from older generations such as parents. In most instances, parents were supportive of their children wearing retainers. However, for some, there was a lack of understanding surrounding the idea of lifelong retention. Ava found herself explaining the importance of them to her father:

> *He thinks it's a really good idea and I should wear it…he did say he was surprised that you have to wear it for so long afterwards. I just explained to him, like you have to- Ava*

Parental influence is an important factor affecting young people's perceptions of retainer wear, but young people's experiences of parental support is widely varied. Some parents have their own expectations and assumptions; however, these do not always match the reality of their child's lived experience. For instance, Harshini explained that her parents assumed she would have a lisp:

They just assumed that when I had my retainers in that, like, I'd have a lisp and talk funny and stuff like that, but when I have the retainers in, I don't think they even realize that I have them in, yeah so, they don't really have an opinion about them- Harshini

Young people learn about retainer wear through the internet, which also shapes expectations. Information and learning from experience sharing occurs on different social media platforms that are widely used by young people. Theo explained how gaining information in digital age is normalised:

You learn I think, I've learned. You learn a lot. I think because I've been on the internet since I can remember. And so, I'm a generation of like, I've grown up with the internet I've done all of that, since the age of, like, eight I have had a phone. I think on the internet, you learn a lot, you learn a lot of information- Theo

8.3.1.2 Immediate experience of wearing retainers

Factors which affect young people's immediate experiences of retainers also included the physical and social implications of wearing them. Young people described the unfamiliar process of transitioning from braces to retainers, with expressions such as 'weird' being used to describe their experience:

I think they look quite nice, like to begin with it was a bit weird, but like, after a few days, like I like them. Like it felt nice, like they fit with my teeth, I liked them- Jade

The physical appearance of the retainers was not an issue, instead young people described them as being discreet:

I don't think you can notice them really. But yeah, they don't look bad, I mean you can't even notice them, they are good, they are so clear, you can't really see anything wrong- Theo

The physical impact of retainers on young people's quality of life varied. Some experiences were expected, whilst others were unforeseen. Common physical experiences of the removable retainers included "*discomfort"* and feeling "*tight*". Other criticisms of the retainers were described. Harshini disliked the unexpected sensations of hypersalivation and felt *"quite thirsty"* whilst wearing her retainers:

> *The first night it was quite weird, like I realized I'm salivating quite a bit, and I was like no one told me that, my mum didn't. I literally called my friends and was like no one told me I was going to drool so much, so I wasn't expecting that- Harshini*

Charlotte found her bonded retainer to cause some initial physical challenges, but she soon got used to her retainer:

> *At first, the like, the glue on it was a bit rough but that's gone down now, and it's pretty all right, I'm used to it already- Charlotte*

A change in speech and presence of a lisp did occur for some young people in this study, but the impact of it appeared to be inconsequential for most as Ava explained: *"I have a bit of a lisp with it because I've got, I've got top and bottom retainers. It doesn't bother me".* People's previous experience of having braces helped them to acclimatise to the changes in their speech and feelings of discomfort. For instance, Theo explained:

> *Definitely not painful. Just like when you had your braces tightened, it's the same sort of like feeling of just putting you in retainer and it's, it's not, it's not painful. It's just a bit uncomfortable- Theo*

Despite the initial physical issues with wearing retainers, young people found them to be minor and less bothersome than appliances, as Rosie claimed: *"I'd take them over the brace any day".*

The young people in this study felt that there is acceptance from society and peers about wearing retainers. Jade explained that retainers are so common that they are not mentioned at all amongst school friends: "*No-one really comments, it's not a strange thing"*. Furthermore, Sabrina stated that retainers are *"just a normal thing".* Harshini felt that there is social acceptance from her peers: *"I feel that people are really understanding"*. She went on to explain how her experience of wearing retainers is normalised:

> *It's just retainers isn't it, it's literally just clear plastic and everyone kind of knows about it and, because I'm at college, a lot of people at this stage already wear retainers and stuff like that so it's not like out of normal- Harshini*

Uditi reiterated the popularity of braces for young people. She explained how stigma and negative connotations associated with wearing braces are outdated:

> *Recently braces have become popular. I'm not sure why, so there's not much pressure on you now, looking like a geek or a nerd, like how it was in the past- Uditi*

Other experiences of retainers that affected young people from a social perspective included a dislike of the odour of the retainer. Jahan explained his desire to keep them clean "*cause it's a bit grim*". Additionally, Ava disliked the presence of saliva, stating: *"It's kind of gross because it's like spit and stuff in it*". Harshini described how handling her retainer can be inconvenient:

> *Cause a big inconvenience especially if I have makeup on, and like it's just not a pretty sight if the saliva is running down the mouth- Harshini*

Certain social situations seemed to affect adherence. For instance, when around family members as opposed to friends, young people could be increasingly disinclined to wear them. Ava remarks:

Like if we were sat there with family, I'd have to say, 'aw can I go upstairs and take out my retainer?' But if it was like just around my friends, I would be less embarrassed- Ava

Some young people experienced family members mocking them, which seemed to be harmless. Young people would expect this from their family but not from peers:

My dad likes watching me trying to take them out because he thinks it's funny. So, he always laughs at that - Jade

Bearing little impact upon their social lives, the young people in this study expressed that night-time wear of retainers was the most convenient time to wear them. Lucy found issues of lisping insignificant because: *"it's usually at night-time, and I'm asleep"*, whilst Sabrina explained that: "*Because this is at night, I'm not really talking to anyone. It's not really like a big deal*". Young people explained that they would prefer to wear retainers at night as Jahan explained: *As long as I'm able to wear them for the night. That'll be for the best".*

Psychosocial impacts of retainers on young people seem to be minimal. They do not seem to disrupt their lives, as Charlotte explained: *"It's not been a burden or anything. It's been fine".* Uditi explained: "*I think, in terms of the retainers there's not much to think about it's not really disrupting my life*". Young people reflected on the joy of having their brace off, and the delight it brought them:

I've noticed that it's given me more confidence to smile and stuff because I used to, like, not smile with it because I hated it. So, now that they're nice and my smile is straight, I can actually, like, smile properly- Jade

In addition to their newfound confidence, a view commonly expressed view was that by completing orthodontic treatment, young people would gain the 'prize' of not having anything on their teeth at all. Uditi explained that since having her

brace off she felt "*so free*". Harshini also reflected positively on *"having the freedom…just to embrace your smile".* She went on to explain that:

> *I feel like I'd have had such a long commitment to my brace and the whole point of getting them off, is to like show your teeth off and like, you know, I like how it feels to actually have like nothing on your teeth- Harshini*

In addition to the physical and social factors affecting retainer wear, the transitional process of adaptation was described.

8.3.2 Theme 2: Adapting to retainers

This theme relates to young people's ability and willingness to adapt to retainers. Specifically, how they created and developed methods of integrating retainers into their lives. Young people recognise the shared responsibility of retainer wear and how this responsibility shifts from the orthodontist to them as individuals. Learning to integrate retainers into their lifestyles required routines and reminders. Adapting to retainers requires self-created interventions to help individuals manage their foreseen problem of forgetfulness, if there is an interruption to their routine then their adherence may be disrupted.

8.3.2.1 Routines

Adapting to retainer wear was varied between young people. Embedding retainer wear into their existing routines and integrating retainer wear with their current behaviours to improve adherence was experienced by all the young people interviewed. Lydia commented: "*I wash my face and then brush my teeth, that's when I put the retainers in".*

Reflexive Box 8: Lydia

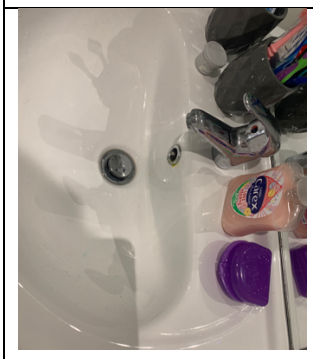
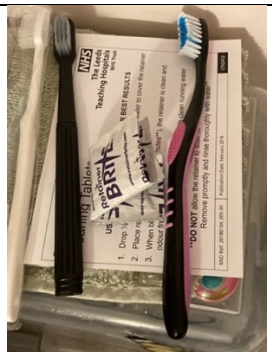
Speaking to Lydia through virtual means was challenging due to her learning difficulties and speech impediment. Lydia's mother was very supportive and present during the interview. She was very shy, with her mother explaining that she was unsure whether she would go ahead with the interview. I felt like I had to

ask her a lot of questions and show a lot of interest for her to speak at all. This meant me using more closed questions than I had hoped. The participant was quite overwhelmed and unsure what to say at times, regularly looking to her mother for support.

Lydia responded to me with big smiles and signs of happiness when I smiled at her or gave positive comment, I could tell she was a patient who is well behaved in front of professionals and likes to please people. When I said 'oh wow' in a happy, excited voice she responded positively to this, but when spoke in a more monotone manner about simple, mundane things she went back into her shell. I really felt using the photos gave her some control over the conversation and enabled her to describe her lived experience in a fair amount of detail. Lydia's mother mentioned at the end of the interview that she was really surprised and happy at how well Lydia has adapted to the retainer and the interview process.

Night-time routines, make-up routines and shower-routines were commonly associated with wearing retainers, however some link their retainers to their own specific behaviours, as Jahan described: "*So at halftime, I think I'll quickly go and brush my teeth, and put my braces on. My retainers I mean sorry".*

Figure 4: Examples of participant photographs related to routines

Rosie	Jade	Sabrina	Matthew
			

Overcoming the initial transition phase and getting used to wearing retainers was an important aspect of succeeding. Theo explained that "*they are still adapting to my mouth a bit and I'm still getting used to them"*. He continues to explain that

"*as soon as you pass that part, it kind of just becomes the norm".* Rosie similarly found *"they've just become more of a habit".* Matthew explained his experience learning to adjust to new retainers:

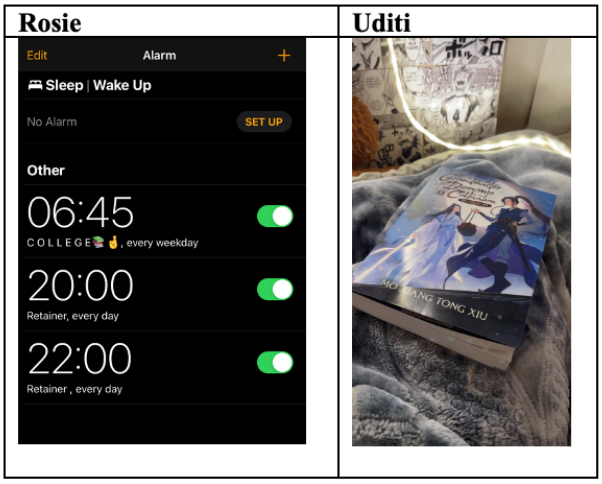
> *Yeah, it's just like if they get used to it. Like with the braces, you get used to it. And then, you don't really notice them at all once they're in- Matthew*

8.3.2.2 Reminders

The use of reminders was identified as important when adapting to retainer wear. Examples included setting alarms, storing the retainer in a familiar or obvious place, and being prompted by others, usually parents and particularly mothers. This was imperative to help young people get used to their retainers. Initially, the process of wearing retainers was a conscious decision, with reminders being a crucial aspect of the initial stages. Lucy describes how reminders helped her:

> *I do remind myself by putting an alarm on, and I've also got my mum there to remind me- Lucy*

Figure 5: Examples of participant photographs related to reminders



The degree to which young people act upon and responded to their reminders was also varied. Rosie described feeling optimistic about her ability to succeed with her retainers due to the satisfaction she gets from following routines:

> *I've got the reminder on my phone, the two alarms for my retainers. I just love a routine, it's really sad, but I just do… I get into them really easily. Yeah, so I thought if I could get into that routine of putting them in at the same time every night, I wouldn't be like 'ah I forgot to wear them last night'- Rosie*

However, for people like Ava, habits were not so easy to develop, and it can take longer to get used to retainers. In her case, the alarms set on her phone are fundamental to her being able to adhere to retainer wear in the initial stages:

> *Well, I kind of had to set like a reminder on my phone, because I knew I'd forget, because it's like, I find it hard to get into a new habit – Ava*

Figure 6: Examples of participant photographs related to reminders

Sabrina	Matthew
	

Several participants explained that the retainer box was a key driver in reminding young people to wear their retainers. For instance, Theo shared his concerns about losing his retainers and cites that having the box to hand is a useful reminder:

I like the tub, it makes it easy to not lose them, because I'm pretty sure I'm gonna lose them at some point. The tub is helping. I just shove them in there and that's it sort of thing- Theo

Reminders set by the individual are an important factor in the transitioning of responsibility for their retainer wear. Some did not feel that they need reminding and disliked parents interfering too much. However, for most, having positive parental support does serve as a useful back-up for when self-created reminders are ignored, as Jade comments:

I think it's more of my personal thing, but if I do need reminding for anything with my braces I can always like sort of rely on my family to be like have you done this- Jade

8.3.2.3 Responsibility

Almost all young people recognised the importance and consequence of retainer wear. Matthew explained that: "*the more you mature, you would realize how, how important it is*". However, one teenager struggled to understand the importance of wearing retainers. Ava described:

I'm a bit like, 'what was the point of the braces then if I have to wear this, for the rest of my life?' It would be better if you only had to wear them, like, a couple years afterwards- Ava

Once appliances are removed, the shift in responsibility for retainer wear becomes clearer. For instance, Harshini clearly expresses the transitional shift of responsibility, with her orthodontist taking care of her brace, to then retainer wear being her responsibility:

It wasn't like I had to really do anything about them, just that it was the orthodontist job to like to fix them and move my teeth and stuff like that. But now that I'm on my own, it's my responsibility- Harshini

Similarly, Theo remarked that the ultimate responsibility of wearing retainers lies with him, and that the consequences of non-adherence would be his responsibility:

> *Like it is my responsibility. I've got nobody telling me to wear it. If I want to go to bed tonight and not wear it, I don't have to. But I know for a fact if I don't, then it's not going to leave me in a good position- Theo*

8.3.2.4 Forgetfulness

In the immediate term, all people wore their retainers as instructed, with one person forgetting to wear it for one night. Forgetfulness and other distractions in life appear to be a significant perceived challenge to longer-term retainer wear. Forgetfulness does not appear to be a deliberate act, but it is nevertheless a significant perceived issue, as explained by Harshini:

> *It's myself, I am my barrier because I am really forgetful, like unbelievably forgetful and sometimes I'll come back from college and like knock out straight away. So, I'll forget- Harshini*

Figure 7: Example of participant photograph related to routines

In addition to forgetfulness, periods of disruption in routines such as holidays, exams or extra-curricular activities are perceived obstacles to long-term retainer wear for teenagers, as Jade remarked:

> *Obviously then with the exam season and everything, I might get a bit busy, and it might slip my mind a few times but I'm hoping it doesn't- Jade*

Having an awareness of their tendency for forgetfulness may be useful. Young people can put systems and reminders in place overcome this barrier. Theo explained how forgetting to take his retainer with him whilst out of his routine will be problematic and that it will take some getting used to:

> *I think that will be a massive barrier of just not remembering to take it with you, and stuff like that, they will be, I think I will be an issue, and also, just always having it is something you can, I guess you've got to kind of used, get used to putting him in your wash bag, get used to taking him with you… I think that will be a massive barrier of just not remembering to take it with you- Theo*

Personifying the retainer and describing it as 'him' is interesting language to use, it indicates an attachment to the retainer, treating it like a friend or an extension of himself. Perceiving the retainer as something that needs to come on the journey with him, and something that cannot be forgotten.

8.3.3 Theme 3: Motivators for retainer wear adherence

This theme pertains to the factors which lead to young people's internal and external motivation for retainer wear adherence. Young people were aware of the risk of relapse and saw this as a key motivational factor for the adherence of retainer wear. A desire to maintain their appearance, prevent feelings of disappointment and avoid the need for retreatment were also identified. Additional contributing factors to this theme included the impact of social media and young people's ability to self-manage and make trade-offs regarding retainer wear.

8.3.3.1 Internal and external motivators

All the young people interviewed in this study experienced a newfound sense of 'confidence' and happiness with their teeth following their brace treatment. This was a central motivator for them to continue wearing retainers and to sustain the orthodontic treatment process. Harshini explained how she treasured her new smile: "*it's just like my prized possession now, I love them. I love the outcome*". Using the term *"prized possession"* is an interesting metaphor, the evocative language here activates the imagination and conveys rich imagery, bringing the young person's experience to life. Using language in this way to describe something that is part of your body is unusual, instead of her new smile being part of her, something she owns, she instead feels her smile is something she has earned.

Theo's internal motivation was driven by the effort that he has put in over time, and his attitude around wanting to persevere wearing them:

> *To keep my teeth straight, keep them right, keep them looking well, cause I had braces for three years there's no point not wearing, not wearing the retainer now. I've just got to keep it on and get on with life- Theo*

Most young people can cope through the initial adaptation phase, as wearing the retainers more often causes less discomfort. When the retainers are forgotten or missed for some time, relapse may occur and therefore putting the retainers back in may cause repeated episodes of discomfort. This is a concern for young people, as Jade explains:

> *Maybe if like I've forgotten to put them in for a while, putting them in again might be a bit of a nightmare because obviously I'd not had them in for a long time so it might be uncomfortable, that might stop me from wanting to put them on- Jade*

External motivators included the perception of parents and the positive attention received from peers. Matthew described the importance of external motivation from parents during the immediate transition as well as internal motivation:

> *If you weren't that motivated but you mum or dad still reminded you, then, you'd still put them in. But if your parents didn't motivate you, and you weren't motivated then, you would just forget a lot- Matthew*

Harshini explained an alternative perspective, explaining how external pressures to uphold appearances encouraged her to wear her retainer. She explained her belief that having straight teeth will reduce her chances of receiving negative comments from others:

> *We're in the age, of like, where your appearance is the like, the most important thing, which is maybe a bad thing but, like, it is. Because of like social media and stuff like, people tend to pick, nit-pick everything about you. So really, even that in itself, even though its maybe a negative thing, like, it helps to motivate me to keep them in like, make sure that there's not that much to nit-pick about- Harshini*

Harshini went on to explain her motivation wearing the retainers, that the idea of peers noticing relapse would be embarrassing:

> *If I've had my braces on before, and I tell people like, I've had them and they've moved, they'll be like, 'oh, well why aren't your teeth straight then', so then I'd feel a bit like, 'Oh God', about it- Harshini*

Similarly, Lucy explained:

> *In the past, where people would call me awful names and just call me nicknames that I didn't really like. And I think all this hard work that people have put in to make my smile better. And I'm kind of just, like, just motivated to keep up to it- Lucy*

Young people recognised that, initially, the novelty of something new drives their motivation, but like many things this begins to wear off over time and their enthusiasm to wear their retainers may decline. Uditi explained:

> *Honestly, it would be it would be you know exciting, a new thing, you know new retainers. And then once the excitement dies down the memory goes - Uditi*

8.3.3.2 Risk of relapse

The young people in this study perceived the risk of relapse as a significant concern. Relapse was viewed as a negative consequence of not wearing their retainers and was described in terms of the impact on young people's appearance, feelings of disappointment and avoidance of orthodontic retreatment.

Young people reported clear reasoning behind wearing their retainers, avoidance of relapse and a desire to maintain their appearance. Matthew stated that: *"I want to wear them. I would rather wear them"*. He went on to explain that he wanted to: *"keep my teeth in like, good shape".* The idea of experiencing relapse caused emotional responses such as feeling 'annoyed' and 'guilty'. For instance, Ava stated that the possibility of experiencing relapse: *"would freak me out"*. She also explained how she would feel if it happened due to not wearing her retainer:

> *Frustrated, because it's taken so long to get to this point, that if they went back now, I'd be really annoyed- Ava*

Noticing relapse on someone else motivated Sabrina to continue wearing her retainer. She explained how she saw first-hand that her friend's teeth had moved:

> *The teeth are not like, held the way like they were when they first got the braces off, and I don't want to do that- Sabrina*

Lucy described her experience of being teased about her teeth when she was younger. She explained how due to her improved smile, she was motivated to wear her retainer:

> *From a young age, I've had really bad teeth, and in school, people called me like bunny, and it was really horrible experience when I was young. So, to have a nice smile now, I just felt I've gone through all this effort. I want to keep it like that- Lucy*

Harshini described her fear of relapse:

> *That's kind of a horror story to me because I did not have three years of braces for my teeth to start moving again- Harshini*

Her use of rich description here, using the term 'horror story', illustrates the strength of her views regarding relapse. This powerful language brings her feelings to life and captivates the reader.

Reflexive Box 9

With hindsight, it is clear that I had a direct influence on the hyperbolic language used by the participant. By asking: "Did you get anyone giving you silly advice or, you know, horror stories or anything?", it is reasonable to assume that my line of questioning directly influenced her response. However, as was clear in the participant's response, she did not feel obliged to agree with my suggestive questioning as she provided a counter point to clarify the reality of her own lived experience: "Not really the only thing that like, people have said to me is I either get lisp or the teeth move…and that's kind of a horror story to me because I did not have three years of braces for my teeth to start moving". Whilst this data was co-constructed there was no imbalance of power between the researcher and the researched. She didn't feel the need to conform to my line of questioning.

The idea of relapse provoked feelings of disappointment in various ways. One way was how they would feel disappointed in themselves, as Sabrina explained:

I'd be pretty annoyed, that was like five years wasted. I don't know, I feel like I would be disappointed- Sabrina

Another motivator to wearing the retainers was avoidance of disappointing others and those involved with getting them to this point of completing treatment. They did not want to waste anyone's time, as Theo describes:

I've done the three years, it's been a bit like if you don't wear them then I'll be a bit like, going back to the start again… could be a waste of time if not wouldn't it, for everybody, everybody not just me- Theo

The orthodontist's role in supporting young people and giving praise appeared to be an important motivator. Young people valued the feedback from the orthodontist and did not want to *"disappoint them by not wearing it".* Jahan explained:

Whenever he [the orthodontist] said 'all good, good progress'. That obviously motivated me. And obviously, when he took my braces off, he told me they looked really good. Obviously, my family did as well, it's like a motivation is to keep them on. - Jahan

For some young people, there was apprehension about going through certain aspects of treatment again. Rosie explained how she wanted to avoid the need for further impressions:

Well obviously, my friends were talking about having have new retainers and things like that. But I was like, I do not want to have the moulds done again! I was not having that done again! So, I thought, I am wearing these retainers every night without fail- Rosie

Theo explained how retreatment would cause him inconvenience:

> *To like start all over again. Oh my god. It just feels like it just be a circle like you didn't ever feel like you'd never get out of it it's like a loop, and just hoping that we never get to that point because that would just be a pain to do that- Theo*

The extent to which people experience relapse varies. Charlotte described her lived experience of noticing small amounts of relapse *"throughout the day, they do move slightly, so it's kind of like, you can see it".* For Ava, she experienced the opposite, where non-adherence did not lead to noticeable relapse when she missed her retainer for one night:

> *Not really, it… I didn't feel a difference…I was little bit paranoid that it would, I think. I didn't feel anything different- Ava*

8.3.3.3 The social media environment

Social media has become a ubiquitous aspect of young people's lives. Different people will use, and be influenced by social media to different extents. Jahan commented on the influence of a famous footballer:

> *I just want to make sure I have straight teeth, that's all I want. Obviously like Ronaldo, he had a transfer-, a transformation, you know, he looks younger now- Jahan.*

Most young people were aware of the potential false reality that social media can present. They see value in 'natural' teeth that are straight, compared to teeth with cosmetic correction, as Jahan continued to explain:

> *I've seen like a lot of people do lot of Tiktok's and videos, I've always thought to myself, what's the point because it's like, they've like, removed most their teeth to get fake teeth. Yeah, I've never got it because I'm pretty sure when I've gone*

into research about it, it costs like 10K. And they have to replace it, so there is no point, I just don't really see the point- Jahan

Like with information provided online, young people recognised that it may be preferable to access information instantaneously, as Theo pointed out:

13-year-olds are not going to sit down and read a leaflet realistically now, they're going to want something, they want something quick and easy and accessible and something that I'll take in less than two seconds, they can keep their attention span on it and all the rest of it. So, something, quick and snappy in a video or anything like that makes life a lot easier- Theo

8.3.3.4 Self-determination

Young people recognise that to be successful with retainers they must self-manage and aim to overcome the barriers associated with them. One way in which the young people in this study demonstrated self-determination is through trade-offs and compensatory changes in behaviour. For instance, if they missed a night of retainer wear, either consciously or subconsciously, then they would often counteract it by increasing wear time the following day or night. For instance, Matthew described his experience:

I would worry if missed two nights. One night not really, as long as I wear it the next day as well. Well, I have a few more hours on, like wear it a bit more the next time. Because in one night, they wouldn't move that much, and I feel like if I wore it like more the next day, I feel like it would just sort it out. Matthew

However, these compensatory behaviours are not without their own unique challenges. The idea of wearing the retainer at an alternative time, either for more hours or during the day, caused a sense of guilt for some young people. For example, Ava shared a common scenario whereby she stays over at a friend's house:

If I forget to take my retainer there, or if I forget to put it in. And then I'll have to wear it all the next day. That'd be a bit of a problem…Because if I didn't wear it on that night, then I'd feel guilty the next day, but if the next day, I'm going out with my friends. Yeah. And then I'll have to take my retainer out, put it away, and then bring it back out, put it back in after- Ava

Wearing the retainers at night felt like a trade-off that many young people could accept to and cope with:

I just feel it would be a bit too much hassle. I mean, every time you have to take them in and out. Every time you want to chew gum or whatever. Seems a bit of a hassle. So as long as I'm able to wear them for the night. That'll be for the best- Jahan

The idea of long-term retention is accepted by those who have the attitude of wanting to make retainer wear part of their subconscious decision making. Sabrina explains her attitude that even in the short-term: "*I don't even, like, think about putting them in, I just put them in".* Harshini explains how she wants her behaviours to be 'automatic':

I feel like if I get used to it now, then I just, it'll be like everyday kind of daily thing, they'll just be part of my life. So, I don't mind that. And just like it'd be an automatic thing next couple of years down the line- Harshini.

Some attitudes toward retainer wear were misunderstood. Some young people felt that as they have worn their retainer for a particular period following brace removal, that retainer wear in the longer term will not be as essential in maintaining their treatment outcomes. Jade contemplates:

Maybe as I get older, the less I'm going to need to put them in. I'm not sure. I'm motivated to wear them because I want to keep my teeth straight but then I think the older I get, the less I'm going to need to wear them because, you know, by then, I've have had straight teeth- Jade

Ava explained how she wanted to leave this chapter of her life behind with her adolescent years:

> *I don't think I could, like, be okay with braces beyond high school, like after I leave high school, I wouldn't want to have braces anymore. I kind of want to feel more grown up and having braces just isn't really- Ava*

Understanding individual limitations to adherence in other aspects of life such as taking medication or abiding by rules, may influence how they adapt to retainers. Uditi describes her poor relationship with taking her prescribed medications, and hopes her experience with retainers will be different:

> *I think, well I'm hoping it won't turn out like how I am with medication, but I think because it's something so physical that you know you have to put in, you've got to make sure it's on, it's next to you, it's something that you HAVE to do or else, you know, teeth will shift- Uditi*

9 Discussion

This chapter discusses the key findings in relation to academic theory. The strengths and limitations of the study are also discussed, and recommendations for both clinical practice and further research are provided.

9.1 Key Findings

Adherence to retainer wear is a complex and multifaceted process that is unique to the individual. The young people in this study described how their previous experience of appliances had informed their attitudes toward, and expectations of, retainer wear. Additionally, the reported experience of their peers who already wear retainers had a significant impact upon their expectations and shaped their anticipated behaviours about their own retainers.

Overcoming the initial adaptation phase requires young people to embrace the shift in responsibility and self-create routines and reminders unique to them, which help to integrate retainer wear into their lives. Despite some teething problems in the immediate term, the young people in this study explained that the minor physical barriers to retainer wear (e.g., discomfort and a lisp) did not, and would not deter them from wearing them.

For the participants in this study, successful retainer wear adherence was associated with both internal and external motivating factors, as well as their ability to self-manage and make compensatory behaviours or trade-offs. Even though young people characterised retainer wear as socially acceptable and normalised amongst friends, it was clear that night-time wear was preferable because of the inconveniences associated with wearing retainers during social situations, such as hypersalivation and eating in public.

9.2 Findings related to theory

Adapting and adhering to retainer wear is fundamentally associated with behaviour change. One comprehensive framework developed to understand behaviour change and intervention is the Theoretical Domains Framework (TDF), which has been further streamlined into the COM-B model. This model highlights three key factors related with behaviour; capability, opportunity and motivation (Cane et al., 2012). Consistent with the phenomenological and data-led nature of this study, the COM-B model was selected as model of 'best fit' to explain young people's experience of retainer wear in relation to theory following data analysis. As the TDF and COM-B describes, there are myriad factors which affect health behaviours and young people's adherence to retainer wear including cognitive, affective, social and environmental factors (Atkins et al., 2017).

Applying a model of behaviour change to young people's lived experiences may help researchers and clinicians to better understand young people's behaviour and facilitate discussion about the ways in which retainer adherence can be improved. In the next section, the findings of this study will be discussed against the backdrop of the COM-B model.

9.2.1 Capability

The first element of COM-B is capability, which helps to explain how young people need the physical and psychological capabilities to perform or change a behaviour (Michie et al., 2011). In the context of this study, all participants were physically capable of wearing their retainers. Retainers seem to be easier for young people to tolerate than active orthodontics, as their prior experiences equipped them with the skills to deal with the challenges of retainers. Discomfort was a physical hurdle in the initial few days but did not act as a significant barrier to retainer adherence. Initial wear was not defined as painful and was never significant enough warrant young people abandoning their retainer entirely.

The participants of this study appeared willing to persevere through any discomfort, as it was anticipated, minor and bore little impact on their ability to adhere. However, Wong and Freer (2005) found discomfort to be a significant barrier, and Al-Moghrabi et al. (2019) reported that sensations of pain led to a participant failing to wear the retainer entirely. Clinicians must recognise the variation in young people's ability to overcome the physical discomfort of wearing retainers and educate young people about the common physical and social aspects of wearing retainers, as well as discussing the unanticipated potentialities, such as odour and hypersalivation, to enable young people to better manage their expectations of retainer wear.

Psychological capability referred to young people's knowledge, attitudes and beliefs about the importance and consequences of retainer wear, and their desire to embed retainer wear into their lives (Michie et al., 2011). The participants reported that they developed knowledge of retainers from a plethora of sources, such as the reported experience of their peers, information passed on by their orthodontist or clinical team, as well knowledge exchange on as the internet.

Knowledge alone does not support behavioural change (Arlinghaus and Johnston, 2018). Merely offering people more information will not necessarily lead to a change in their behaviour, attitudes, or the desired outcomes. Instead, patients must be equipped with both the physical and psychological capabilities needed to succeed in the orthodontic process. Patients need to combine their tacit knowledge (knowing how) with propositional knowledge (knowing that) in order to adhere to retainer wear outside the clinical setting (Hager, 2012).

It is not only new knowledge, whether tacit or propositional, that is important in this process. In popularizing Schema Theory, Anderson et al. (1977) suggest that an individual's prior knowledge has a substantial effect on the way new knowledge is interpreted. Orthodontists should strive to understand their patients' prior experiences with the view to build on these experiences for an optimal outcome. Harshini explained how her prior experience of functional appliances

prepared her for retainer wear, making her removable retainers seem more convenient, and Charlotte's experience of fixed appliances equipped her with the skills needed to clean her bonded retainer. This is significant because by drawing upon patients' prior experiences, clinicians could provide a personalised approach to increasing young people's knowledge about their retainer by drawing comparisons and instilling confidence in them. Understanding the type of retainer prescribed, its intended purpose and the consequence of not wearing them, namely relapse, is fundamental to both their knowledge and successful outcomes.

Patients, parents and caregivers need to be provided with useful information, which needs to be facilitated in an effective and meaningful way to the individual, to positively influence young people's physical and psychological capability of behaviour change. Although the young people in this study tended to possess the required knowledge about retainer wear and knew the practical steps they should be taking, their knowledge did not prevent forgetfulness. Therefore, knowledge and understanding form only one part of the behaviour change process (Michie et al., 2011). Relying on education alone for oral health promotion has been shown to be inadequate for sustained behaviour change (Renz et al., 2007). However, other studies have identified a lack of knowledge can be the cause of non-adherence (Kelly and Barker, 2016). Lin et al. (2015) found immature mentality and lack of knowledge about the importance of retention to be significant barriers to adherence.

Young people today grow up in an increasingly digital world. Social media has been shown to be an accessible and engaging method of providing information and increasing knowledge to orthodontic patients (O'Brien and Duane, 2017). Information shared on social media and learning from the internet influences young people and may be a contributing factor as to why they want to maintain their orthodontic outcomes and appearances. The extent to which social media affects young people's adherence to retainers is not fully explored from the experience of the young people in this study. However, appreciating the role that social media plays in the lives of young people today, and the instantaneous

advantage of sharing information online might enable orthodontists and researchers to tailor the way in which they educate patients and provide information. This interest in instant access to information has been highlighted previously. Of orthodontic patients who has access to social media, 30% had previously accessed social media related to their treatment and 73% reported that they would be willing to use social media in the future to support future orthodontic treatment (Siddiqui et al., 2022). If social media was to become a mainstream way in which young people find and share knowledge about orthodontics, it is vital that the information provided online be valid and evidence based. Although this may be desirable, managing and controlling information shared online is realistically impossible.

In 2017, The British Orthodontic Society developed the 'Hold that Smile' campaign which were developed to improve patient knowledge about retention. An audit of this campaign found that it had been successful in increasing knowledge and intentions of retainer wear in the longer-term (Bharmal et al., 2020). Orthodontic apps also have been developed to engage young people in developing positive behaviours, with over 300 available through app stores (Baheti and Toshniwal, 2014). In relation to retainer wear, the app “My Retainers” has been developed, which aims to increase adherence through education, provision of patient accounts, tracking progress and providing interactive reminders to their users (Al-Moghrabi et al., 2020a). This specific app is yet to be implemented following refinement, but the results are promising. When looking at apps, 87% of patients stated that they would be willing to use an app to support orthodontic treatment (Sharif et al., 2019) however, due to their early development, and the limited choice with orthodontic apps it would not be possible to recommend one app over another to patients (Siddiqui et al., 2021). Digital development such as retainer adherence apps like these may be useful in driving adherence in the future.

9.2.2 Opportunity

The second element of COM-B is opportunity, which suggests that individuals must have both the physical and social opportunities to perform a behaviour (Michie et al., 2011). The TDF recognises that the physical and social opportunities are beyond the control of some individuals, which poses a challenge for the clinician. An orthodontist cannot control a patients' physical and/or social opportunities outside of the clinical setting, which exposes a vulnerability in all practice for which the successful outcomes rely on patient adherence.

In the context of the participants in this study, opportunity is related to young people's parental and peer support network, the normalisation of retainer wear in society, and the influence of the digital world on their lives. Examples of the social environment which impeded their successful adherence to retainer wear for the young people in this study included staying away from home, travel, the commitment of exams and extra-curricular activities.

The social environment and their relationship with peers are significant factors affecting young people's experience of retainer wear. Young people described how retainer wear is normalised in their friendship groups and within the school setting. As a result, retainer wear does not appear to concern young people. However, as with the findings from Frawley et al. (2022), some young people in this study raised potential barriers to long-term wear being the social burden retainers may carry in later life, particularly when moving to university or travelling. This is interesting as although normalised, young people still want to avoid wearing them where possible, for example in a social context. This suggests that, despite their lack of general concerns about social stigma, young people would still find retainer wear in a social setting a barrier to adherence.

Whilst some young people in this study accepted the process of adaptation, for others, routines, reminders, and systems are much harder to integrate into their lives, with some admitting that they find routines hard to stick to. The ability to

comply with self-created routines could be potential barriers to those who live in chaotic households or within unsupportive environments, and for young people with special educational needs or disabilities. The successful transfer of responsibility may be a difficult proposition for those who do not have access to the same physical and social opportunities.

The process of socialisation plays a fundamental role in shaping the values, attitudes and behaviours of young people (Fuligni, 2019). Outside of the school environment, the predominant social setting for most young people to wear their retainers is at home. As a result, parents and caregivers need to be educated about both the realities of retainer wear and about the significant impact that their own presumptions or mockery can have on their children. In an ideal world, one way to mitigate this problem for young people would be to establish a triangulation meeting, comprising the clinician, the patient and their parents or caregivers. The expectations, roles and responsibilities of both the parents and the patient could be agreed, and together establish the optimal physical and social opportunities for successful retainer wear.

9.2.3 Motivation

The final domain of the COM-B model is motivation**,** which is defined as "all those brain processes that energize and direct behaviour, not just goals and conscious decision-making" (Michie et al., 2011). The model explicitly distinguishes between reflective and automatic motivation; the former pertains to planning and evaluation, whereas the latter relates to impulsive or emotional responses to stimuli (Willmott et al., 2021).

External motivation is important to young people, including the positive attention from peers and external social pressures to maintain a positive outward appearance. Young people's appearance and the concept of straight, white teeth has been shown to reflect social competence, health status and intellectual ability (Newton et al., 2003). Improved attractiveness, success and popularity have also

been associated with improved smile aesthetics (Beall, 2007). The desire for straight teeth has become increasingly normalised amongst people in society (Khalid and Quiñonez, 2015), with digital social circles and social media having a significant influence on young people's perception of appearance (Longstaff et al., 2021). Young people wearing braces have been shown to judge their social acceptance and satisfaction based on the number of 'likes' that a *selfie* receives on social media (Longstaff et al., 2021). A pilot questionnaire found that social perceptions influenced preferred retainer designs, which could be considered when determining retainer choice with young people (Meade et al., 2014).

Maintaining orthodontic outcomes and avoiding relapse were both significant and reflective motivating factors for the young people in this study. Having received various compliments from friends and family, it appeared that their newfound confidence gave them a sense of freedom and social capital, all of which were important for participants' motivation to wear their retainers. An improved appearance and increased confidence have been found to be motivators in previous research (Kettle et al., 2020). The young people in this study described the avoidance of embarrassment or negative comments as an additional yet central motivator for retainer wear. They expressed concerns about friends 'nit-picking' if their teeth were to move following relapse. External motivation in the form of avoidance of negative comments and social embarrassment was a central driver in adherence for the participants of this study.

Another key motivator highlighted by the young people in this study was the increased responsibility and accountability they experienced as they transitioned to retainer wear. An example of reflective motivation, this shift in responsibility from orthodontist to patient was experienced by young people, with a sense of ownership over their own behaviours. Kettle et al. (2020) similarly found that taking responsibility enabled young people to get used to an appliance. For instance, one person in this study expressed her acceptance to engage with orthodontic treatment during adolescence but with the view to leaving this chapter of wearing braces behind after she leaves school. This might appear like

an example of internal motivation, suggesting that wearing braces as an adult was not very “grown up”. The participant may perhaps be pre-empting issues of social validation into adulthood and is using these intuitions as a source of external motivation. By *reflecting for* the future, this example demonstrates how internal and external motivation can exist simultaneously. However, it does raise questions about her (and others’) long-term commitment to orthodontic retainer wear as the years wearing retainers increases.

Internal motivation is also important for young people’s adherence to retainer wear. For instance, having already invested their time and effort with fixed braces previously, the young people in this study did not want to undo the hard work they had already put in. This example of internal motivation indicates a sense of self-directed accountability and a desire to not let themselves down. Previous research has found patients’ attitudes, particularly this sense of ‘investment’ towards their retainers to be an important determinant of retainer adherence (Kearney et al., 2016). Al-Moghrabi et al. (2019) similarly found that participants who had already experienced extensive orthodontic treatment did not want to devalue their already-invested efforts and commitment by experiencing orthodontic relapse.

Young people explained that they would expect to feel disappointed if they experienced relapse or required retreatment. Firstly, disappointment that their teeth could move, and secondly an apprehension that if they did experience relapse, they would feel disappointment to have to go through re-treatment and social embarrassment. Feelings of guilt and not wanting to let themselves or the orthodontist down were experienced by the young people in this study, this echoes recent findings from Frawley et al. (2022). This provides another example whereby internal and external motivation can occur simultaneously, even if the goal is the same. Whilst there is internal motivation to avoid relapse and feelings of disappointment, the risk of retreatment and comments from peers noticing relapse act as external motivation.

For those in this study, the encouragement of the orthodontist's positive feedback, parental influence and avoidance of disappointing themselves, their parents and their orthodontist were motivators to retainer wear. Maintaining the patient-clinician relationship during the retention phase, alongside consistent parental support has been discussed in the literature as being important for satisfactory adherence to retainer wear (Bartsch et al., 1993; Al-Moghrabi et al., 2019; Mirzakouchaki et al., 2016). In the study by Frawley et al. (2022), the influence of parental support was not found to be such a significant motivator to retainer adherence, compared to the valuable support parents offered during active treatment. This may be due to the higher levels of internal motivation or responsibility that older adolescents experience (Trulsson et al., 2002). In this study, parental support was critical in the immediate phase, acting as a first line reminder for some and parents support acted as back up for when self-created reminders were forgotten. Once people had started to embed retainers into their routines the need for parental reminders reduced. Understanding familial relationships, and either using them to the patients' advantage or alternatively offering other sources of support may aid the support network for young people and in turn impact their retainer adherence.

Notwithstanding their desire to sustain their orthodontic achievements, the young people in this study did indicate that forgetfulness was a significant concern and an inevitable barrier to their retainer wear. Lin et al. (2015) found that forgetfulness is a major contributing factor to non-adherence of retainers, with 50% of patients attributing their non-adherence to forgetfulness. This issue was also revealed in a qualitative study by Kettle et al. (2020). Overcoming forgetfulness was something of a determination for the young people in this study and most achieved this by establishing routines and reminders. Reminders were highlighted as essential for some young people, particularly during the immediate phase following appliance removal. Many reported the retainer box and seeing the retainer nearby as a useful aide-mémoire in reminding them to wear the retainers. This was also found to be the case in previous orthodontic research (Al-Moghrabi et al., 2018). Some of the young people claimed to thrive when

developing routines, and most felt optimistic about engaging with routines and reminders, but forgetfulness was still raised as a perceived challenge or threat to retainer wear adherence, suggesting that forgetfulness is a potential barrier for even the most willing patients. Individuals' ability and willingness to respond to their self-created reminders and routines are fundamental to their success in retainer adherence, however this process may be more challenging for those with different capabilities and opportunities.

The transitional stage of adaptation requires acceptance of a shift in responsibility and the ability to make trade-offs to integrate wearing them into their day-to-day lives. In this study, young people appeared to consider how they can make up time for missed retainer wear, whilst also recognising that wearing retainers during the day also comes with its own unwanted challenges. Such self-made trade-offs could be perceived as compensatory behaviours, or an example of young people's system of self-determination, by adapting the advice to suit and fit in with their own lifestyle. Schott and Ludwig (2014) also found that many young patients tried to compensate for missed appliance wear by wearing the device more on other days. Clinicians should aim to support their patients and try to harness something that already exists, provide advice about overcoming the barriers, and discuss possible realistic trade-offs that young people can make in their own lives in order to make wearing them possible. Young people will be better placed to make realistic trade-offs with themselves if they can change and compensate their behaviours and develop the attitude that whatever the circumstance, they must wear their retainers on a part-time basis to maintain their result and avoid relapse.

9.3 Recommendations for clinical practice

A shared understanding and mutually agreed action between the clinician, the patient and their parents or caregivers are recommended. As part of the current clinical pathway, clinicians could establish a triangulation meeting prior to appliance removal to manage the expectations, roles and responsibilities of both

the parents and the patient regarding retainer wear. Establishing the optimal physical and social opportunities for successful retainer wear could be achieved through verbal communication or via a screening tool, where questions could be developed to explore young peoples' capability, opportunity and motivation toward retainers. In addition, this screening tool could explore how young peoples' expectations are influenced by their own previous experience, their peers' experience, the impact of social media and the levels of parental support at home.

For optimal retainer adherence, clinicians should view each patient on an individual basis and strive to understand their motivational drivers, both internal and external, as well as their perceived and actual barriers to retainer wear. Clinicians must ensure their patients have a clear understanding of what their retainers will be like and what to expect. Education is a reciprocal process and clinicians should strive to elicit their patients' current knowledge and expectations in order to tailor the information they provide (Krist et al., 2017; Al-Moghrabi et al., 2019). Clinicians need to appreciate that wearing retainers takes up just a small space in a young person's life, and this highlights the importance of establishing co-constructed long-term adherence strategies throughout the retention phase. Each patient has uniquely personal experiences which may affect their adherence to retainer wear, and, with a heightened awareness of these factors, clinicians could modify their approaches on a case-by-case basis to improve the retainer wear adherence for each patient. Personalised advice and information based on an individual's unique experiences may help improve adherence in the longer-term.

In addition to young people's experiences, expectations and attitudes, understanding parental influence and recognising the importance of parental support is recommended. Whilst being responsive to the personalised care and advice of the orthodontist, parents should also be informed of how their language and attitudes can affect their children's experience and attitudes towards retainer wear. Retainer review appointments should be arranged where possible, not only

to clinically review the patient and their retainer effectiveness, but to revisit their capability, opportunity and motivation, providing plans to support on-going adherence.

Highlighting the importance of setting reminders, developing routines and the impact this will have on their adherence is recommended. Advise could include using reminders in the adaptation phase and continuing until their behaviours become habits. Advising young people to implement adherence plans in preparation for specific periods of their lives where they anticipate retainer wear may be more challenging, such as during exam season or when they are on holiday. Efforts should be made to attach retainer wear to existing patterns of behaviour that are unique to each individual, such as whilst removing makeup or gaming during the evening.

Where possible, clinicians should continue to recommend indefinite part-time wear through the night as this is a time where adolescents' adherence is most likely to succeed. Of course, this is not possible for all patients, such as those with hypodontia or very high risk of relapse. In cases where patients are advised to wear their retainers during the day, peoples' motivation to wear retainers would be different to those in this study. For example, replacing missing teeth with prosthetic ones would be socially and aesthetically advantageous during the daytime, and therefore this motivation may outweigh the potentialities of inconvenience and lisping.

Appreciating the impact of social media on young people is important. Information needs to be provided in a way that young people respond to and seeking this information from the patient directly means that this could be facilitated on an individual basis. In an ideal world, information on social media should be moderated and evidence based. Due to vast sources of information online, it would be impossible for one team or organisation to monitor it. Instead, patients should be directed solely to the British Orthodontic Society website or their

clinical team for support, and warned about the misinformation, misleading and potential influential information social media may provide.

Initiating the shift in responsibility early on may be helpful, explaining that the prevention of relapse is down to the young person and that the only way to prevent relapse is through retainer wear. The responsibility of ongoing retainer care is challenging. Following discharge from specialist services, in addition to self-monitoring by patients, this role must be handed to general dentists in the long-term. Despite some misunderstanding around who the ultimate responsibility of ongoing retainer maintenance lies with, developing transition strategies from specialist to primary dental care should be a priority, with additional training and effective communication between services recommended (Molyneaux, C et al., 2021).

9.4 Strengths

The insights from the young people in the study have provided a unique contribution to the body of knowledge in orthodontic research. Previous qualitative studies have investigated young people's experiences of retainer wear, but this study is the first of its kind because, until this study, photo-elicitation has not been employed in orthodontic research. The notable strengths of this study are the richness of data, the uniqueness of the methodology and the transparency and trustworthiness developed through reflexivity.

Trustworthiness can be characterised into four key components: credibility, transferability, confirmability and dependability (Lincoln, 1985). Credibility and dependability have been demonstrated at every stage of the study, through being transparent, consistent, organised and systematic with data collection and the analysis process. Documentation of reflective and reflexive thoughts through journaling and regular debriefing with the supervisory team was a strength of this study, further demonstrating credibility. Scrutinising the transcripts and extensive familiarisation with the data led to the development of codes and themes which

span the participants' experiences, with evidence of verbatim quotes represented across the results. Demonstrating that the interpretations are derived directly from the data increases confirmability of the findings.

The findings of qualitative studies do not set out to be generalisable. Instead, the researcher strives to provide a transparent methodology so that the reader can decide whether the results can be transferred to other contexts, settings or other respondents (Arlinghaus and Johnston, 2018). Clearly documenting the entire process and explaining the methodology would enable another researcher to repeat similar research in other settings or disciplines, which increases the transferability of this study. Delivering a concise, coherent, logical write up of the data, whilst remaining faithful to the lived experience of young people has enabled further insight into the lives of people wearing retainers. As a result, the richness and depth of information gained from the young people in this study makes a valuable contribution to the current retainer adherence literature.

Whilst the aims of this research were not to be representative of a broader orthodontic patient cohort, the findings of young people's experience of retainer wear in a recently published qualitative study by Frawley et al. (2022) arrived at very similar conclusions. Interestingly, the participants in the Frawley et al. (2022) study were based in Sheffield, a geographical location near the participants in this study. This suggests that the experiences of the participants in this study are perhaps a shared experience of young people more broadly. Not only does this show triangulation but also bolsters the credibility of the findings of this study.

9.4.1 Researcher experience of photo-elicitation

Participants' photographs were extremely helpful in allowing the participants to lead the discussion during the interviews and have the freedom to describe their own experience. The photo-elicitation interviews gave participants a chance to discuss their photographs in detail and tell stories which provided depth to the conversation. Using photographs as a stimulus for discussion was clearly an engaging process for the participants, because it gave them a sense of ownership

and confidence to direct the themes for discussion. The photographs were instrumental in revealing the idiosyncrasies associated with each individual's lived experience of retainer wear, many of which were unlikely to have been addressed had the photographs not been used as a point of reference.

Asking participants to take meaningful and relevant photographs prior to an interview is a point of tension. On the one hand, I had to request that participants devote their own time to prepare for the interview as required of the photo-elicitation method and, on the other hand, I had to do so in a manner which maintained their interest in, and commitment to, the study. Consequently, I had to strike a balance between encouraging participants to take photographs whilst at the same time encouraging them to take part in the study. This was particularly important considering the COVID-19 pandemic, as I was conscious not to put any additional pressure on young people and risk putting them off from participating in the interview at all. I achieved this by explaining how valuable each participants' insights would be to the orthodontic profession. As I had no face-to-face interaction with the participants prior to their virtual interview, it was challenging to build rapport through the telephone and usually the first time I saw the participants was through a screen during their interviews. The photos were very useful as a means of building rapport through digital means.

Young people did not seem to mind taking the photographs. Whilst some seemed to spend time taking them over the course of the week, others seemed to have taken them all in one go or just before the interview. Some participants engaged very well with the process and enjoyed speaking about their experience through the prompt of the photographs, whereas others seemed unsure how to explain the significance of their photographs or seemed to take the photos very close to the time of the interview. Either way, the photos were still meaningful to them and served as a useful stimulus for building the participant-researcher relationship. It gave a building block to then support the individual in exploring the meaning behind their photos.

In the niche context of retainer wear, some of the photographs were quite self-explanatory and the participants occasionally struggled to elaborate on them in detail. For example, a photograph of a toothbrush or the retainer box seemingly required little explanation. However, when it came to photographs of their smile or the way they use reminders, it sparked thought-provoking discussion and the ability for participants to explain their photographs from their own perspectives.

For one participant with learning difficulties, the use of self-created photographs and the ability for the researcher to hand over the control of the conversation to the participant was essential in building confidence. As an introvert, encouraging her to elaborate past ‘yes’ and ‘no’ responses by reflecting on her own photographs was particularly useful. Empowering her to share content that she created helped her to successfully engage in the virtual interview. Using media in this way allows individuals who might otherwise struggle to explain their point of view to convey their experience. This method of information exchange proved highly beneficial to younger participants and perhaps those with learning difficulties.

At times, older adolescents were not entirely clear of the relevance of showing a photograph. There were times during which the conversation about their photographs were overlooked, and the participants were keen to talk about their general experiences instead of reflecting specifically on the photographs. Reflecting on the photo-elicitation method, therefore, it would seem prudent for researchers to encourage the direction of conversation remains focused on the photographs and what they mean to the participant. However, I did not want to make the conversation feel forced or awkward for the young person.

The photographs aligned with the themes that developed, particularly in relation to motivators for retainer adherence. Photographs of their toothbrushes, retainer boxes and alarm clocks were commonly bought to the interview and linked to their reminders. Some young people brought abstract photographs which were particularly interesting: darkness outside their room, their bathrooms, and their

genuine smiles. Other, more unexpected, photographs that they brought included their association of remembering to wear their retainers at specific times of day, such as during half time in a football game, when they are gaming or when reading a book.

9.5 Limitations

This study captured the experiences of young people who have access to digital resources, such as cameras and laptops, and a supportive family network. As a result, they were well positioned to access the participant information sheets, take phone calls, respond to emails, and access Zoom for scheduled interviews. The experiences of young people who lack the digital resources or do not have a supportive family network were underrepresented in this study. Whilst these individuals may be some of the most challenging to access, they may also be amongst the patients who would benefit the most from intervention. The presence of mothers during two of the interviews was both advantageous and methodologically significant. At times, they would provide prompts which led to participants providing further information. However, this may have affected their sense of freedom and it was occasionally difficult to ascertain whether the participant would have arrived at their responses had they been alone.

Furthermore, young people with special educational needs and disabilities were underrepresented, as were those with craniofacial abnormalities, and cleft lip and/or palate. Complex conditions such as craniofacial and orthognathic were excluded due to the high burden of care associated with their condition, and the different experiences they may have had due to this. This may be considered as possible selection bias. Young people in these circumstances may all have varied capability, opportunity and motivation regarding retainer wear which were not captured in this study. The young people in this study were treated in a hospital setting, therefore, their experience will be different to those treated in specialist practice or those who pay for orthodontic treatment, as additional barriers of access may influence young people's adherence (Vagdouti et al., 2019).

A further limitation is the length of time that the young people had with retainer wear, and the limited types of retainers they were provided with. Individuals had been wearing their retainers for approximately 1-2 weeks, which limits the insight into the long-term impact of retainer wear on young people's lives. None of the participants wore Hawley retainers, and therefore the experience of those in this study are limited to clear plastic and one bonded retainer. Despite the initial high adherence to retainer wear for the participants in this study, the evidence suggests that removable retainer wear reduces over time, with wear levels decreasing by around two thirds after two years (Al-Moghrabi et al., 2018; Pratt et al., 2011b). Therefore, repeating the interviews at several stages of their retainer wear experience would lead to more comprehensive insights. Aiming to reach people wearing different types of retainers would also be advantageous to increase understanding about the experience of those wearing Hawley retainers in the daytime.

Whilst there were positive features of collecting data remotely during COVID-19, such as researcher convenience and no travel time, it also has some potential drawbacks. Hensen et al. (2021) explain that remote interviews can reduce the ability of researchers to form trust and rapport, to pick up on nuanced social cues, and that unreliable technology can be a hinderance. In this case, some participants experienced network interruptions and the extent to which participants used body language was not consistently visible.

Finally, whilst member checking is an optional feature of qualitative research (McGaha and D'Urso, 2019), the researcher did not have capacity to undertake this process due to time constraints and work commitments. Whilst this might be viewed as a limitation, member checking is by no means a flawless process; whilst member checking is designed to ensure that the researcher's interpretations of participants' experiences are accurate (Birt, L. et al., 2016), the participants might view the data in a completely different way than when initially collected (McGaha and D'Urso, 2019). Consequently, in accordance with the interpretive qualitative

methodology, the researcher has stayed true to her original interpretations of the data.

9.6 Recommendations for further research

- Further qualitative research is indicated to explore the specific experience of wearing retainers for people who may face further barriers, to understand the experience of those who may benefit from additional support. These may include people who have; disability, hypodontia, dental anomalies, craniofacial syndromes, cleft lip and/or palate and those following orthognathic surgery.
- Further use of photo-elicitation to explore the experience of specific cohorts of people who may benefit most from using photographs to explain their experiences. For example, younger children or people with learning disability.
- Longer term follow-up to understand the experience of retainer wear using photo-elicitation is indicated. Extending beyond the scope of this Masters research project, the researcher has arranged follow-up interviews at the six-month stage for all participants.
- Using qualitative methods to understand the relationship between social media and young peoples' experience of retainer wear is recommended.

10 Conclusions

The purpose of this study was to explore young people's experience of orthodontic retention immediately after completion of orthodontic treatment. Factors associated with young people's experience of orthodontic retention are complex and multifaceted, comprising a 'web of influential factors' that overlap. This final section will draw conclusions from the findings.

- Young people's own experiences, peer influence and parental input shaped their expectations of retainer wear, which did not always match their lived experience. Other key influences on retainer wear adherence included internal and external motivation, avoidance of relapse and self-determination.
- Young people must recognise their responsibility regarding retainer wear and that, to overcome the adaptation phase and prevent forgetfulness, they must establish routines, respond positively to reminders and implement self-directed trade-offs. Compensatory changes in behaviour and adapting professional advice to realistically fit retainer wear into their lives was and will be important for ongoing adherence success.
- Although social acceptance of retainers was reported, the notable perceived barriers to retainer adherence were associated with day-time wear, during which young people experienced inconvenience of handling retainers during social situations.
- Both patients and their parents should be fully informed about what to expect with retainer wear and parents should be advised about the importance of their influential role in supporting young people's retainer wear adherence. Mutual understanding of the long-term commitment to retainer wear and the consequence of non-adherence is essential.
- Using the COM-B model of behaviour change, orthodontists should strive to understand each individual patient's unique capability, opportunity and motivation for retainer wear adherence. This will enable clinicians to

develop co-constructed strategies for successful retainer wear adherence. Doing so could enable young people to make positive health decisions, change behaviours and potentially increase their adherence to retainers.

11 Conflicts of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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13 Appendices

Appendix 1: Instructions for taking photographs

Photograph Instruction Sheet

Thank you for taking part in this research.

Below is some information about the photographs

What we would like you to do

We would like you to take some photographs to send to us so we can chat to you about your orthodontic retainers.

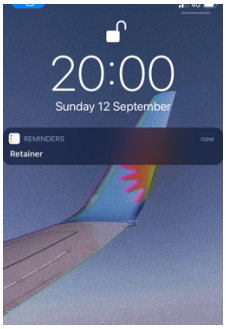
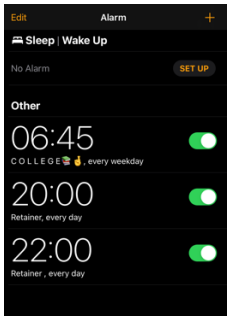
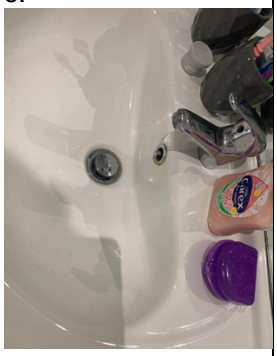
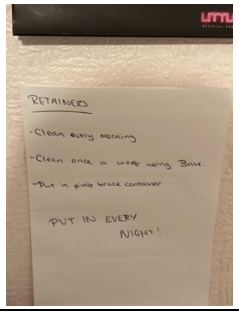
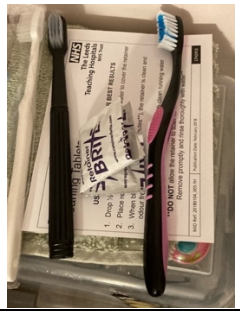
We would like you to take photographs each day for one week to show things that are important to you. This photo diary should help you explain how it has been having orthodontic retainers.

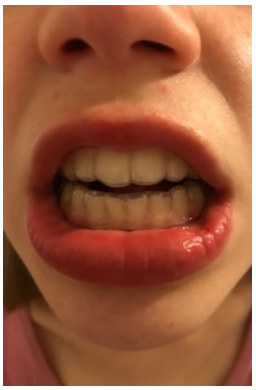
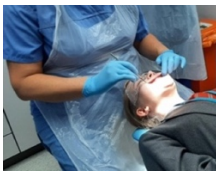
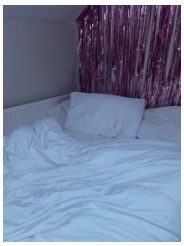
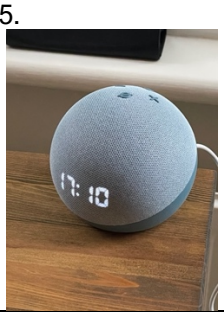
The photographs can be of anything you want. You can take as many photographs as you want each day and the quality of the photograph is not important. We will text you each day to remind you to take some photographs.

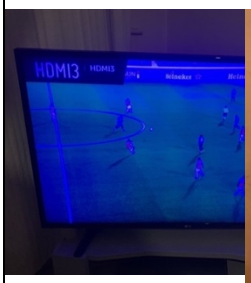
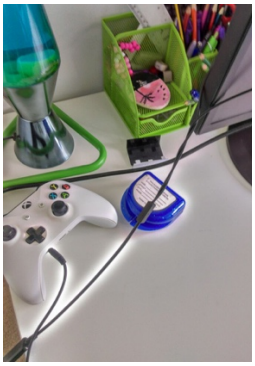
Important information

- If the photograph includes other people you need to check that the person is happy to be in the photograph before you take it.
- You can take as many photographs as you want. We normally recommend 2-3 each day over the week.
- The photographs can be taken on your phone, tablet or digital camera.
- The quality of the photograph is not important so do not worry if you do not think the photograph is good, we would still like to see it.
- Only the research team will see your photographs.
- We will not use the photographs for anything else or share them without asking your permission.

Appendix 2: Respondent Photographs

Name	No of Photo	Content Descriptors	Photographs
Rosie	3	1. An iPhone reminder to wear retainer 2. An alarm set to everyday for 'Retainer' 3. Purple retainer box next to white sink	1.  2.  3. 
Charlotte	3	1. A blue suitcase 2. White sink 3. Bathroom cabinet	1.  2.  3. 
Jade	2	1. Written reminder 2. Toothbrushes, information leaflet and cleaning tablet	1.  2. 
Lucy	5	1. Packet of chewing gum 2. Cabinet of dental products 3. Tube of Steradent 4. Retainers on casted model 5. White retainer box and retainer	1.  2.  3.  4.  5. 

Lydia	2	1. Participant wearing her clear plastic retainer 2. White glittery retainer box on a desk	1.  2. 
Ava	5	1. Participant smiling in dental chair 2. Participant lying down in dental chair 3. Participant lying down in dental chair 4. Participant smiling in dental chair 5. Participant smiling in car	1.  3.  5.  2.  4. 
Sabrina	7	1. Shower head 2. Pink electric toothbrush and purple retainer box next to sink 3. Purple retainer box on sink side 4. White bedding 5. Alarm clock 6. Contact lenses on top of retainer box 7. Participants mother	1.  3.  6.  4.  2.  5.  7. 
Theo	None		

Harshini	1	1. Hand holding an apple	1. 
Jahan	3	1. Football game on television 2. Green retainer box 3. Darkness outside bedroom window	1.  2.  3. 
Uditi	4	1. Clear retainer box 2. Participant medications 3. Headphones 4. Book	1.  2.  3.  4. 
Matthew	2	1. Xbox controller and blue retainer box 2. Toothbrush and toothpaste in family bathroom	1.  2.