

**Developing an intervention to improve reading comprehension for
children and young people with autism spectrum disorders.**

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Abstract

Aim: This study investigates the use of an intervention to improve the reading comprehension of adolescents with autism. Recent research suggests that 30% of children and young people with autism demonstrate a 'hyperlexic' profile whereby they display accurate word reading but struggle to understand the content of what they are reading. Currently very little is known regarding which interventions are effective for this group of students and no research has been conducted on interventions for adolescents with autism and reading comprehension difficulties.

Method: 29 pupils with autism, (mean age 13 years, 6 months) and difficulties with reading comprehension took part in the intervention (15 in the intervention condition and 14 in the control condition). The intervention used an adapted version of the Reciprocal Teaching approach developed by Palincsar and Brown (1984). This was delivered in 50-minute sessions, twice a week over a period of 6 weeks by the researcher. The impact of the intervention is evaluated using a standardised measure of reading comprehension. Furthermore, semi-structured interviews were conducted to capture participants' views of the efficacy and organization of the intervention.

Findings: The results indicated that the intervention group demonstrated an increase in their reading comprehension equivalent to three years of progress as measured by the York Assessment of Reading Comprehension (YARC). Statistical analyses indicated that this increase in comprehension was significantly greater in the intervention group than in the control group. Semi-structured interviews with participants indicated that many demonstrated a shift in their approach to reading with a greater focus on comprehension. Participants also identified that the intervention supported their speaking and listening skills.

Conclusions: This study makes a valuable contribution to the knowledge base regarding approaches to teaching reading comprehension to students with autism. Implications for Educational Psychologists and other professionals are discussed.

I, Horatio Turner, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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Chapter 1. Introduction

The current study investigates the use of an intervention to help reading comprehension in Autism Spectrum Disorders. To provide the necessary background, the national and professional context will first be outlined, highlighting the importance of this field of study. The subsequent sections discuss current priorities for research involving individuals with autism spectrum disorders and the researcher's personal interest in this field.

1.1 National and professional context

Children and young people with Autism Spectrum Disorders (ASD) constitute 11% of all children with Special Educational Needs (SEN) in England (DfE, 2014). The majority (70%) of these students with ASD are educated in mainstream school settings, which reflects nearly four decades of inclusive education policy since the publication of the Warnock Report (Warnock, 1978). This policy of inclusion is central to the Children and Families Act 2014, which places a duty on local authorities to ensure that all children and young people with Special Educational Needs and Disabilities (SEND) are included in mainstream education. While the principle of inclusion is valued throughout the education system, it presents considerable challenges for teachers working with these young people. The most recent research, conducted in 2011, identified that 55% of a large sample (1,787) of teachers felt that they did not have sufficient training to teach pupils with ASD (Phillips & Pyle, 2011). This research highlights the need for appropriate interventions and training, which can build the capacity of schools to meet the needs of students with ASD.

Children's academic attainment has a significant impact on their long-term educational, personal and professional outcomes. Jones et al. (2009) highlight that children with ASD frequently fail to realise their academic potential relative to their cognitive abilities, especially in the area of reading comprehension. Research indicates that as many as 35% of children and young people with ASD demonstrate a hyperlexic profile, where their reading comprehension is significantly lower than their reading accuracy (Nation, Clarke, Wright, & Williams, 2006). This compares to only 10% in the typically developing population (Nation & Snowling, 1997). Understanding written text is essential for accessing all areas of the curriculum, from scientific concepts to word problems in mathematics; as a result, many of these students may be at risk of failing academically. This is reflected in the latest Government figures for 2013-2014 in England which reveals that only 28% of young people

with ASD achieved five good GSCEs (A*- C grade), compared to 66% of students overall (DfE, 2014).

The transition to secondary education presents considerable challenges for young people with ASD. Secondary schools are complex environments which place greater demands on the student's social, organisational and academic abilities (Mandy et al., 2016). It is often at this time of major transition, at the cusp of adolescence, when young people are most at risk of developing mental health problems. Research has identified that children with ASD are at a higher risk of developing emotional and behavioural difficulties (Kaat, Gadow, & Lecavalier, 2013), and of being bullied (van Roekel, Scholte, & Didden, 2010). Despite improvements in the quality of educational provisions for children and young people with ASD, many schools struggle to deal appropriately and sensitively with challenging behaviour. Research by Ambitious About Autism (2014) identified that 20% of children with ASD had received a formal fixed-term exclusion and as many as 40% had received an informal exclusion (which are illegal in England) during a 12-month period.

Given the difficulties children with ASD often face with behaviour and social interactions, difficulties with reading comprehension can go unnoticed, especially if this is masked by proficient decoding skills (reading individual words accurately). This becomes particularly important as children move into secondary education, which requires students to develop increased independence in acquiring information from written texts (Roberts, 2013). As a result, there is an urgent need for increased evidence-based practice in schools to ensure that children and young people with ASD have the literacy skills to enable them to reach their academic potential and achieve positive long-term outcomes.

1.2 Service and research context

The autism community (individuals with ASD and their families) has emphasised that future research into ASD should prioritise developing basic skills for young people with ASD both for everyday life and to increase access to employment (Pellicano, Dinsmore, & Charman, 2014). Reading comprehension can be seen as essential to accessing employment and as a skill for everyday life.

This research was conducted to meet the requirements of the Doctorate in Educational, Child and Adolescent Psychology (DEdPsy) at the UCL Institute of Education (IOE). The local authority where I am currently working on placement as part of the DEdPsy

qualification has established its priorities for development over the coming three years.

These include increasing the range of training that it provides to schools in order to continue to “give psychology away”.

1.3 Personal Interest

My professional background involves working with pupils with ASD in primary and secondary schools. In my current role as a Trainee Educational Psychologist (EP) I regularly work with young people with ASD and their families. The unique contribution that EPs can make in supporting schools to identify and meet the learning needs of this group of pupils is highlighted by Fallon, Woods, and Rooney (2010) in their review of the EP role in the UK. In my experience of working with children and young people with ASD, I have frequently observed that students may demonstrate highly proficient reading accuracy; however, their difficulties with understanding impact on their ability to access the content of the lesson.

In my role as a trainee EP, I have become increasingly aware that schools rarely have systems in place to identify and monitor the reading comprehension skills of students with ASD. This is reflected in research by Garner (2011) which suggested that secondary schools are failing to identify children with reading difficulties. This large-scale ($n=857$) study of reading abilities in 11-16-year-olds found that only 44% of students with reading comprehension difficulties were identified by the school as having Special Educational Needs (SEN).

The current study involves an intervention which is designed to be delivered by trained teachers or teaching assistants to improve the literacy skills of young people with ASD, thus enabling them to access academic and professional opportunities. Therefore, the current project meets the development priorities of my Education Psychology Service, is in line with priorities for research identified by the autism community, and is highly relevant to the professional practice of an EP.

Chapter 2. Literature review and rationale

To understand the theory underpinning this study, the definition and prevalence of ASD will first be reviewed. Secondly, theoretical frameworks of ASD are evaluated in light of their implications for reading comprehension. Thirdly, the theoretical basis for reading comprehension is discussed. The fourth section evaluates the research on the causes of reading comprehension difficulties in both typically developing children and those with ASD. The final section reviews the evidence base of reading comprehension interventions for students with ASD, and introduces the concept of Reciprocal Teaching, the focus of the present study. It is acknowledged that many of the terms used in this study are contested as there are competing definitions and approaches to understanding psychological concepts. A glossary is provided in appendix K which defines the way in which the terms are used in this study.

2.1 ASD: Definition and prevalence

ASD is a neurodevelopmental condition characterised by difficulties with social interaction and restricted interests. The most recent diagnostic criteria published by the Diagnostic and Statistical Manual of Mental Disorders: DSM-V (APA, 2013b, p. 299) defines ASD as "Persistent deficits in social communication and social interaction". As such, individuals with autism may have difficulties interacting appropriately in conversations, and establishing and maintaining age-appropriate friendships. Furthermore, autistic individuals are defined as having "Restricted, repetitive patterns of behaviour, interests, or activities". As a result, individuals may be very dependent on routines and struggle to adapt to change; furthermore, they may show a fascination for a narrow range of interests and obsessions with inanimate objects or people (National Autistic Society, 2015).

Prior to the publication of the DSM-V, individuals could be diagnosed with either autism or one of several related conditions, including: Asperger's Syndrome (a form of autism without a language delay in early childhood), or 'pervasive development disorder – not otherwise specified' (PDD-NOS; those who demonstrate autistic traits but do not meet the criteria for a diagnosis of autism or Asperger's). With the introduction of the DSM-V, these categories were incorporated under the term Autism Spectrum Disorder (ASD). The authors of the DSM-V argue that this approach emphasizes the nature of ASD as a continuum and therefore reduces the variation in diagnostic rates between different professionals (APA,

2013a) Consequently, the term ASD is used for the rest of this report and is used to describe a diagnosis of any disorder on the autism spectrum.

Research often presents varying prevalence rates for ASD due to different measures and criteria for diagnosis. An often-cited piece of in-depth research in one area of Southern England indicated that prevalence rates for children (aged 9-10) were 0.4 in 100 based on the criteria produced by the World Health Organization (International Classification of Diseases: ICD-10); nevertheless, over 1 in 100 children demonstrated some ASD traits but did not meet the threshold for diagnosis (Baird et al., 2006). These findings are consistent with recent large-scale research by Taylor, Jick, and MacLaughlin (2013) which suggested that previously rising rates of ASD had stabilized at 0.4 in 100 for boys aged eight in the UK. A large proportion of children with ASD also meet the criteria for diagnosis of a comorbid (additional) psychiatric disorder. Influential research by Simonoff et al. (2008) identified that from their sample of 112 children aged 10-12 with ASD in the UK, 70% had at least one comorbid disorder. From this sample, 29% met the criteria for a diagnosis of social anxiety and 28% for Attention Deficit Hyperactivity Disorder (ADHD).

The ratio of ASD in males to females is rather more consistent with most authors citing a male:female ratio of between 4:1 and 5:1 (Baird et al., 2006; Fombonne, 2005; MacLaughlin et al., 2013; Wingate et al., 2014). Large-scale, international research by Fombonne (2005) identifies how sex ratios vary depending on intellectual ability. This study identified a male:female ratio of 5.5:1 in individuals with intellectual functioning in the typical range (not defined in this study) but a ratio of 1.95:1 in the group with moderate to severe learning difficulties. This highlights how ASD presents differently for females and may lead to this group being misdiagnosed and therefore under-represented in prevalence figures (Gould & Ashton-Smith, 2011). Public awareness of ASD in girls has improved in recent years with the increasing number of female television characters with ASD (such as Saga Noren, the protagonist of the Scandinavian drama *The Bridge*). Nevertheless, members of the autism community have expressed frustration with the portrayal of the stereotypical “rude, abrupt and dismissive” female character with ASD and called for a more diverse representation of how ASD manifests differently in girls (Walker, 2015).

There is a growing body of literature into gender differences in ASD. Research suggests that the distinct differences in behavioural presentation between males and females with ASD indicates that there is a unique female autism phenotype (Dean et al., 2014; Lai,

Lombardo, Auyeung, Chakrabarti, & Baron-Cohen, 2015; Sedgewick, Hill, Yates, Pickering, & Pellicano, 2016). Compared to males, females with ASD tend to have greater motivation for social interaction and a greater number of neurotypical friends (Dean et al., 2014). Furthermore, girls with ASD often present with more developed language and imaginative skills together with special interests which focus on people and animals rather than objects (Lai et al., 2015). A potential implication of these differences is that girls with ASD may find it easier than boys to understand narrative literature. While this hypothesis is plausible, very little is currently known about the reading ability of girls with autism. The only research in this field is a study by Asberg, Kopp, Berg-Kelly, and Gillberg (2010) which found that in a small sample ($n=20$) of Swedish females aged 8-17 with ASD, 30% ($n=6$) were classified as having a reading comprehension disorder (as defined by a standardised score below 75). This figure is comparable to the prevalence of reading comprehension difficulties identified in males with ASD (Nation et al., 2006). Nevertheless, the small sample size and different measures employed in the two studies means that it is not possible to draw any firm conclusion regarding the prevalence of reading comprehension difficulties in females with ASD at this stage. The research presented in this thesis included a large proportion of female participants with ASD; therefore, it is useful to discuss any potential differences in the approach to reading of boys and girls with ASD.

2.2 ASD: Theoretical Models

Although there are a large number of explanatory models that have been proposed for ASD, three main psychological theories have emerged: theory of mind, weak central coherence, and executive functioning difficulties. These aim to explain the pattern of strength and difficulties in the condition. The following section presents a brief overview of the theoretical and empirical basis of these models and discusses the implications for reading comprehension.

2.2.1 Theory of mind

A robust finding in psychology is that individuals with ASD consistently demonstrate difficulties with Theory of mind (ToM), which refers to the ability to understand the beliefs, feelings and perspectives of others (Baron-Cohen, Leslie, & Frith, 1985; Hill & Frith, 2003; Premack & Woodruff, 1978). Difficulties with theory of mind are thought to have a significant impact on reading comprehension. The ability to infer the mental state of others is important for understanding the actions and intentions of characters in narrative texts (Briskman, Frith, & Happe, 2001). Also, a lack of social understanding may impact on the reader's

ability to make inferences regarding the characters' intentions in a story (Jolliffe & Baron-Cohen, 2000). Furthermore, Gately (2008) highlights how fairy tales and books for young children emphasise the understanding of 'false beliefs' (recognising that someone else can hold a different and mistaken belief), which are integral to deception and plot twists.

As a result, difficulties with ToM are often cited as one of the main barriers to comprehension for children with ASD. This view is supported by research conducted by Weissinger (2014) which investigated ToM in 47 children aged 9-13. This study found a strong correlation between ToM score and reading comprehension for a group of children with ASD (n=10), but not their typically developing peers (n=37). Additionally, research by Ricketts, Jones, Happé, and Charman (2013) identified that social competence was an important predictor of reading comprehension in a large group (n=100) of adolescents aged 14-16 with ASD.

2.2.2 Weak central coherence

Another common feature of autism is the concept of Weak central coherence (WCC) which Happé and Frith (2006, p. 1) describe as a "detail-focused cognitive style" where individuals show a preference, or bias, towards local processing (the small details of an image), often at the expense of global processing (the overall meaning or bigger picture). This compares to individuals without ASD (neurotypical) who demonstrate a preference for global processing, often at the expense of small details. Happé and Frith argue that framing this as a cognitive style has been welcomed by the autism community as it signals a move away from the traditional deficit discourse towards a discussion of the unique profile of abilities in ASD.

Different cognitive styles offer both advantages and disadvantages: individuals with increased focus on detail may be very skilled at drawing, proof reading or even able to sing in perfect pitch (L. Miller, 1999). However, in terms of reading comprehension, this cognitive style conveys more disadvantages. An overly detailed focus on individual words may result in the reader not accessing the gist of the story (Randi, Newman, & Grigorenko, 2010). It may also lead to difficulties interpreting ambiguous words from the context of the sentence such as homophones (words with identical sounds but different spellings) or homographs (words with identical spellings but different sounds) (López & Leekam, 2003; Norbury, 2005).

2.2.3 Executive functioning

Executive functioning (EF) is an umbrella term that comprises several aspects of cognition: planning skills, flexibility, and response inhibition. Planning skills describes the cognitive process that enables certain goal-directed behaviours and relies on working memory capacity. (Hill, 2004, p. 3) describes planning skills as “a sequence of planned actions that must be constantly monitored, re-evaluated and updated”. Children with specific working memory and planning difficulties often present as distractible and have difficulty following complex instructions or approaching tasks independently (Gathercole, Alloway, & Lamont, 2006). Cognitive flexibility is defined as the ability to quickly switch between different thoughts or actions according to the situation. Difficulties with cognitive flexibility may manifest as a strong preference for routine and avoidance of change (Happé, Booth, Charlton, & Hughes, 2006). The third aspect of EF, response inhibition, involves preventing impulsivity. In her review of the EF literature, Hill (2004) notes that individuals with ASD typically experience difficulties on planning, working memory, and flexibility but do not routinely demonstrate significant difficulties with response inhibition, unless they have a comorbid diagnosis of Attention Deficit Hyperactivity Disorder (ADHD).

Executive functions are most likely to impact on reading comprehension through difficulties with planning skills and associated working memory demands. Successful readers need to be able to plan how they are going to read a text and to consistently monitor and evaluate their own comprehension. According to Cain & Oakhill (2007, p. 50), reading involves considerable planning and memory processes as readers need to be “actively engaged in constructing...a model of the text’s meaning and relating each new piece of information to the model as it is read”. There is evidence to support the link between EF and reading comprehension. Research has identified that children with specific comprehension difficulties often perform poorly on measures of EF planning skills (Locascio, Mahone, Eason, & Cutting, 2010; Sesma, Mahone, Levine, Eason, & Cutting, 2009) and working memory (Swanson & Jerman, 2007).

It is important to note that not all children with ASD demonstrate all three cognitive models. In research by Pellicano (2010) involving a group of 45 children aged 4-7 with ASD, most only displayed one or two of these models and their profile of abilities changed significantly over the following three years. Furthermore, although these three models are thought to make unique contributions to the profile of abilities in ASD, they are interdependent to some extent. Research consistently finds a correlation between ToM and EF in children with ASD

(Hughes, 1998; Pellicano, 2007). The association between these two constructs is likely to reflect the planning, organization and working memory demands of ToM tasks. As a result, it has been suggested EF may be one important factor in the development of ToM (Pellicano, 2007). Similarly, weak central coherence is conceivably dependent on EF because an individual's preference for details may be due partly to difficulties with switching between local and global processing (Happé & Frith, 2006).

These three theoretical models of ASD provide a useful framework in which to understand the difficulties associated with ASD. From a practical perspective, they are useful for identifying aspects of learning tasks that are likely to be challenging for students with ASD. As a result, this knowledge can help teachers and researchers to design tasks which scaffold and support potential weaknesses or different cognitive styles. For example, it may be beneficial to encourage students with ASD to focus on the overall meaning and gist of a text as they may not do this spontaneously (Randi et al., 2010). However, these models can be criticized for being overly broad and therefore offering plausible explanations for a range of difficulties associated with ASD. As a result, their explanatory power is greatly reduced.

2.3 Reading Comprehension: theoretical models

Current approaches to teaching reading in the UK are based on the Simple View of Reading (SVR) developed by Gough and Tunmer (1986) and recommended as part of the National Literacy Strategy in the Rose Report (Rose, 2006).

The Simple View of Reading

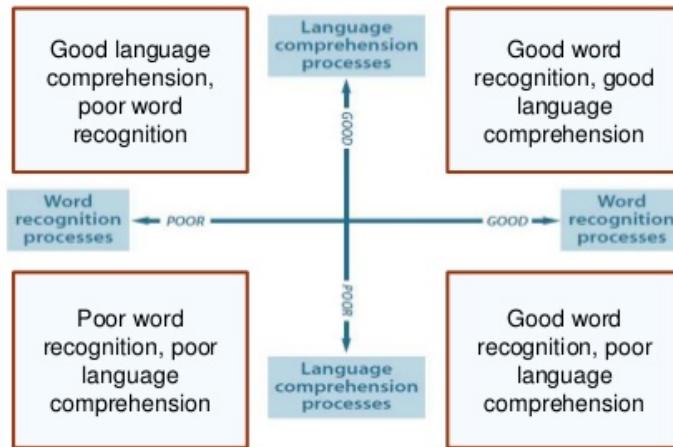


Figure 1: Simple view of reading

The SVR model is based on the view that word reading and comprehension are two separate but parallel processes. Research has identified that children may present with word reading difficulties in the absence of comprehension difficulties and vice versa (Stuart, Stainthorp, & Snowling, 2008). As a result, all individuals can be placed somewhere along this axis, forming four distinct groups. Firstly, those with good comprehension but poor reading accuracy demonstrate a 'dyslexic' profile. Secondly, those with good reading accuracy and comprehension are typically developing readers. Thirdly, those with both poor reading accuracy and comprehension can be seen as 'struggling readers'. The final group demonstrates a 'hyperlexic' profile whereby poor reading comprehension contrasts with good reading accuracy.

The distinction between the 'struggling readers' and the 'hyperlexic' group is important for this study. The struggling readers' understanding is hindered by their inability to access the text when reading; therefore, it is expected that comprehension will increase in line with improvements in reading accuracy (Cain & Oakhill, 2007). As a result, both the dyslexic and struggling reader group require interventions based on phonics (understanding of letter-sound correspondence). However, the hyperlexic group's comprehension is affected by a

complex interaction of factors such as motivation, knowledge of language, communication and reading strategies and therefore requires an intervention targeting these skills.

2.4 Reading comprehension: causes of difficulties

This section explores the ‘good word reading - poor comprehension’ quadrant of the SVR model in more detail. Cain and Oakhill (2007) provide a comprehensive overview of comprehension difficulties in children without ASD. They identify five key areas that contribute to comprehension difficulties: inference making, knowledge of narrative structure, anaphoric references, working memory, and meta-cognitive strategies. A systematic review of the literature was undertaken to investigate how these five areas of comprehension difficulty relate to children and young people with ASD. The working memory category is not included in this section as it has already been discussed in relation to Executive Functioning. Where research is limited, studies investigating reading comprehension in adults or children without ASD are included.

2.4.1 Inference making

Reading is a complex process that requires the integration of information from prior experience or different parts of the text in order to draw inferences regarding the motivations of characters in a story, the intentions of the writer, and the meaning of novel vocabulary and phrases. There is strong evidence that inference skills are an important component of reading comprehension. Longitudinal research by Cain, Oakhill, and Bryant (2004) assessed the reading comprehension and component skills of a group of 102 children aged 7-8 over the course of three years. The study found that inference skills significantly predicted reading comprehension over and above the contribution of working memory. Inference making poses a particular challenge for many individuals with ASD, potentially due to the requirements for global processing of information as well as theory of mind (Loukusa & Moilanen, 2009). As a result, children and young people with ASD often experience significantly greater difficulties answering inferential comprehension questions than factual questions (Myles et al., 2002; Roberts, 2013).

Interesting research by Wahlberg and Magliano (2004) demonstrates how individuals need to integrate prior knowledge into their reading to build a coherent model of the text. This study provided adult participants (60 neurotypical and 12 with ASD) with deliberately ambiguous texts based on famous events from history, some with a title and some with a primer passage giving background information to help make sense of the text. The results

indicated that both groups were able to use some degree of background knowledge to make sense of the texts. Neurotypical participants benefited from the title and primer passage and were able to recall more information in these conditions. However, participants with ASD were not able to recall any more information in these conditions, suggesting that the participants in the ASD group were less skilled at integrating background information to understand details in the text.

An important aspect of inferential reasoning is that it enables children to learn vocabulary by deducing the meaning of novel words and phrases from the context of the sentence. Children learn between 1000 and 3000 new words per year depending on different estimates (Nagy & Scott, 2000). This highlights the vital role of learning new vocabulary from the context of spoken or written language as this quantity of words could not be learned from direct instruction. As a result, there is likely to be a reciprocal relationship between vocabulary learning and the development of reading comprehension, as difficulties inferring the meaning of new words impacts on their future comprehension. There is some tentative evidence to support this conclusion from research by Cain, Oakhill, and Elbro (2003) which investigated the ability of children to infer the meaning of new vocabulary from the context of a sentence. The study identified that a small group ($n=12$) of children with specific comprehension difficulties were significantly less skilled at this task than their peers with average reading comprehension ($n=13$).

2.4.2 *Narrative skills*

There is evidence that children with comprehension difficulties demonstrate weaknesses in their use of narrative discourse. Research by Cain (2003) identified that 7-8-year-old children with comprehension difficulties had difficulty producing organised and coherent stories relative to children with good comprehension skills. This was despite the fact that the group with comprehension difficulties ($n=12$) could demonstrate adequate knowledge of story conventions such as “Once upon a time” and use of connectives such as “and, because”. This is consistent with much of the research on children with ASD which has not found quantitative differences in terms of narrative length, structure and complexity, relative to their typically developing peers (Diehl, Bennetto, & Young, 2006).

Research by Diehl and colleagues explored the ability of primary-aged children ($n=17$) with ASD to retell an orally-presented story from memory. Participants in this study were carefully matched to typically developing children ($n=17$) on measures of verbal language

and reasoning as well as chronological age. Consistent with previous work in this area, the study did not identify significant differences between the two groups in terms of recall of gist or factual components in the story. However, the narratives presented by the ASD group were significantly less coherent in terms of their causal connectedness. The authors described the ASD group's responses as: "more like a listing of discrete events than a structured narrative" (p.96). This research suggests that children with ASD may benefit from interventions designed to build their knowledge of causal connections and sequences in narrative text.

2.4.3 Anaphoric references

One aspect of successful text comprehension (at least in English) is understanding anaphoric references (words which refer back to previous ideas in the text for their meaning such as personal pronouns). There is research in the typically developing population indicating a link between reading comprehension and anaphoric referencing skills (Cain & Oakhill, 2004). Research by Oakhill and Yuill (1986) indicated that typically developing children with poor reading comprehension also had difficulty matching pronouns to their source of reference when compared to children matched on age and decoding ability.

There is evidence that individuals with ASD experience particular difficulties with anaphoric references. One influential piece of research conducted by O'Connor and Klein (O'Connor & Klein, 2004) suggested that encouraging ASD children to focus on the use of anaphoric references (personal pronouns in this example) in a text increased their comprehension. This study used a within-group design and included 20 students aged 14-17, ten of whom had diagnoses of ASD. The results indicated that the participants' comprehension of the text was significantly greater when their attention was drawn to the personal pronouns rather than unrelated words in a cloze condition (completing gaps in the text).

The research by O'Connor and Klein has been influential because it highlights a potential mechanism underlying the difficulty which some autistic children face with reading comprehension. Nevertheless, there are some significant methodological limitations to this research. Firstly, the study analysed the impact of teaching several strategies to the participants, anaphoric references, pre-reading questions, completing cloze questions, and a control (reading only) condition. Although these conditions were counterbalanced across the participants, there is still likely to be a substantial practice effect as a result of participants taking part in multiple interventions.

2.4.4 Meta-cognition

Whereas good readers apply meta-cognitive strategies such as comprehension monitoring, predicting, questioning and note taking (Paris, Lipson, & Wixson, 1983), children with comprehension difficulties tend to be less actively engaged with a text. Poor comprehenders are often motivated by decoding rather than understanding; as a result, they tend to focus on the mechanics of reading at the word level and are not consciously aware of using more strategic approaches to accessing a text (Cataldo & Oakhill, 2000). It is important to consider that reading comprehension is an active process; as Mokhtari and Reichard (2002, p. 251) state, “constructing meaning from text is an intentional, deliberate, and purposeful act”.

One of the most important meta-cognitive skills is comprehension monitoring, which describes the reader's ability to identify and correct misunderstandings in a text and is essential for successful reading comprehension. Research has identified that comprehension monitoring is a strong predictor of reading comprehension (Cain, Oakhill, & Bryant, 2004; Kolić-Vehovec & Bajšanski, 2007). There is evidence that comprehension monitoring is particularly difficult for children with autism. Research by Roberts (2013) examined the reading profiles of a group of twenty-four children with ASD aged 10-12. The study identified significant correlations between reading comprehension ability and comprehension monitoring ($r = .74$). Furthermore, in a structured interview with the participants, nine of the original twenty-four children responded that they often chose to ignore parts of the text that they didn't understand. This observation suggests that some children do not fully understand the importance of extracting meaning from text when reading. The study by Roberts further identified a significant correlation between reading comprehension and ability to resolve anaphoric references ($r = .60$), and knowledge of narrative story structure ($r = .78$).

This section indicates that individuals with ASD experience a range of difficulties with the component skills of reading comprehension, and may not fully understand the purpose of reading. Overall, there is evidence to suggest that individuals with ASD demonstrate many of the same difficulties as non-autistic children with specific comprehension difficulties but may be at greater risk of developing comprehension difficulties due to their particular cognitive profile.

As a result, there is evidence to suggest that teaching the skills of inference, narrative structure, anaphoric references and comprehension monitoring may form the basis of successful reading comprehension interventions.

2.5 Reading comprehension interventions

This section presents a review of interventions to improve reading comprehension for children and young people with ASD. Firstly, recent systematic reviews are identified to establish the overall picture of research in this field. The second section evaluates the strength of the evidence base of reading comprehension interventions for students with ASD. The final section summarises how these findings can be used to inform the development of a reading comprehension intervention.

2.5.1 Systematic reviews of reading comprehension interventions

Given the difficulties individuals with ASD experience with reading comprehension, there appears to be a lack of research into effective interventions. Two recent systematic reviews have evaluated the research into reading comprehension interventions for children with ASD. A systematic review by El Zein, Solis, Vaughn, & McCulley (2014) examined studies published from 1980 to 2012 and found that only 12 studies had specifically explored methods of teaching reading comprehension strategies to students with ASD. The most recent review in this field looked at studies of interventions for both listening and reading comprehension published until 2013 (Knight & Sartini, 2015). These two reviews identified 21 separate studies of which only 2 are group-based interventions; however, neither of these group interventions has more than twenty participants. The remaining studies are all single-case study designs involving one to three participants. This demonstrates the early stage of research in this field and the need for a more robust evaluation of approaches to reading comprehension.

The available evidence was further updated by conducting a systematic search of the literature using the following databases: Academic Search Complete, British Education Index, Medline, PsycARTICLES, PsycBOOKS, PsycEXTRA, PsycINFO, ERIC, and ETHOS. The search was conducted for studies published between January 2013 and April 2016 in order to capture any research not included in either of the two previous systematic reviews. Search criteria included the terms ‘reading’ and either ‘autism’ or ‘ASD’ in the title and the term ‘comprehension’ anywhere in the body of the article. This search initially identified 157 studies. Of these, 19 studies were selected for further examination.

The criteria for inclusion were based on Knight and Sartini's (2015) systematic review as this used relatively broad criteria, thus enabling the inclusion of any research which may be relevant. As such, studies were included if they: (a) used a single case study or group design, (b) used an intervention focused on reading comprehension, (c) included participants with ASD, (d) were published in a peer-reviewed journal or available as a completed doctoral thesis. Seven studies were identified as meeting these criteria that had not already been identified in either of the previous systematic reviews. Of these, six were single case study designs and one was a randomised controlled trial.

The available research in this field was identified from the two systematic reviews mentioned above, as well as reference lists of studies evaluated and the systematic literature search detailed above. Of the twenty-six studies identified, five are excluded from this literature review because they either contained only one session and are therefore not interventions (including O'Connor & Klein, 2004), evaluated the impact of adapted reading materials rather than teaching approaches to access standard reading materials, or involved participants with Severe Learning Difficulties (SLD), which falls outside the remit of this study. The remaining twenty-one studies are categorised into four main groups based on the main focus of the intervention: inference making (2 studies), anaphoric references (2 studies); visual story structure (5 studies), and meta-cognitive strategies (12 studies).

The following review evaluates the strength of the evidence base for each of these approaches and discusses the role of collaborative learning. Where research is limited, the review includes studies on typically developing children and those involving listening as well as reading skills, which highlight potential approaches for interventions.

2.5.2 *Interventions to develop inference skills*

Of the two studies evaluating inference skills to improve reading comprehension, only one focused on reading (rather than listening) comprehension. This was conducted by Flores and Ganz (2007) and evaluated the use of a published programme of Direct Instruction called Corrective Reading on four students aged 10-14. This method uses a scripted programme that teaches inference and analogy skills through orally presented examples, practice and testing. Using a single case study design, the authors report that the participants improved their comprehension relative to their baseline score. However, the outcome measure was not standardised and assessed the same questions that the

students were taught, which limits the validity of the findings. A review of research into Corrective Reading published by the authors of the approach has shown some effectiveness for phonetic decoding and comprehension in typically developing populations using randomised controlled trials (RCTs; Marchand-Martell, Martella, Przychodzin-Havis, Associates, & Hill, 2005) However, the effective studies cited in this review have all taught phonetic decoding and comprehension at the same time. As a result, any improvements in comprehension are likely due to increased word reading fluency rather than the comprehension skills that are taught.

Despite the limited nature of reading-based inference studies, there is promising research into oral language inference skills. Interesting research by Åsberg & Sandberg (2010) evaluated the effectiveness of an intervention teaching twelve students (aged 10-15) with ASD how to identify and when to use inference in answering orally-presented comprehension questions. This intervention presents three types of comprehension question and encourages students to identify which skill they need to perform to answer the question correctly. The types of question from Åsberg and Sandberg (2010, p. 93) are presented below:

1. ‘Right there’ questions where the information that constitutes the basis for the answer is directly mentioned in one and the same sentence in the text.
2. ‘Reflect and search’ questions where information has to be inferred by integrating different sentence passages, or the question and a text passage, using text-connecting inferences.
3. ‘On my own’ questions where the critical information has to be inferred using world knowledge.

The students in this intervention showed a significant improvement in a multiple-choice measure of listening comprehension relative to their score at the start of the intervention. This intervention demonstrated a small to medium effect size (0.35), which is considerable given that it was delivered by classroom teachers over a 4-week period of two 20-minute sessions per week. Nevertheless, the results remain inconclusive as the study did not include a control group with ASD. Furthermore, the outcome measure relied on yes / no responses; however, the authors made some attempts to verify that respondents were not simply guessing by asking questions to verify their understanding. Nevertheless, this type of

task potentially requires different skills than developing one's own inference and responding to open-ended questions.

The research identified here provides some tentative evidence that training or instruction can improve inference skills for individuals with ASD. However, studies with ASD have only used verbal mediation as the main medium of instruction; therefore, there is scope for further research presented with reading materials or other visual approaches for this population.

2.5.3 *Story structure and visual support of sequencing*

One of the areas that has received the most attention in the literature regarding reading comprehension in ASD is using visual aids to support understanding of story structure and sequence. Five studies were identified evaluating the effectiveness of visual approaches to teaching story structure in single case study designs, all of which showed some degree of improvement for students using these approaches relative to their baseline scores.

A promising example of research in this area by Stringfield, Luscre, and Gast (2011) investigated the impact of a story map with three children aged 8-11 with ASD and reading comprehension difficulties. This study explored how using this visual technique generalised to independent reading comprehension. The participants learned to use a simple story map over a period of several weeks. They were given guidance on using the story map (where students note down the main characters and events at the beginning, middle and end of the story). Furthermore, students were allowed to discontinue using the story map when they felt confident reading without it. The findings suggest that for all three participants, the story map substantially increased their ability to answer comprehension questions correctly relative to their baseline score.

One of main strengths of this study is that improvements were maintained after the children had stopped using the story map. The authors suggest the story map is beneficial as it may reduce external distractions and supports the reader as they do not need to hold in mind all the key information, thus supporting their working memory. Nevertheless, the outcomes measure utilised in this study is a 'quiz' included as part of the Accelerated Reading programme. While this quiz taps both literal and inferential questions, it presents questions as multiple-choice, which is not standardised and possibly presents a lower level of challenge compared to open-ended comprehension questions.

Research in this area suggests that using visual aids to develop sequencing skills and knowledge of narrative structure may support memory difficulties and potentially offers a useful approach for comprehension interventions. There is a large body of evidence demonstrating the effectiveness of graphic organisers in the typically developing population (Manoli & Papadopoulou, 2012) and there is a need to increase the evidence base for individuals with ASD.

2.5.4 Anaphoric references

Only one study has systematically evaluated an intervention for anaphoric references. Campbell (2011) conducted a reading comprehension intervention teaching a group of ten, 7-12-year-old students with autism how to identify and resolve personal pronouns. This intervention led to a significant improvement in reading comprehension based on the students' ability to summarise the story and on a standardised measure of reading comprehension. Although this study used a between-groups design, it involved only 5 participants in the intervention condition. Furthermore, children in this study had very low levels of reading accuracy. Therefore, improvements in comprehension are likely due to improvements in accuracy as a result of increased exposure to reading material.

The only other study identified which examined anaphoric references is research by Roux, Dion, Barrette, Dupéré, and Fuchs (2014) which used a randomised controlled trial to evaluate a reading comprehension intervention (in French) with 45 children with ASD aged 6-12. This study taught participants how to identify and resolve anaphoric references, how to identify the 'main idea' in a text and also definitions for sets of vocabulary. This study identified that following the 16-week intervention, the 24 participants in the intervention condition demonstrated a significant improvement on a task of resolving anaphoric references relative to the 21 participants in the control condition. Furthermore, the intervention group demonstrated a small but significant improvement on a researcher-developed summarisation task. It is not possible to ascertain the distinct contribution of anaphoric references to any improvements in comprehension as the intervention taught several skills concurrently. Nevertheless, the most interesting finding of this study was that the intervention group showed a significant and large (effect size = 0.86) improvement in their ability to identify the main idea in the text. This suggests that explicitly teaching children with ASD how to identify the main idea in a text is an effective strategy. However, it

is not clear whether children in this study are able to generalise this isolated skill to their general reading comprehension.

The research by Roux et al. (2014) makes an important contribution to the knowledge base regarding reading comprehension interventions for young people with ASD. Their findings strengthen the rationale for the current study and the approaches identified in this research are used to inform the development of the intervention in the current study. The present study adopts the approach of explicitly teaching students how to identify the ‘main idea’ in a text as this was identified as a particular difficulty for many of the students in the present study. However, the present study does not explicitly teach sets of vocabulary items as in the Roux et al. study. Instead, the present study aims to build the participants’ capacity to define unfamiliar words independently using inferential strategies and greater use of external resources such as dictionaries. Although the research by Roux et al. (2014) indicated that teaching participants to resolve anaphoric references increased their skills in this area, this was not identified as a particular area of difficulty for participants in the present study and therefore, was not adopted as a core component of the intervention. Further details regarding the design of the intervention in the current study are included in the discussion section.

At present, there is insufficient evidence to support discreet teaching of anaphoric references as an intervention to improve the reading comprehension of children and young people with ASD. Nevertheless, it is useful to be aware of the fact that students with ASD may have difficulty identifying the source of an anaphoric reference such as a personal pronoun. Therefore, certain students may benefit from guidance in this area when reading with an adult; however, further research is needed to establish whether this can have a significant impact on reading comprehension.

2.5.5 *Collaborative reading approaches*

The majority of the interventions in this literature review have been delivered in group settings. Therefore, this section reviews the evidence for collaborative learning approaches in general and examines some of strengths and challenges of using this approach with students with ASD.

Collaborative (or cooperative) learning is an approach where students work together in small groups on structured learning activities. This approach is widely used in schools and

has demonstrated strong evidence of effectiveness across a range of ages and subjects (Education Endowment Foundation, 2016). In a recent meta-analysis of 65 studies of collaborative learning, Kyndt et al. (2013) conclude that collaborative learning showed a significant improvement on measures of academic achievement compared to individual and competitive learning approaches with a medium effect size of 0.54. In this meta-analysis, collaborative learning was found to be effective for all age ranges but most effective for the primary and further education cohorts. Collaborative learning has also demonstrated a wider impact beyond attainment in academic subjects. In a meta-analysis of 39 studies of collaborative learning with undergraduate students, Springer, Stanne, and Donovan (1999) identified that collaborative learning activities led to increased persistence on tasks and higher self-esteem. The large scale SPRinG project (Kutnick & Blatchford, 2014) in primary and secondary schools in the UK demonstrated that alongside increasing attainment, collaborative learning demonstrated improvements in pupil behaviour, engagement with tasks and thoughtful discussion between pupils.

In his large scale review of educational interventions, Hattie (2009) emphasises the importance of carefully organising small group learning to ensure that the participants have the skills needed to work effectively as a group. This conclusion reflects in the key findings of the SPRinG study in the UK. Kutnick and Blatchford (2014) emphasise the importance of moving from the commonly used ‘group seating’ approach where students sit with peers but work individually, to a ‘group working’ approach. Effective group working requires the teacher to carefully consider the arrangement and dynamics of the group members and provide training in communication skills so that learners can develop trusting and supportive relationships. Furthermore, Kutnick and Blatchford identified that collaborative learning is most effective when students are provided with challenging activities which legitimize group work and when it is implemented as a whole school approach. A further consideration when establishing collaborative learning opportunities is ensuring that students are motivated to participate. Several studies indicate that it is important to include both group rewards to establish a common purpose and rationale for the group to work together but also individual accountability to reduce ‘free riding’ (Newmann & Thompson, 1987; Slavin, 1983).

One important aspect of collaborative learning interventions for pupils with ASD is to consider the impact that challenging behaviour may have on the student’s reading comprehension and improvement over the course of the intervention. Research by Reutebuch, El Zein, Kim, Weinberg, and Vaughn (2015) evaluated a collaborative reading

approach where three students with ASD aged 15-17 were paired with a typically developing peer with strong reading comprehension. The single case study design was delivered over sixteen weeks and encouraged the students to collaborate to use a meta-cognitive reading programme called ‘Collaborative Strategic Reading–High School’ (CSR-HS) which has demonstrated improved reading outcomes for typically developing students in the United States. This study indicated that the CSR-HS programme was effective at increasing the students’ accuracy on multiple-choice questions of reading comprehension. More importantly, the intervention showed a dramatic decline in challenging behaviour for all three participants, which included off-task behaviour, non-compliance, and in one case, skin picking. Furthermore, all three participants demonstrated improvements in their ability to initiate and respond to social interactions.

This study suggests that group-based reading comprehension interventions can have positive social and behavioural impacts alongside improved academic attainment. The authors note that several strategies were helpful in achieving positive outcomes. One participant benefited from having reward time at the end of each session, and careful consideration was given to ensure that students were paired with appropriate role models with whom they were seen to interact successfully. Furthermore, the authors emphasize that for interventions to be successful with this group of students, they need to be flexible and adapted to the needs of the participants.

2.5.6 Meta-cognitive strategies

Meta-cognitive strategies have demonstrated robust evidence of effectiveness at improving general education skills in the typically developing population. In their comprehensive review of the cost-effectiveness of education approaches and interventions, the Education Endowment Foundation (EEF; Higgins et al., 2014, p. 21) concludes that:

“Meta-cognition and self-regulation approaches have consistently high levels of impact, with pupils making an average of eight months’ additional progress. The evidence indicates that teaching these strategies can be particularly effective for low achieving and older pupils”.

Higgins et al. add that meta-cognition is a low-cost intervention, because it does not require purchasing expensive materials; however, they note that this approach can be difficult to implement successfully as it requires students to take more responsibility for their learning. The literature search identified 12 studies teaching meta-cognitive strategies, all of which

were single case study designs teaching students how to generate or respond to questions in either pairs or small groups. All of these studies identified improvements in researcher-developed measures of reading comprehension for the students with ASD. While this suggests that meta-cognitive strategies are effective at developing reading comprehension, this may also reflect a publication bias as only those studies which are effective achieve publication.

2.5.6.1 Meta-cognitive strategies: Reciprocal Teaching

Two recent studies have explored teaching meta-cognitive reading strategies in single case study designs with students with ASD. Research by Roberts (2013) implemented a Reciprocal Teaching (RT) intervention, which teaches children how to work collaboratively to monitor their comprehension, repair misunderstandings, and generate summaries of the text. This intervention was delivered to a group of three 11-year-old students with ASD over a four-week period. The results revealed that 2 of the students made substantial gains in their ability to answer both literal and inferential questions, and produce an accurate summary of a text based on a standardised measure of reading comprehension. Further research by Truelove (2014) used an action research design to explore how to adapt an RT intervention with three 8-9-year-old pupils with ASD. This research identified that increasing the use of visual aids such as question cards and mind maps to support understanding and the use of skills learnt during the session was beneficial for the participants. Overall, Truelove's qualitative assessment of the process indicated the children's approach to reading changed as a result of the intervention (p.154).

I perceived a shift in their understanding of the purpose of reading as a means of deriving meaning rather than a more superficial task involving the decoding of words and the answering of questions posed by an adult.

Furthermore, the children in Truelove's study initially required a high level of scaffolding to ask relevant questions and understand the purpose of a summary. However, it was possible to reduce the level of teacher support over time as the children became more confident taking on the role of 'detective' in their reading.

Interventions teaching meta-cognitive strategies such as Reciprocal Teaching (RT; Palincsar & Brown, 1984) appear to be one of the most promising approaches to developing the reading comprehension of children and young people with ASD. RT aims to

make comprehension explicit so that children understand the processes that they need to perform to become proficient comprehenders. This programme has been well researched in typically developing populations with reading comprehension difficulties. A synthesis of meta-analyses by Hattie (2009) identified 38 studies including 677 participants and found an overall high effect size of 0.74. A previous meta-analysis by Rosenshine and Meister (1994) identified that when using researcher-developed outcome measures, RT demonstrated an effect size of 0.88; however, this was reduced 0.32 based on standardised measures. Importantly, this research did not find a difference in effect sizes between interventions that were delivered by researchers or classroom teachers.

Cooper and Greive (2009) propose that RT has several key strengths: the open process means the teacher is able to evaluate each student's thinking processes and approach to the task, it explicitly encourages internalisation of the skills through devolving leadership to the students, and the flexible nature of the approach means that it can be used with any age group or reading material. In fact, it has been used successfully with a range of different texts such as social studies or mathematics word problems (Cooper & Greive, 2009). One of the key strengths of the RT approach is that it teaches the student techniques which they can use independently to monitor and repair their understanding. As a result, it provides a scaffold that supports the individual needs of the students, such as difficulties with inference skills or working memory impairments, which would otherwise hinder the student's comprehension. Although this approach has demonstrated considerable success in North America, it has only recently been used in the UK.

Pilot research conducted by the Fischer Family Trust in 2011 trained Teaching Assistants across 6 different schools in England to deliver a Reciprocal Teaching programme to 48 pupils in years 5 and 6 over a period of 10-12 weeks. This unpublished study indicated that the pupils made considerable gains on a standardised measure of reading comprehension (The York Assessment of Reading Comprehension). The findings indicated that 48 pupils in the intervention condition made an average of 16 months' improvement in reading comprehension and 13 months' improvement in reading accuracy. This was compared to 24 pupils in a control group in the same schools who demonstrated smaller improvements of 1 month in comprehension and 3 months in reading accuracy over the same period. While these results are very promising, such a large gain in reading accuracy is unexpected as the programme is not designed to teach this skill and suggests that students may also be benefiting from affective factors and increased exposure to reading. This study would

provide more robust evidence if the results were confirmed with statistical analysis and further information was provided regarding the programme fidelity and the type of reading accuracy assessments used.

A further interesting piece of research investigating the use of RT in British schools was conducted by the Hackney Learning Trust and evaluated by the Education Endowment Foundation (EEF; 2014). This large-scale study implemented an RT-based literacy intervention to Year 7 (age 10-11) students with literacy difficulties in 19 schools over the course of an academic year. The total number of pupils receiving the intervention, for whom data is available, is reported to be 1078. The findings did not indicate a statistically significant improvement in reading comprehension for the intervention group compared to control groups who attended different schools. These negative results suggest that RT is challenging to implement in the UK education context. However, there were numerous methodological problems with the implementation and evaluation of this project.

Although the intervention used in this study is described as being based on RT, there are few details to support this. The study aimed to include RT as part of a package to replace regular English lessons for the entire academic year and as a result it is unclear what proportion of these sessions involved RT. The EEF report states that students were also given writing and grammar tasks which are not usually part of the RT approach. Post-intervention questionnaires and interviews with school staff were used to assess programme fidelity. These interviews highlighted a large variation in delivery methods and approaches, with some teachers explaining that they found the methods ‘repetitive’ and therefore devised their own approaches to teaching the subject matter. As RT focuses on the method rather than the content, this suggests that some teachers did not fully understand the purpose of the technique.

The EEF evaluation reports that participants’ scores varied widely between the baseline and outcome measures, with many participants in the intervention and control groups demonstrating a substantial decrease in performance over the course of the year. The authors suggest that this was due to participants not making sufficient effort when completing the final assessment; however, this could also be interpreted as a lack of reliability in the outcome measure (The Access Reading Test; ART). The ART assessment is a multiple choice test that is widely used by schools for exam access arrangements; however, this literature review was unable to identify any published research into its

reliability. Furthermore, anecdotal evidence from schools that have used it suggests there are concerns regarding the face validity of some of the items and the reliability of the online version.

The EEF report states that it was not possible to draw any conclusions regarding the effectiveness of the *Lit* intervention because the intervention and control groups were significantly different on measures of attainment and demographics, and therefore a meaningful comparison between the groups was not feasible. The limitations of this study demonstrate some of the challenges in conducting large-scale research in education and the difficulties ensuring programme fidelity within a complex system such as a school. Nevertheless, interviews with school staff identified some qualitative benefits of the *Lit* programme. Overall, teachers felt that the programme fostered the confidence and independence of students in literacy lessons and was particularly effective at developing the confidence of low attaining students. Furthermore, the structure of RT provided a valuable (and rare) opportunity for ‘lively debate’ in the classroom which is an Ofsted requirement for a school to achieve an ‘outstanding’ rating.

However, teachers implementing the *Lit* programme reported that for students with ASD, the severity of their social communication difficulties impacted on the students’ ability to engage with the interactive demands of the task and to understand some higher level concepts such as inferences. Teachers also reported that some children with SEN did not engage with the programme because their low reading accuracy levels prevented them from accessing the texts used in the sessions. These issues suggest that either reading texts or group levels were not always appropriately differentiated to meet the needs of the students in the group; this highlights the need for careful organisation of group dynamics and ability levels when implementing RT. These areas are carefully considered in the current study and implications for practice arising from this are discussed in more detail in the discussion section.

The difficulties observed in the *Lit* programme reflect the views of Dion, Fuchs, and Fuchs (2007) who suggest that although RT has been shown to be effective when implemented correctly, it has not been widely adopted because teachers find it challenging to implement. They argue that many students lack the confidence and social skills necessary to adopt the different roles in the group without close supervision from the teacher. As a result,

implementing this approach with students with ASD requires careful planning and organisation to support potential difficulties in these areas.

The research identified in this literature review demonstrates the promising but early stage of research in this field. RT has strong face validity, is based on a sound theoretical framework and has demonstrated consistent success with typically developing pupils in different countries. Current evidence for the implementation of RT in the UK is limited; nevertheless, there is some tentative evidence (Roberts, 2013; Truelove, 2014) suggesting that RT is the most likely candidate for an intervention to improve the reading comprehension of children and young people with ASD. There is an urgent need for further research involving larger-scale, experimental studies to enable professionals to make evidence-based recommendations that are appropriate for students with ASD. Therefore, this project implements an RT-based reading intervention with the aim of improving the reading comprehension of secondary school students with ASD.

The research suggests that it would be beneficial to adapt the RT approach to include more visual materials such as graphic organisers to support the understanding of narrative structure and sequencing (Truelove, 2014). Furthermore, there is evidence to suggest that it would be beneficial to incorporate explicit instruction in how to make inferences based on the work of Asberg and Sandberg (2010). Finally, the work of the Hackney Learning Trust (Education Endowment Foundation, 2014) emphasises the need to carefully consider the grouping of students and differentiation of materials in order to facilitate the social demands of the task. The intervention used in this study aims to incorporate the available evidence on effective implementation with young people with ASD and further details are described in the methodology section.

2.6 Research aims and rationale

The current study expands on the evidence base for improving the reading comprehension of students with ASD. There is substantial research supporting the effectiveness of Reciprocal Teaching (RT) with typically developing populations (Hattie, 2009; Rosenshine & Meister, 1994). And some exploratory research with individuals with ASD (Roberts, 2013; Truelove, 2014) demonstrating the potential benefits of RT with this group. The current study aims to extend this research base and address some of the methodological issues found in the previous literature. It is the first study to evaluate the effectiveness of RT at improving reading comprehension in adolescents with ASD.

2.6.1 *Research questions*

1. Does RT improve reading comprehension and ability to summarise a text from memory as measured by scores on the York Assessment of Reading Comprehension (YARC)?
2. What are participants' views of the intervention?
3. What strategies can support effective delivery of a reading intervention for young people with ASD?

2.6.2 *Hypotheses.*

1. It is predicted that students who receive the intervention will show significantly more progress in their reading comprehension (as measured by changes in their score on the York Assessment of Reading Comprehension; YARC) than students who receive treatment as usual (control group).
2. It is predicted that students who receive the intervention will show significantly more progress in their summarisation of a text (as measured by changes in their score on the YARC summarisation task) than students who receive treatment as usual (control group).

Chapter 3. Methods

3.1 Design

The process of reading comprehension is an individual and subjective experience. Nevertheless, education systems require objective measures of attainment in order to identify individuals who require further support and evaluate the effectiveness of instructional methods. The present study is situated within this conflict and therefore, adopts a critical realist ontological position as it purports to identify an objective assessment of reading comprehension. In addition, the study aims to capture the subjective experiences of participants through a semi-structured interview conducted following the intervention. This is analysed using a thematic analysis and explores participants' view on how the programme has informed their approach to reading. There is a growing awareness of the benefits of mixed-methods research designs such as this. Johnson and Onwuegbuzie (2004) highlight how mixed-methods designs have the advantage that they can corroborate results and therefore provide stronger evidence for a particular finding. Furthermore, mixed-methods can provide a more complete understanding of a research area and therefore make an important contribution to informing practice in that area. The current researcher believes that this study makes a unique and helpful contribution to the understanding of reading comprehension in young people with ASD and provides useful insights to inform practice in this area.

This study employs a between-subjects, repeated-measures design to evaluate the effectiveness of a reading comprehension intervention in comparison to a control group.

3.2 Ethics

Care was taken to ensure that the study adhered to the ethical requirements of the British Psychological Society's Code of Ethics and Conduct (2009). Furthermore, this study was approved by the Ethics Committee of the Institute of Education, University College London (see appendix A). As participants in this study were young people with ASD under the age of 16 (therefore, a vulnerable population), certain ethical issues must be carefully considered:

3.2.1 Consent

Parents of potential participants were provided with information regarding the nature of the project and who would be delivering the intervention. Potential participants were also provided with an information leaflet and had the requirements of the project explained by

the researcher. These measures ensured that both parents and young people were able to provide fully informed consent to participate in the research. Parents gave written consent and students gave verbal consent to participate. Participants were reminded of their right to withdraw from the project at any point. It was important for the aims of the project that the young people participated voluntarily so that they would become independent and successful at applying the strategies taught in the programme. Responsibility for establishing ongoing consent was allocated to the schools who met with students individually and in groups during the programme to establish the progress of the intervention and the students' willingness to continue. Following completion of the project, students were debriefed regarding the purposes of the intervention (although the aims and purpose of the intervention were made explicit throughout the course of the intervention).

3.3 Participants

3.3.1 *Autism diagnosis*

Schools were asked to confirm that each target child had received a formal diagnosis of an Autism Spectrum Disorder (including Asperger's Syndrome), and this information was verified by viewing the multi-disciplinary diagnosis contained in school files. Attempts were made to confirm present ASD symptomology by asking parents to complete the Social Responsiveness Scale (2nd Edition). However, only 2 parents returned completed forms and therefore this information was not possible to obtain.

3.3.2 *Recruitment*

Participants were selected through an opportunity and snowball approach to sampling. Emails to recruit participants were sent to schools in the Local Authority which provided the training placement for the researcher and other schools which were contacted through the university. Recruitment was completed in two phases. The first phase recruited participants for the intervention condition and delivered the intervention between November 2015 and January 2016. The second phase began in February 2016 and recruited participants for the control condition who received treatment as usual over a six-week period. Assessment of this group lasted until April 2016.

In total, eighteen schools were contacted by email either directly by the researcher or via the school's EP. Following this initial contact, twelve schools expressed an interest in taking part. Initial meetings were held either in person or by telephone with each of these schools

and seven were able to commit to participating in the project. All schools were located in the South of England. It is important to note that the researcher considered the potential bias of this type of recruitment whereby only those schools that have the motivation and capacity to deliver an innovative approach to education engage in educational research. These exemplar schools may not reflect the general reality of an education system that is struggling with a ‘funding crisis’ leading many schools to cut extra educational provision and reduce the deployment of support staff (Weale, 2015). Nevertheless, this compromise is a necessary evil in real-world educational research; further implications are explored in the discussion section.

The schools sent information leaflets to parents and requested their children’s involvement in the study. Initially, forty-seven students were identified by their schools as presenting some comprehension difficulties. Following screening, twenty of these students were identified as meeting the criteria for inclusion in the study. One student was removed from the programme as he failed to attend 75% of the sessions and was not able to complete the final assessment.

In the second phase of recruitment, five more schools were contacted by the researcher, all of whom initially expressed an interest in participating in the control condition.

Subsequently, three schools were able to commit to taking part in the control condition and identified sixteen students with reading comprehension difficulties. Thirteen of these students obtained parental consent and were included in the initial screening assessment. Ten of these students met the inclusion criteria; these were assigned to the control condition and received treatment as usual for a period of six weeks. See figures 2 and 3 below for details of recruitment and intervention.

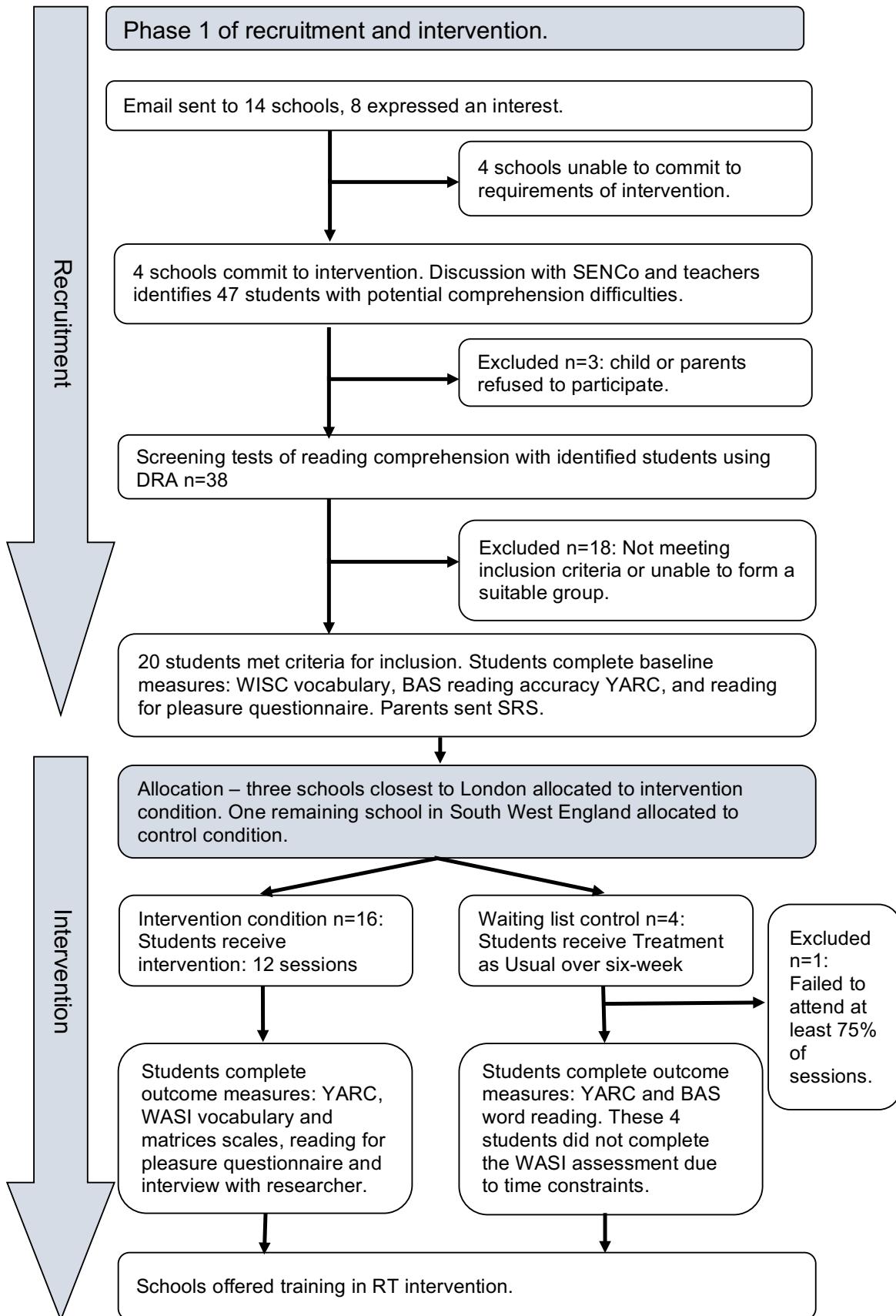


Figure 2: Recruitment and selection process: Phase 1.

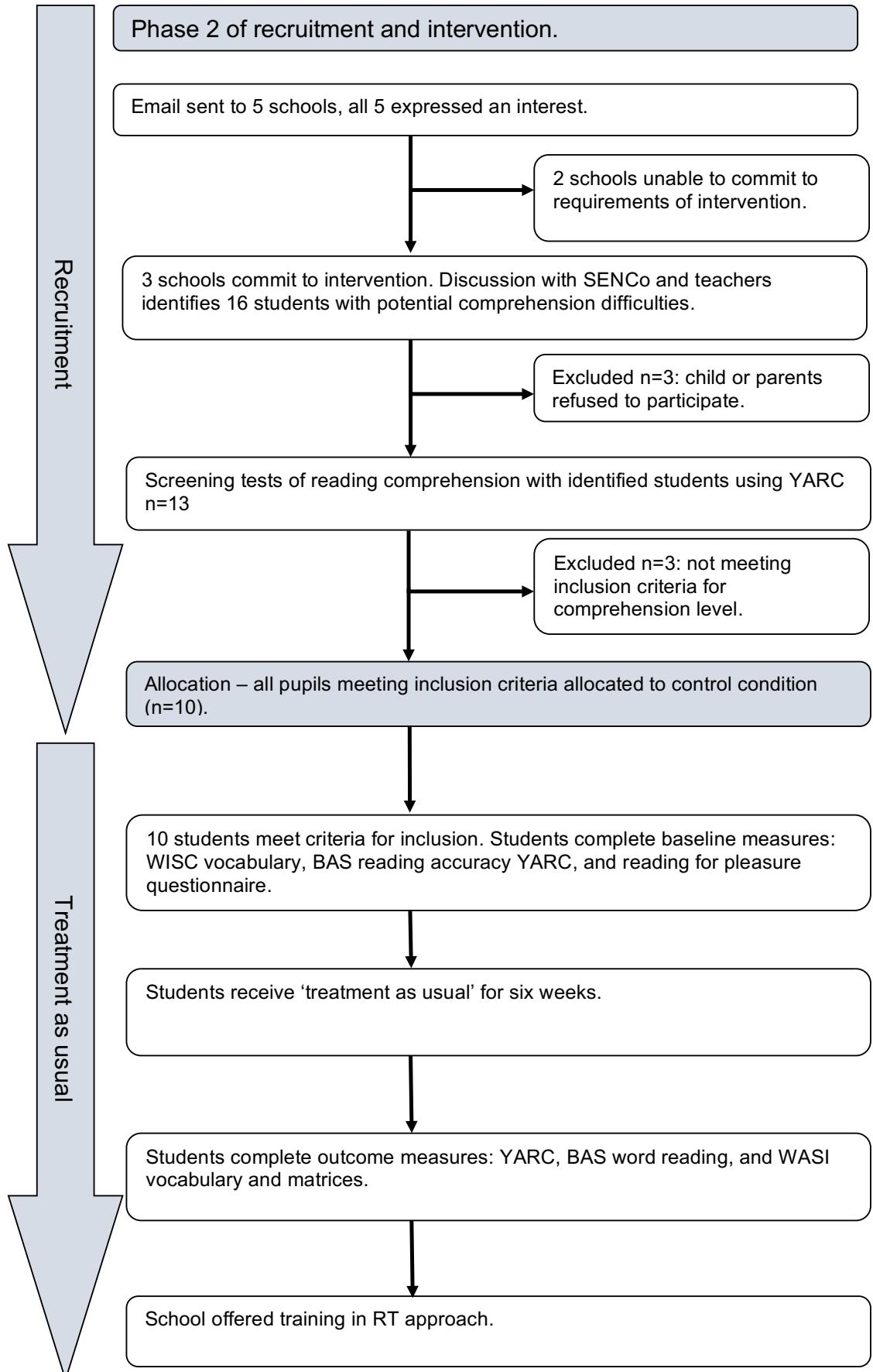


Figure 3: Recruitment and selection process: Phase 2

The following criteria were used to establish eligibility for inclusion in the study; justification for each criterion is discussed in more detail below.

1. Reading comprehension difficulties identified by the student's school and a standardised score on the York Assessment of Reading Comprehension below 115 (see below for discussion regarding selection methods).
2. Reading accuracy equivalent to age seven or above measured using the British Abilities Scales (3rd Edition) Reading subtest.
3. A diagnosis of an ASD including autism or Asperger's syndrome (including comorbid diagnoses of other disorders such as ADHD) verified by viewing documentation held by the school.
4. Normal or corrected to normal vision.
5. Sufficient hearing to access the verbal instructions in the intervention.
6. English mother tongue or evidence of attending a minimum of six years primary education in the UK.

3.3.2.1 Assessment of reading comprehension difficulties

There is currently no agreed definition or cut off point at which reading comprehension difficulties are identified. Previous research has employed different approaches to determining eligibility for reading comprehension interventions. Roberts (2013) uses a cut-off point of one year below expected age equivalent score on a test of reading comprehension.

This norm-referenced criterion is similar to the approach adopted by the large scale research by the Hackney Learning Trust (Education Endowment Foundation, 2014). This study conducted a whole-school screening with the Access Reading Test (ART) and subsequently selected the lowest scoring 15% of students as eligible to receive the intervention. Setting a minimum cut off score has the advantage that it captures the lowest attaining students; however, it has the disadvantage of including those who struggle with reading accuracy and therefore achieve a low score on the assessment because they are not able to access the text and / or the questions. As discussed in relation to the 'Simple view of reading' this group of struggling readers would benefit more from a phonics-based intervention to build their basic reading skills before potentially moving on to an intervention focused on comprehension such as RT.

An alternative approach looks at the discrepancy between reading accuracy and comprehension. This method was used by Truelove (2014, p. 43) who adopted a loose description of “strong discrepancies” between reading accuracy and comprehension for eligibility in her study. This ensures that participants have the basic literacy skills to be able to access the text used in the intervention. However, there are some disadvantages to using a discrepancy model to identify comprehension difficulties in individuals with ASD. Young people with ASD may experience difficulties with very specific areas of reading comprehension such as making inferences, understanding idiomatic language and identifying the gist of a passage. However, they may score within the average range on a standardised measure of comprehension because they may be able to compensate for their difficulties with a keen eye for detail and / or the ability to recall factual information from the text. This profile was evident in some of the participants in the current study as they were able to recall many (often irrelevant) details from what they had read but entirely misunderstood the gist of the story.

As discussed in the literature review, reading comprehension is a complex construct and difficulties in this area may be due to a variety of reasons. Therefore, it is important to consider that a ‘snapshot’ reading assessment may not be able to capture the range of difficulties that a young person could experience in a real-world learning environment. Consequently, it was decided to include students who were described by their school as experiencing difficulties with reading comprehension because their teachers were best placed to make a thorough assessment of the strengths and difficulties over time. Only those who scored in the above average range of the YARC (standardised score above 115) or Diagnostic Reading Analysis (DRA) were excluded from participating. Those young people who scored in the above average range were usually very proficient readers with high academic attainment, and as a result, were not well known to the school SEN department. In several instances the researcher was asked to include these young people in the initial screening simply because little was known about their relative strengths and difficulties.

3.3.2.2 Reading accuracy

A reading accuracy score equivalent to age 7 (as measured by the BAS word reading subtest) was chosen as the minimum cut off point as this enabled the students to access the reading text chosen for the programme. There is no evidence to suggest that students

with a reading age below this level would not benefit from an RT approach (if also combined with specific phonics instruction). However, during the initial screening it was not possible to identify a large enough group of participants with this low level of reading accuracy all together in one school.

3.3.2.3 Diagnosis of ASD or Asperger's.

School records were used to verify that each child had received a formal diagnosis consistent with NICE (2011) guidelines. Participants with comorbid diagnoses such as Attention Deficit Attention Hyperactivity Disorder (ADHD) were also included. Due to the high frequency of comorbid psychiatric disorders in individuals with ASD (Simonoff et al., 2008), it would not have been possible to obtain a group without any comorbid diagnoses. Furthermore, this data was not collected as there was no way to assess the individual impact of each 'disorder' on the student's ability to concentrate and learn new skills. Therefore, schools were asked to confirm that all potential participants would be able to sustain attention for a sufficient length of time to be able to access the intervention.

3.3.2.4 Normal or corrected to normal vision.

It was considered important to verify this as teenagers may be self-conscious about wearing glasses and refuse to wear them in school, which might impact on their ability to access reading texts.

3.3.2.5 Sufficient hearing to access the verbal instructions in the intervention.

Schools were asked to provide details of any participants with hearing impairments. One participant in the control group used a hearing aid in school. As a result, he was presented with the assessment items visually as well as verbally. This was a deviation from the standardised administration of the YARC assessment but it was felt necessary to ensure that he was able to access the requirements of the task.

3.3.2.6 English mother tongue or evidence of attending a minimum of six years primary education in the UK.

This minimum requirement for English language ability is consistent with research in this area which suggests that it takes an average of 6-8 years of formal schooling for pupils who speak English as Additional Language (EAL) to develop proficiency in academic English (Demie, 2010).

3.3.3 Allocation

Due to the difficulty of delivering the intervention in different schools and the need to complete the recruitment in two phases, it was not possible to randomly allocate students to the intervention or control conditions. As a result, participants were allocated on a first come, first served basis. From the initial recruitment phase, four schools were able to start the intervention in November 2015. Due to the geographic location of one of the schools, it was not possible for the researcher to deliver the intervention personally in this school and therefore, the four students in this school were assigned to the control condition. The remaining fifteen students (across three schools) were assigned to the intervention condition. Following completion of the intervention, a further three schools were identified to participate in the control condition. All the students ($n=10$) meeting the inclusion criteria from these schools were subsequently assigned to the control condition.

It is accepted that this approach does not meet the ‘gold standard’ of randomised controlled trials; furthermore, the design does meet the criteria for ‘well-matched control group’ as defined by the Education Endowment Foundation (2014) because participants are not matched individually on measures of reading comprehension. However, as this study was targeting a very specific group of young people, it was not possible to obtain the large sample numbers needed for a fully experimental design. There are two factors which increase the robustness of this allocation method. Allocation to each condition was conducted at a school rather than individual level and the majority of the control schools were recruited after the intervention had been delivered. Both of these factors help to reduce any potential bias in allocating participants.

3.3.4 Participants: characteristics

This study involved 29 participants aged 11-15 (mean age: 13 years, 6 months). This age range was chosen as it presents a unique challenge to students with ASD. Secondary education in the UK places a high demand on reading comprehension: students are expected to acquire information from written text and there is a greater focus on interpretation of literature. Furthermore, students have fewer lessons focusing on the mechanics of reading and writing skills and are expected to access a greater quantity of reading material. As a result, students who present with reading comprehension difficulties at this age are likely to struggle to become independent learners in school. Furthermore, as Barrington (2015) notes, adolescence is the stage in which reading is often replaced with new interests and activities. If students do not enjoy reading, they are unlikely to continue to

access books independently. The upper age limit of 15 was chosen to avoid removing students from essential exam preparation.

Students attended four different types of school: specialist ASD schools, one of which was a residential school for girls and the other a day school for boys. Other students attended mainstream secondary schools and were either placed in a specialist ASD unit or were part of the general school population. Participants attended seven schools in total (two ASD specialist schools and five mainstream schools, two of which included an ASD unit within the school). The majority of participants in the intervention condition (11/15) attended specialist provisions and the majority (10/14) of the control group attended mainstream education. This was considered as a potential confound, however it was felt that this would not have a significant impact on the results as each student had an individualised programme of support and therefore it was not possible to identify distinct differences between the educational provision of the two groups. As such, some students from each school type had a high degree of adult support in their curriculum lessons and some students had very little.

The intervention group contained a mix of boys (8) and girls (7). Unfortunately, it was not possible to recruit as many girls for the control group given the relative lack of girls with an ASD diagnosis. The ethnic background of participants was relatively homogenous. All of the control group and all except 2 participants in the intervention group described themselves as *White British* or *White Other*. This is likely to reflect the location of the schools in which the study was conducted and also potentially cultural biases in the recognition and acceptance of autism. Paired-samples t-tests (or Mann Whitney U test where the data did not meet the assumption of normal distribution) were conducted for each variable and indicated that there were no significant differences between the two groups on the baseline measures of expressive vocabulary, age, non-verbal reasoning, reading accuracy, rate, or comprehension. Further details including exact p values for each variable can be seen in table 1 on page 55.

3.3.5 Treatment as usual control group.

The majority of the young people involved in this study were well known to their school SEN department and had received extra educational provision to improve their reading skills. These interventions ranged from individualised support with reading using published programmes and trained staff to more informal approaches and group-based interventions.

Where a student was timetabled to receive this support, this continued during the current research project for both the intervention and control groups. Of the fifteen participants in the intervention group, three continued to receive weekly guided reading groups, one had 1:1 support in every lesson (for reasons of behaviour) and another three continued to receive twice-weekly phonics instruction using a computer-based programme (Lexia). Of the fourteen participants in the control group, five continued to receive a weekly self-directed reading comprehension intervention (Accelerated Reader), two continued to receive weekly individualised phonics instruction with a teaching assistant, and one student had support in all core curriculum lessons (to support learning needs). The remaining students did not have systematic support for their reading but were able to access support in class on an ad-hoc basis where necessary.

3.4 Measures

This section details the baseline and outcome measures employed in the study. Unless stated otherwise, all measures were administered by the researcher.

3.4.1 Background measures

3.4.1.1 Reading comprehension

Diagnostic Reading Analysis (DRA; Crumpler & McCarty, 2004). This assessment is standardised on a UK population up to age 16 and includes measures of reading accuracy and comprehension. The DRA includes both literal and inferential comprehension questions. Williams (2015) conducted a detailed analysis of the component skills tested by the DRA and identified that it had a greater focus on text-based rather than general knowledge-based inferences relative to other standardised measures of reading comprehension. Therefore, Williams suggests that this represents a more culturally fair test of reading comprehension. Nevertheless, this literature review was unable to identify any published research into the reliability or concurrent validity of the DRA assessment. This assessment was chosen as it is suitable for a wide range of ages and reading abilities and is relatively quick to use for screening purposes. However, the stimulus texts are relatively short (maximum 100 words), which means that it is not representative of long and complex texts that students at this age are expected to read. Furthermore, the DRA presents the student's standardised score as a range rather than an exact score, making it difficult to ascertain a clear discrepancy between word reading and comprehension. For this reason, the DRA was only used as a screening tool and students' results on this assessment are not compared to their scores on the YARC.

3.4.1.2 Reading accuracy

The participants' reading accuracy was assessed using the British Abilities Scales (3rd Edition; BAS-III; GL Assessment, 2011) Word Reading subtest. This subtest has two parallel forms (A and B) which allow for retesting within a short period of time. The BAS is developed for British students, is standardised on a large sample aged 3-17, and demonstrates robust reliability (Elliot & Smith, 2011). The BAS reading subtest provides a reading standardised score with a mean of 100 and a standard deviation of 15. The Technical Manual for the BAS-III (GL Assessment, 2011) does not report the standard error of measurement for the assessment but provides reliability data for each of the scales based on the norms derived from the previous edition (BAS-II). However, the technical manual does not provide reliability data for the Word Reading subtest, presumably because this subtest contains two parallel forms (A and B).

3.4.1.3 Students' views of reading

An adapted version of the Reading for Pleasure Survey developed by the National Literacy Trust (2015), presented in Appendix A, was employed. The items on this questionnaire ask about the student's enjoyment of reading, how often and what type of materials they read. It also asks students what would encourage them to read more often. The survey was recently administered to a large sample of 32,000 students aged 8-18 in the UK (Clark, 2015) and indicated that there was a decline in young people reading for pleasure in the UK. The National Literacy Trust does not report any attempts to establish the reliability of the questionnaire. Three questions from this survey were used to compare the intervention and control groups on the key measures of perceived ability, enjoyment and frequency of reading. The first item required students to indicate their perceived ability at reading on a 10 point Likert-type scale, with 10 being the highest. The second item required students to choose from four options to describe their enjoyment of reading (*not at all, a bit, quite a lot, very much*); to enable comparison between the groups, these four options were converted to a 4-point scale where 1 corresponded to *not at all* and 4 corresponded to *very much*. The final item on the questionnaire asked students how often they read and provided four options (*never or almost never, once or twice a month, once or twice a week, every day or almost every day*). Similarly, these were converted to 4-point scale with *never or almost never* as 1 point and *every day or almost every day* as 4 points. A comparison of the results of the two groups can be seen in table 1 on page 55.

3.4.1.4 Expressive vocabulary

Students completed the Wechsler Intelligence Scale for Children, 4th Edition (WISC-IV; Pearson, 2004), Vocabulary scale. This scale assesses the participant's ability to provide a verbal definition for common words and has been standardised on a British sample of children aged 6-16 and demonstrates robust reliability. The WISC-IV Technical Manual does not report the standard error of measurement; however, it reports that the Vocabulary subtest demonstrates strong reliability ($r=0.85$). The WISC-IV provides a scaled score ranging from 1-19 with 10 as the mean average and a standard deviation of 3. A separate study by Oliveras-Rentas, Kenworthy, Roberson, Martin, and Wallace (2011) explored the profile of young people with ASD on the WISC-IV. The 56 participants with ASD in this study achieved a mean scaled score of 10.27 (SD=4.19) on this subscale, which suggests that, on average, expressive vocabulary is not an area of relative difficulty for this population.

3.4.1.5 Cognitive abilities

The Wechsler Abbreviated Scales of Intelligence, 2nd Edition (WASI-II; Pearson, 2011) is a cognitive assessment which is relatively quick to administer and is therefore useful for screening and research purposes. The test is standardised on children and adults aged 6-89 including those with learning difficulties and developmental disorders; however, individuals with autism were not included in the original standardisation sample. Further research indicates that the WASI-II is predictive of IQ scores on the full versions of Wechsler IQ tests in a sample of children and adults with autism (Minschew, Turner, & Goldstein, 2005). The current study used the Matrices subtest which assesses the participant's non-verbal reasoning skills with a visual, analogical reasoning task. The WASI-II Technical Manual does not report the standard error of measurement for the assessment; however, it reports strong reliability in the child standardisation sample for the Matrix Reasoning subtest ($r=0.87$) and Vocabulary subtest ($r=0.91$). Following the intervention (or treatment as usual period for the control group), students completed the Vocabulary subtest in which the participant is required to give a definition for common words.

The matrices subtest was used as a proxy measure of non-verbal intelligence to enable comparisons between the intervention and control group at baseline. The vocabulary subtest was used to assess whether participants' expressive vocabulary changed over the course of the intervention. Given that the two subtests were conducted at different time points; a full scale IQ score was not calculated as this was not considered to be valid.

3.4.2 Outcome measures

3.4.2.1 Reading comprehension

York Assessment of Reading Comprehension; Secondary (YARC; Snowling et al., 2009) was selected as the pre and post measure of reading comprehension. There are very few reading comprehension assessments which have recent standardisations on young people up to the age of 16. The YARC provides a standardised score for each participant. (This is a limitation of the DRA, which only provides a score within a range and is therefore less sensitive as an outcome measure). The YARC was standardised on a sample of 1376 pupils across the UK (Snowling et al., 2009). A small percentage (3.9%) of children with SEN were included in this sample but information on the number of these with autism is not available. The comprehension items are designed to assess literal and inferential understanding of the text.

Participants are asked to read two passages (one non-fiction and one fiction) and respond verbally to questions that include factual and inferential information. Furthermore, participants are asked to summarise the passages from memory. This final task is designed to reflect the demands of secondary school examinations, which require the student to read a variety of genres of text and extract the key information. The results of the summarisation task in the YARC are presented separately from the comprehension score to allow for comparison between these two different but complimentary skills. The YARC has two parallel forms to allow for retesting (A and B). The YARC does not report the standard error of measurement for any of the passages; however, table 1 below lists the reliability data for each of the subtests for the comprehension and summarisation tasks as reported in the technical manual (Snowling & Stothard, 2011). This table indicates that the comprehension tasks demonstrate strong reliability; however, the summarisation tasks are relatively weaker. This reflects the difficulty in accurately measuring summarisation.

Passage	Reliability (Cronbach's alpha)
Comprehension	
Form A, Level 1.	0.90
Form A, Level 2.	0.86
Form B, Level 1.	0.88
Form B, Level 2.	0.85

Summarisation	
Form A, Level 1.	0.65
Form A, Level 2.	0.71
Form B, Level 1.	0.74
Form B, Level 2.	0.74

Table 1: Reliability data for the York Assessment of Reading Comprehension (Secondary).

3.4.2.2 Expressive vocabulary

The WASI-II Vocabulary subtest is used as the outcome measure for expressive vocabulary. This subtest is very similar to the WISC-IV vocabulary subtest administered at baseline but contains different vocabulary items which the participants are asked to define verbally. This was chosen in order to avoid repeated administration effects which would be likely to inflate the participants' score over such as short period of time. The WASI-II vocabulary subtest provides a T-score which is then converted into a scaled score to enable comparison with the WISC-IV. Research by Zhou and Raiford (2011) compared the performance of participants on both the WASI-II and WISC-IV and suggest that the WASI-II Vocabulary subtest is a suitable substitution for the WISC-IV Vocabulary subtest. The reliability of the Vocabulary subtest for the child standardisation sample is reported as $r=0.91$ in the technical manual.

3.5 Procedure

3.5.1 Screening

Following identification of potential participants by schools and receipt of parental consent forms, an initial screening session was arranged for pupils in the intervention condition. In this session the researcher introduced himself to the student and explained the purpose of the project; the student was asked to give their verbal consent to take part in the initial screening. Each student in the intervention condition completed the Diagnostic Reading Assessment (DRA) assessment in a quiet space in the school and was also accompanied by their teaching assistant if they wished. At the end of this session, each student was given some positive feedback on their reading skills and the format and timings of the proposed intervention (which was called the reading group) were explained. It was decided that it would be important to conduct an initial screening test with the students for two reasons. Firstly, it enabled the researcher to quickly identify pupils who were not suitable for the intervention. Secondly, it enabled the students to become more familiar with the

researcher. It was hoped that this would reduce any potential anxiety about meeting a new person and enable them to perform at their best on the baseline YARC assessment.

Due to time constraints it was not possible to follow the same procedure with the control group; this group did not receive an initial screening test and completed the YARC at the first meeting. The impact of this decision was considered and it was thought that it may increase the chance of seeing a significant improvement in the control group, as they would not have the benefit a second session to become familiar with the researcher and therefore, their performance may be impacted by anxiety. There was some evidence to suggest that this was an effect in the intervention group as several students appeared much more relaxed on the second meeting with the researcher whereas they had been noticeably nervous during the first session. Therefore, this design meant that some students in the control might have an artificially low score on the baseline assessment due to anxiety. This impact would be likely to reduce the potential power to detect the efficacy of the intervention and would be unlikely to lead to a false positive finding.

3.5.2 *Baseline session*

All students completed the BAS Word Reading subtest on this first meeting, which was presented in a counterbalanced order so that 50% of pupils received version A and the other 50% version B. All students then completed the YARC comprehension assessment. The level of the passage was chosen according the student's Year Group as recommended in the YARC manual. Students in Years 7-9 completed level 1 and students in Year 10 completed level 2. The order of presentation was counterbalanced so that 50% of the participants completed Reading Paper A and the other 50% completed Reading Paper B. Students also completed the WISC-IV Vocabulary subtest, the WASI-II Matrix Reasoning subtest and Reading for Pleasure Questionnaire during this meeting.

For all students, care was taken to ensure that they were able to perform at their best on this initial assessment. In order to achieve this, the researcher liaised closely with the schools to ensure that students were not removed from their favourite lessons and if the student was unhappy or not feeling well, the assessment was postponed for another day and the student was asked to nominate a lesson that they would be happy to miss. Assessments needed to be postponed in approximately 5 instances. It was possible to identify several potential confounding factors which might influence the students' performance on the baseline and outcome assessment. The day of the week on which

participants completed the assessment was considered to be a potentially confounding factor as several of the students attended a weekly residential provision and therefore had long journeys to school on a Monday morning. As a result, students completed the baseline and outcome assessments on the same day of the week (e.g. those who completed the baseline on a Thursday also completed the outcome measure on a Thursday) to reduce potentially confounding factors such as tiredness.

3.5.3 *Intervention procedure*

The intervention is based on the Reciprocal Teaching (RT) programme developed by Palincsar and Brown (1984). It is a group approach to reading which aims to teach and practise the skills used by good readers to aid their comprehension. The intervention focuses on four key strategies: prediction, clarification, questioning and summarising. The adult facilitator introduces and models these strategies while reading a text. Students are provided with starter sentences to scaffold their use of the strategy and the students are encouraged to apply them in discussion with the group. Over a few sessions the students are expected to become increasingly independent in the use of these strategies and the adult's role becomes more about facilitating the discussion and extending the students' understanding.

The procedure used in this intervention is based on the work of Oczkus (2010), Brown, Palincsar, and Campione (1989), and Fischer Family Trust (2012). Adaptations are designed to take into account recent research exploring how to employ the RT approach with children with autism (Roberts, 2013; Truelove, 2014), and research on developing inference skills for children with autism (Elbro & Buch-Iversen, 2013). Furthermore, the researcher attended a training day delivered by the Fischer Family Trust which provided an opportunity to discuss the implementation of the programme with professionals experienced in delivering it. Below is a brief overview of the procedure of the intervention; details of the adaptations together with observations of their impact are explored further in the discussion section.

The intervention was delivered in two 45-minute blocks per week over a period of six weeks by the researcher. The frequency of the intervention was based on existing research employing RT with typically developing populations (Oczkus, 2010) which recommend that the programme is most effective when implemented twice a week. Existing research into reading comprehension interventions for children with ASD have used programmes ranging

from six (Roberts, 2013) to eighty sessions (Asberg & Sandberg, 2010). However, there are three recent studies which have taught children with ASD meta-cognitive questioning strategies in programmes ranging from six to twelve sessions (Roberts, 2013; Truelove, 2014; Whalon, Al Otaiba, & Delano, 2008). All of these studies have demonstrated improvements in reading comprehension for at least some of the participants. Given this research base and the desire to create an intervention that is compatible with school timetables and pressure on staffing resources, the period of six weeks (a school half term) including a total of twelve sessions was chosen.

In each session, the students silently read a short section of text from the novel that had been chosen in collaboration with the students. Before reading each section, one student was randomly allocated the role of 'group leader'. The group leader predicted what they expected to happen in the text based on their knowledge of the story and the previous chapters. Following reading, the group leader's role was to facilitate a discussion of new words or expressions which required clarification. Throughout this process, students were encouraged to support each other. When they knew a definition they could provide it to the group or they could use the dictionary or computer to find the definition. Following this, all students were encouraged to ask questions about the text and to answer each other's questions where possible. The adult's role in this was gradually to support their development from factual 'wh' questions to more inferential questions towards the end of the intervention. Following this, the group leader was asked to summarise the text in one or two sentences and encouraged to identify the main idea in the passage. Once this process was completed, the role of group leader passed to the next participant in turn, and the process was repeated. Each participant was able to take on the role of group leader at least once per session. Over the course of the intervention, students were encouraged to integrate these four skills simultaneously and apply them while reading, thereby replicating the process that successful readers use subconsciously. See appendix I for a more detailed account of a typical reciprocal reading session.

All the sessions were delivered by the researcher; four different members of school staff participated in some of the sessions in order to learn the approach. An example session plan is included in appendix B together with some example materials in appendix C.

Sessions were delivered in a quiet room in the school and care was taken to ensure that students did not miss their favourite subjects and that they were not routinely taken out of

the same subject each week. During the first few sessions, the initial 10 minutes was dedicated to relaxation and familiarisation activities (such as chocolate meditation) to encourage students to feel at ease with the researcher and each other. A minimum attendance of 75% of sessions was established in order to allow some flexibility to account for students who were not able to attend every lesson due to factors such as illness, school trips or exams. Groups consisted of 3-4 students organised by reading accuracy ability with a mix of ages in each group.

3.5.3.1 *Reading materials*

'The Fault in Our Stars' by John Green (2012) was chosen as the reading material for this intervention. This was selected from an online list of popular teen fiction (www.goodreads.com) where it was rated as the fifth most popular novel by over 2.5 million young people. This book had several advantages that made it suited to a reading comprehension intervention with this age group. Firstly, it was relatively new and therefore not included in any of the school English curriculums and none of the participants had previously read the book. Secondly, the protagonists in the story were teenagers and the story contained some mature themes such as love, romance, and death; therefore, it helped the students to view the reading intervention as an enjoyable activity which was slightly different from typical school lessons. Thirdly, it was easily readable from a lexical perspective (not many unfamiliar words for this age group) but was challenging from a social communication perspective in that it required the reader to make numerous inferences and relate events to personal experience in order to make sense of the story.

It also contained numerous idiomatic expressions written in plain language, which provided ample opportunity for discussion of the author's intent. A useful example of idiomatic language was the section in which the protagonist discussed her mother's reaction to her cancer diagnosis: "There's only one thing worse than biting it from cancer, and that's having a kid that bites it from cancer" (Green, 2012; p.18). This sentence provoked a lively debate about the meaning of '*biting it*' and also about viewing a situation from another's perspective. Finally, the use of an entire novel is relatively uncommon in reading comprehension interventions which tend to use short, somewhat contrived stories followed by numerous questions to test the reader's comprehension (examples of this approach include the SRA Reading Laboratories series). However, the use of a novel was considered advantageous because a consistent narrative with familiar characters would scaffold the social communication demands of the task.

3.5.4 Final assessment session

Following the intervention (or treatment as usual for the control group), all participants completed the remaining form (either A or B) of the BAS Word Reading and YARC comprehension and summarisation assessments. Following this, they completed the WASI-II Vocabulary subtest (except 4 pupils in the control group who did not receive the WASI-II due to time constraints). The 15 students in the intervention condition also completed the semi-structured interview with the researcher.

3.5.5 Inter-rater reliability

Both the intervention and baseline and outcome measures were delivered by the researcher who therefore was not blinded to the treatment condition. To reduce the potential for bias inherent in this design, all the participants' responses for the YARC were written verbatim on the answer sheet during the assessment. A sample of 10% of these answer sheets ($n=3$ participants; 12 individual question papers) were randomly selected and double marked by a colleague who was familiar with the YARC assessment but blinded to the treatment condition of each participant. This process yielded an inter-rater agreement of 98%. The other outcome measures (WISC-IV and WASI-II vocabulary and BAS word reading) were not recorded verbatim as this would have hindered a fluent administration of the assessment and would be likely to impact on the participant's performance.

3.6 Analyses

3.6.1 Quantitative data analysis

Exploratory data analysis was conducted on the main variables in the present study using the Statistical Package for the Social Sciences (SPSS 22; IBM). Mean scores and comparisons between the intervention and control groups are presented in table 1 on page 55. Where the data did not meet the assumptions of normal distribution, non-parametric tests were conducted and these are detailed under each part of the results section below. The performance of the intervention and control groups on the baseline measures and questionnaire responses was compared to ensure that there were not significant differences between the two groups at baseline, these are presented in the results section below.

3.6.2 Qualitative data analysis

The responses of participants in the semi-structured interview were analysed using a process of thematic analysis as outlined in Braun and Clarke (2006). This approach was chosen as it represents an inductive process of deriving meaning from participants' subjective experiences of the intervention. Furthermore, Robson (2011) suggests that thematic analysis is a flexible approach which can provide unique theoretical frameworks. It was considered important to develop some theoretical insights into the processes involved in the reading intervention. It is suggested that this qualitative approach identifies factors which mediate the successful acquisition of the intervention skills and that this can be used to inform best practice in this area.

The process of thematic analysis involved reading the transcripts several times to increase familiarity with the data. This was particularly important given the social communication difficulties of the participants meant that some of the responses were difficult to interpret. The data was subsequently coded at a descriptive level to identify the main points of each comment. Many contributions were relatively short in these interviews, the majority of responses contained only 1 or 2 sentences and were followed by prompts for more information by the researcher. These codes were organised into potential subthemes and subsequently overarching themes, this was an iterative process in which the themes were reviewed several times to ensure that they were coherent and captured unique aspects of the data. Appendix J provides an examples showing how the codes and subthemes were derived from a transcript.

The search for themes was guided by the research questions and aimed to identify factors which participants expressed as being relevant to their reading comprehension or the success of the intervention. There is some debate about whether it is appropriate to conduct an inter-rater reliability check when using thematic analysis. Braun and Clarke (2013) argue that the constructivist perspective of thematic analysis does not allow for the existence of an objective reality within the data that can be identified and verified by another coder. However, Boyatzis (1998) recommends that it is best practice to compare the identification of themes with an impartial researcher to reduce any potential for bias. Given the researcher's close involvement with both the study and the semi-structured interview, it was decided to review the identified themes with a colleague, this indicated an inter-rate agreement of 87%.

Chapter 4. Results

4.1 Quantitative results

4.1.1 Characteristics of participants at baseline

An analysis of the mean values for the intervention and control groups at baseline indicated that the groups were well matched on all the comparison measures. There was a small difference in age of 3.5 months between the intervention and the control group which had a higher mean score on the measures of reading accuracy (+5.21 standard scores) and comprehension (+4.97 standard scores). Bonferroni adjusted t-tests (or Mann Whitney U tests where the data did not meet the assumption of normal distribution) were conducted for each variable and indicated that there were no significant differences between the two groups on any of the comparison variables and these are presented in table 1 below.

Variable	Assessment measure	Intervention mean score (SD) n=15 unless stated otherwise)	Control mean score (SD) n=14 unless stated otherwise	P value of between – group comparison
Age	N/A	13.63 (1.19)	13.27 (1.30)	0.45
Vocabulary	WISC-IV	7.53 (1.96)	7.50 (2.07)	0.97
Non verbal reasoning (matrices)	WASI-II	42.40 (12.67)	42.80 (15.15) (n=10)	0.94
Reading accuracy (standard score)	BAS-III	81 (5.33)	86.21 (10.74)	0.11
Reading rate (standard score)	YARC	89.47 (12.92)	89.43 (11.90)	0.81
Comprehension (standard score)	YARC	88.67 (11.44)	93.64 (12.57)	0.27
Comprehension (age equivalent in years: months)	YARC	10:05	11:09	N/A (age equivalent scores not suitable for comparison)
How good a reader are you? (scale of 1-10)	National literacy trust	6.53 (2.26)	6.75 (1.75)	0.79
How much do you enjoy reading? (scale of 1=4)	National literacy trust	2.47 (0.99)	2.25 (0.71)	0.56
How often do you read? (scale of 1=4)	National literacy trust	2.77 (1.30)	2.38 (1.06)	0.43

Table 2: Comparison of baseline scores of intervention and control groups

4.1.2 Group comparisons for reading comprehension:

This study aimed to analyse the results of the intervention using an Analysis of Covariance (ANCOVA). Research suggests that this provides a more powerful technique than a gain-score analysis when the groups are randomly allocated. In order to test the assumptions of an ANCOVA, regression slopes for each of the variables were plotted using SPSS. These identified that only the comprehension standardised score variable met the assumption of homogeneity of regression slopes. A Levene's test indicated that the assumption of homogeneity of variances had not been violated for this variable.

An ANCOVA was conducted to compare the change in comprehension score in the intervention condition to the control condition. This analysis was conducted with the comprehension outcome scores as the dependent measure, condition as the fixed factor and baseline comprehension scores as the covariate. This analysis identified that the comprehension score increased significantly more in the intervention condition than in the control condition: $F(2,26)=12.53$; $p<0.001$ with an effect size of $r= 0.49$ (see figure 4). The mean score of the intervention group increased by 9.80 standard scores over the course of the intervention and the control group's mean score decreased by 4.57 standard scores over the 6-week period of 'treatment as usual'. A repeated measures ANOVA was conducted to determine whether there was a significant difference between comprehension scores at the two time points for both groups. This indicated that comprehension scores in the intervention group were significantly higher at time 2 than time 1, $F(1,14)=17.84$; $p=0.001$. Furthermore, comprehension scores in the control group were significantly lower at time 2 than time 1, $F(1,13)=8.35$; $p=0.013$.

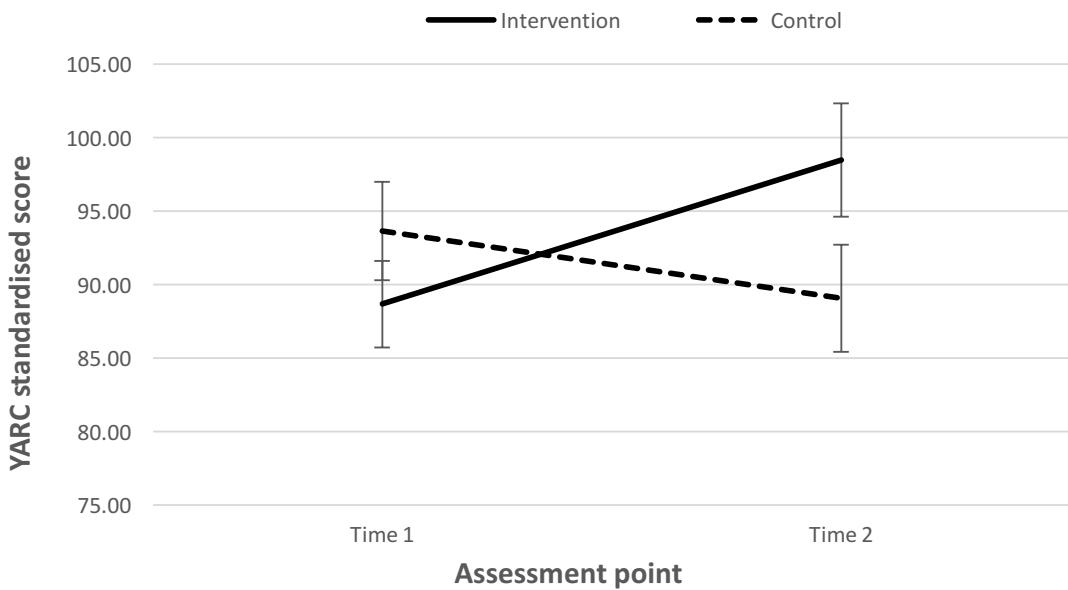


Figure 4: Graph of change in comprehension score from time 1 to time 2 in each group.

Based on the age equivalent data provided by the YARC manual, it can be seen that the intervention condition made 36 months of progress in their reading comprehension and the control decreased by 11 months. The age equivalent score was computed from the mean comprehension ability score for each group based on the data provided in the YARC manual. As the age equivalents were calculated in 3-month bands and therefore did not demonstrate a linear relationship with the ability scores, this approach was considered to be more accurate than calculating a mean average of all the participants' individual age equivalent scores.

4.1.3 Group comparison of remaining outcome variables

Due to the fact that the remaining variables did not meet the assumptions required for an ANCOVA, gain scores were computed for each variable by subtracting the baseline from the outcome scores. Also, because several participants scored below the minimum standard score of 70 for the reading rate variable, gain scores were computed for the reading rate ability score (from which the standardised scores are derived) for this variable as this provided a more sensitive measure of reading rate than the standardised score. Where the data did not meet the assumption of normal distribution, non-parametric analyses were conducted. Table 2 below presents the mean gain scores for each of the variables for the intervention and control groups, and the following sections provide details of each comparison.

	Intervention group mean gain score (SD) N=15 unless stated	Control group mean gain score (SD) N=14 unless stated
Vocabulary	2.20 (1.90); n=10	1.70 (2.11); n=10
Reading accuracy (standard score)	-0.93 (5.19)	0.10 (5.34)
Reading rate (ability score)	-4.73 (14.54)	-2.60 (12.83)
Comprehension (standard score)	9.80 (8.99)	-4.10 (5.88)
Comprehension (age equivalent in months)	36	-11
Summarisation (ability score)	6.27 (12.68)	1.20 (6.65)

Table 3: Comparison of gain scores between the intervention and control group

4.1.4 Group comparison for summarisation of text

An independent samples t-test was conducted to compare the performance of the intervention and control groups using the gain scores on the measure of summarisation. This analysis showed a significant effect of group $t(27)=2.211$, $p=0.04$, with an effect size of $d=0.83$. A within-subjects analysis was conducted using paired samples t-tests to compare participants' scores at time 1 and time 2 for both groups. For the intervention condition, the summarisation score was higher at time 2 than time 1; however, this difference only approached statistical significance, $t(14)=-1.914$, $p=0.07$. For the control group, the statistical analysis indicated that there was not a significant difference between scores at time 1 and time 2, $t(13)=1.175$, $p=0.261$.

4.1.5 Group comparison of other measures

Mann Whitney U tests were conducted to compare the gains in performance of the two groups on the remaining measures. These indicated that there were no significant differences between the two groups on the gain scores of reading accuracy ($p=0.96$), expressive vocabulary ($p=0.70$) and reading rate ($p=0.32$). Within-subjects analyses were conducted to explore these results further. This identified that only the measure of vocabulary showed a significant difference between the baseline and outcome measures. Repeated measures t-tests showed a significant increase in vocabulary scaled scores for

both the intervention group, $t(14)=-4.491$, $p=0.001$, and the control group, $t(9)=-2.547$, $p=0.031$.

4.1.6 Individual differences and clinical significance

Overall mean scores are informative for evaluating how effective an intervention will be for the average attainment of a group of pupils in a school. However, in order to translate this into a meaningful change for students, it is helpful to look at individual results. Furthermore, due to the unexpected finding that the control group demonstrated a decrease in comprehension scores over six weeks of ‘treatment as usual’, it was decided to look more closely at the pattern of results for individual participants. As can be seen from table 4 below, the majority of the intervention group made at least some progress with their reading comprehension (13/15) and summarisation (11/15). In contrast, very few of the control group demonstrated an increase in comprehension (2/14) and summarisation (4/14), with the majority demonstrating a decrease on comprehension (8/15) and summarisation (8/15).

4.1.6.1 Clinical significance

Although reading comprehension is measured on a continuum, there are some suggested cut-off points which are used to identify those students who demonstrate considerable weaknesses or strengths in this area. The suggested ranges of comprehension ability provided by the YARC are presented in table 3 below.

YARC standardised score	Description
<80	Severe difficulties
80-84	Below average
85-115	Average
>115	Above average

Table 4: YARC comprehension ability ranges

On the measure of comprehension, the majority of the students (10/15) achieved a baseline score in the ‘average’ range (85-115 standard scores) as defined by the YARC. However, 1 student achieved a baseline score in the ‘below average’ range (80-84) and four students scored in the ‘severe difficulty’ range (<80). In table 4 below, the light shaded rows show participants who moved up at least one band (e.g. from severe to below average), and the dark shaded rows show participants who moved down at least one band.

Participant number	Sex	Baseline comprehension score (standardised score)	Outcome comprehension score (standardised score)	Baseline summarisation (ability score)	Outcome summarisation (ability score)
Intervention group					
1	Male	91	95	52	60
2	Male	102	116	49	73
3	Female	86	103	48	69
4	Female	82	106	68	52
5	Female	101	118	65	71
6	Female	78	84	44	48
7	Female	76	78	38	37
8	Female	74	95	35	60
9	Female	98	110	56	65
10	Male	86	85	65	48
11	Male	70	71	31	45
12	Male	88	101	63	68
13	Male	110	116	58	69
14	Male	94	112	54	62
15	Male	94	87	57	50
Control group					
16	Male	93	80	67	61
17	Male	88	78	69	50
18	Male	90	90	62	53
19	Male	80	80	50	31
20	Male	92	94	52	60
21	Male	114	114	66	74
22	Female	76	76	43	46
23	Male	85	76	60	50
24	Female	105	111	67	66
25	Male	112	99	62	69

26	Male	94	86	52	44
27	Male	87	79	49	52
28	Male	82	77	40	36
29	Male	113	107	65	71

Table 5: Individual scores at baseline and time 2 for each participant.

In the YARC, participants' scores on the summarisation task are given an ability score which translates to a descriptive band ranging from low to above average. The shaded rows in table 5 below show those participants who moved up at least one band in their summarisation ability. Many of the participants in the intervention group (6/15) moved up at least one band (e.g. from low to below average), approximately half of the participants (7/15) stayed within their same ability band, and two students dropped to a lower band. In the control group, only three participants moved up a band, two dropped a band, and the remainder (nine) stayed in the same band.

Participant number	Baseline summarisation band	Outcome summarisation band	Increase (+), same (0), or decrease (-)
Intervention group			
1	Average	Average	0
2	Below average	Above average	+
3	Below average	Average	+
4	Above average	Average	-
5	Average	Above average	+
6	Below average	Below average	0
7	Below average	Below average	0
8	Low	Average	+
9	Average	Average	0
10	Average	Below average	-
11	Low	Below average	+
12	Average	Average	0
13	Average	Above average	+
14	Average	Average	0
15	Average	Average	0
Control group			
16	Average	Average	0

17	Average	Average	0
18	Average	Average	0
19	Average	Low	-
20	Average	Average	0
21	Above average	Above average	0
22	Low	Below average	+
23	Average	Average	0
24	Above average	Above average	0
25	Average	Above average	+
26	Average	Below average	-
27	Below average	Below average	0
28	Low	Low	0
29	Average	Above average	+

Table 6: Summarisation bands for each participant in the intervention group.

4.2 Qualitative Results

Following the intervention, students in the intervention group participated in a semi-structured interview with the researcher to capture their views about the intervention, what aspects of it were helpful, and what changes they would like to make. Responses were transcribed and analysed using a thematic analysis approach as detailed in the Methods chapter. A total of fifteen interviews were conducted and these ranged in length and quality from approximately two to ten minutes (an example transcript can be seen in Appendix D and the interview questions can be seen in Appendix E). The students' overall impression of the intervention was uniformly positive with all the students expressing that they enjoyed the intervention and the majority reporting that they found it useful for their reading.

"I really enjoyed it" (girl aged 12).

"It's good and important" (boy aged 14).

"I enjoyed it because before I didn't know what to do but since I've come on this reading group I know what to do." (Boy aged 14).

Analysis of the transcripts identified four main themes: 1. Materials and organisation of the intervention. 2. How the intervention supported the students' reading. 3. Generalisation and retention of strategies. 3. Group and collaborative working. Each of these is composed of several subthemes as detailed in Figure 5, below.

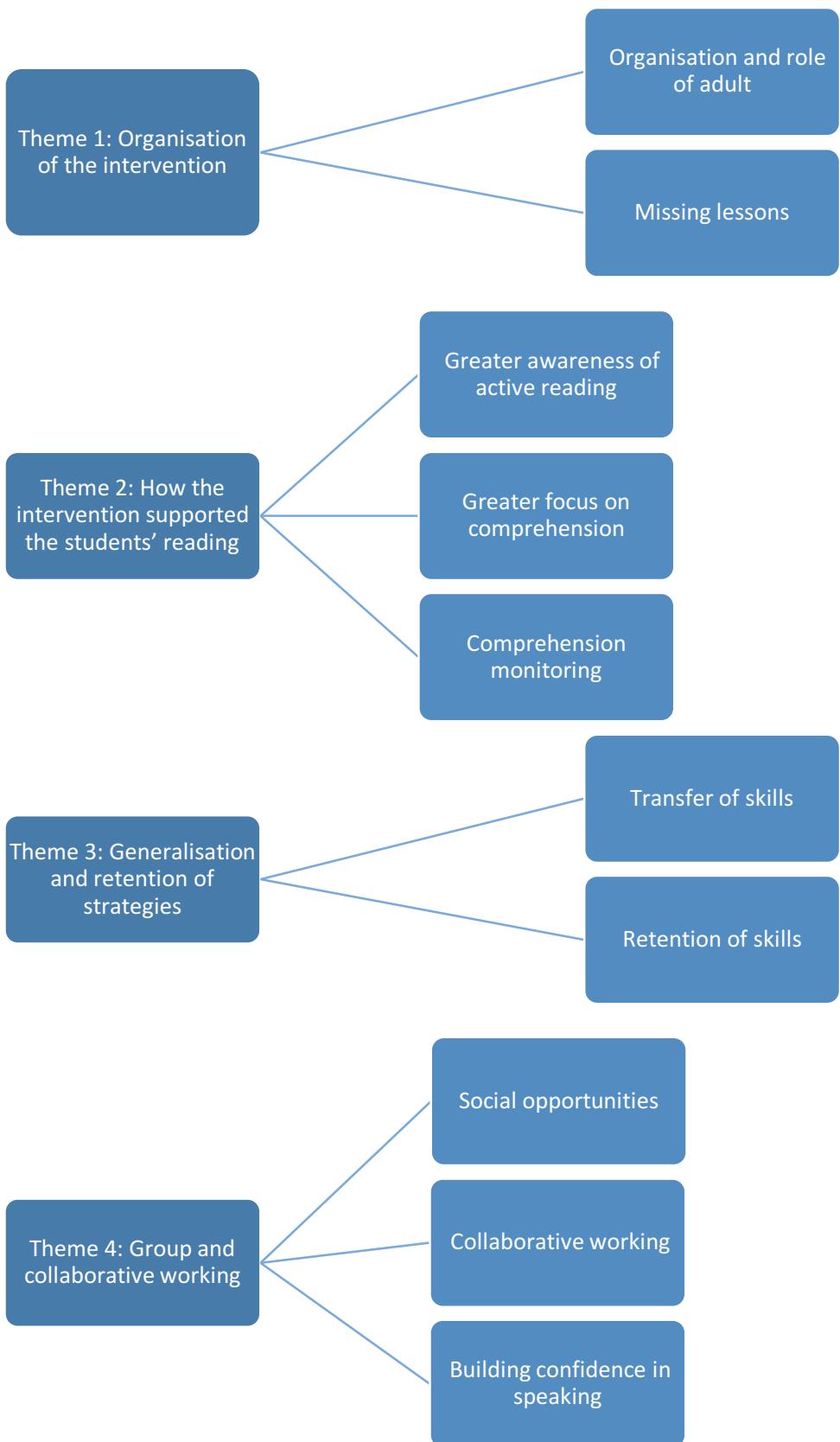


Figure 5: Thematic map of student responses to semi-structured interviews

4.3 Theme 1: Organisation of the intervention.

Within this theme, respondents discussed how the intervention was delivered; they focused on timetables, the role of the adult and the materials and structure of the intervention. This theme is divided into two subthemes: 1. Organisation of the intervention. 2. Missing lessons.

4.3.1 Organisation of the intervention

Within the subtheme of organisation, several respondents discussed the role of the adult as facilitator. One student reported that they enjoyed the intervention because they had a good relationship with the researcher. While only one student reported this, it is likely to reflect a more general need of adolescents to experience non-judgemental acceptance from adults. This highlights the important role of affective factors in delivering successful interventions and is discussed in more detail in the discussion section. Students were asked what they would like to change about the intervention to make it better for future participants. There was a general consensus among respondents that they were not able to identify any necessary changes.

Researcher: "If I ran the group again in the future, is there anything I could do to make it better?"

Student 1: "It's already better now!" (Girl aged 13)

Student 2: "Not really because it was pretty good." (Boy aged 15).

Although students were not consciously aware of changes they would like to make to the group, this was a challenging question for these young people as it required a high degree of reflectivity and confidence to be able to provide the researcher with constructive criticism. Nevertheless, one student was able to provide an articulate consideration of the adult's role in the group:

Researcher: If I was to do it again, how could I change it to make it better?

Student: Sit over there [points to corner of room] and just watch us.

Researcher: Was I too much involved?

Student: Yes, it would be more independent for us and show you what we had learnt over this time. (Boy aged 14).

This quote highlights the difficult balance that facilitator needs to find between encouraging the students to extend their understanding of the story and encouraging them to develop independence in the process. One aspect of the intervention that received unanimous

approval was the small quantities of chocolate that were provided during the sessions either as a plenary activity (chocolate meditation) or as a reward for contributions. This was a conscious decision to motivate students to actively engage in the intervention and also to make the reading group appear more informal than a typical lesson.

"I liked it when we got loads of chocolate. The food made me think more." (Girl aged 12).

4.3.2 Missing lessons

In the second subtheme, several students discussed missing lessons in order to attend the reading intervention. It was generally accepted that this was a disadvantage to attending the intervention as they occasionally missed out on some enjoyable lessons:

"It might be a waste of lesson time... like last week I had science and we were about to have a practical and I had to go to the reading group and I couldn't do the practical experiment" (Boy aged 14).

During the course of the intervention the issue of missing lessons was discussed with the students either by the researcher or their school with the aim of encouraging them to view it as a short-term problem that would be beneficial in the long term. Some of the students' responses suggest that they were able to accept this perspective.

Researcher: "You weren't very happy about joining the group at the start, can you tell me more about that?"

Student: "Yes, because we are doing GCSEs at the moment and I thought I should be revising for it, but when I got into it, it helped in a way" (Girl aged 14).

"It was nice because I got to miss a few lessons that I couldn't do well in but now I can because of the reading group" (Boy aged 14).

The girl in the above quote initially left the group due to concerns about missing other lessons, however she requested to re-join a week later and subsequently became one of the most vocal advocates of the group. Responses included in this theme suggest that students were generally satisfied with the organisation of the group. Comments from students suggest that the approach taken by the facilitating adult can promote engagement, and affective factors are likely to play an important role in this process; however, adult facilitation could also hinder the independent application of skills if it is not carefully managed. It appears that many students were willing to miss out on other enjoyable

lessons as they could appreciate the longer-term benefits of attending the reading group. This finding is important as it suggests that students are making a personal investment in the intervention and are taking responsibility for learning and applying the skills.

4.4 Theme 2: How the intervention supported the students' reading

In this theme, students discussed how the intervention had been useful for them and how the strategies they had learnt could support their reading. Within this theme, three subthemes were identified: 1. Greater focus on comprehension. 2. Comprehension monitoring.

4.4.1 Greater focus on comprehension

In the first subtheme, many of the students' responses indicated a greater awareness of active engagement with reading. These comments reflected an emergent understanding that comprehension is a two-way interaction between the reader and the text. Several participants expressed that they could use the strategies to improve their comprehension but were not always able to explain why these were helpful.

Researcher: "Can you tell me what you thought about the group?"

Student: "I enjoyed the group because it helped me to use the strategies a bit more when I'm reading.... ummm, I forgot.... Clarifying questions, they help me because they help me understand the story better." (Girl aged 14).

Many of the students reported a shift in their approach to reading with a greater emphasis on the comprehension of text rather than a mechanical approach to decoding. This was reflected in the fact that several respondents reported that they had learnt not to skip over unfamiliar words and could report strategies that they could use to clarify the meaning of unfamiliar words.

"If I read a longer book I can understand if it's a big word that I need to know for the story to make sense, I don't miss it so I can understand the book." (Girl aged 14).

"It helped me understand...if I'm stuck on a word, how to help it make sense. It helped me by wanting to read more instead of skipping a word out..." (Boy aged 12).

"I found most things [useful], especially the clarification like finding the clue is in the text." (Boy aged 14)

These responses suggest that some of the students were now more confident in choosing and defining key words that were necessary for comprehension and had developed a conscious awareness of the skills they could use to achieve this. The process of clarifying new words appeared to be the most salient aspect of the intervention for participants, as this was the area that was most discussed during the interviews. This is potentially because it is the most concrete strategy in the intervention and there is a clear link between understanding individual words and understanding a whole text.

4.4.2 Comprehension monitoring

The second subtheme also demonstrated an increased focus on comprehension, however these responses tended to reflect a conscious awareness of monitoring comprehension while reading. As a result, some students reported that they were now more aware of the importance of regularly stopping to check that they had understood a part of the text by generating a mini-summary.

“Instead of rushing through the whole paper or something, you’re taking your time and you’re reading it again to get your summary going.” (Girl aged 13).

Developing a summary while reading was also identified as an important strategy for supporting the memory demands of understanding a long text. Respondents reported tying together events from different parts of the story in order for it to make sense and how remembering key events could support them when scanning for details.

“I was trying to remember more stuff … because if you can remember what happened a couple of pages back it will help you to understand the story better” (Boy aged 12).

“When I read it the first time I remembered the key events and then I could find those again when I went back to look for details” (Boy aged 14).

The responses in this theme indicate a shift in the students’ understanding of the purpose of reading. It suggests that many are engaging in a more interactive approach to reading and are more aware of the importance of focusing on comprehension rather than decoding. Some students demonstrate that they have developed a set of skills to identify and define unfamiliar words and are able to integrate information from different parts of the text. However, it could be argued that students are simply more aware of the strategies that they

were already using and have not actually changed in their approach to reading. This argument is explored in more detail in the discussion section. Nevertheless, it will be important to ensure that these skills are generalised to reading in other areas of the curriculum and for pleasure.

4.5 Theme 3: Generalisation and retention of strategies

In this theme respondents discussed how they could apply the skills they had learnt outside of the reading group and how they might remember the strategies in the future. Two subthemes were identified: 1. Transfer of skills. 2. Retention of strategies.

4.5.1 Transfer of skills

Most of the students reported that they would be able to use the skill they had learnt in other lessons. Many students suggested that it would be useful to use the strategies in English and some reported having already tried this successfully.

“In English we’re doing poems and I sometimes use the strategies which helps in lessons” (Girl aged 14)

The teacher of the student in the above quote reported separately that this student had previously been very disengaged during literacy lessons but now appeared to be taking a keen interest in poetry. Other students could identify how the skills might transfer to different subjects.

“We can do this any time [clarifying] you’re reading... I think in any lesson like science has lots of complicated words... also you need to predict what will happen in your experiment.” (Girl aged 14)

“If I have a word in Geography that doesn’t make sense I can try to fit another word into it to make more sense for me.” (Boy aged 12)

It appeared that using an online dictionary was a new technique for many students. However, it was unclear whether they were more familiar with using a paper dictionary or simply did not have experience of looking up the definitions of words. From the researcher’s observations of students during the intervention, it was apparent that the majority of them had considerable difficulty finding an appropriate definition from both paper and online sources.

Researcher: “When will you be able to use the strategies we learnt?”

Student: "Everyday in reading. I will clarify on the laptop – I didn't know you can do that". (Girl aged 13)

[I can] highlight and work out [the meaning] from a dictionary or the text. A dictionary is too slow; you can use the internet." (Girl aged 14)

Some students commented on how they could use the subject matter in other lessons rather than the skills.

Student: "In English I found it kind of OK, but now I can actually write better"

Researcher: "How has it helped you to write better?"

Student: "Because I got to read new words. Those words [which] we worked out the meaning of in the group" (Boy aged 14).

4.5.2 Retention of strategies

Some students discussed how they would like to continue using the skills they had learnt and what they would do to help them remember.

(on the last day of the reading group) "I'm going to speak to Mrs Brown this afternoon and suggest that we keep doing the reading group for the other kids in Year 7" (Boy aged 14).

At the start of the intervention, this young man appeared very disengaged with the whole process. He required frequent reminders to stay on task and only gave short contributions when requested; however, his attitude appeared to change as he became more independent at applying the strategies. Another student suggested what she might do to retain the skills she had learnt.

"I will keep on repeating [the strategies] in my head" (Girl aged 12).

Two students expressed some doubt about their ability to retain the skills in the future.

"If I'm reading English I should be clarifying. But I'm not sure I will remember to do this forever." (Boy aged 15).

The comments in this subtheme were fairly limited. This reflects the difficulty in ensuring that educational interventions are sustainable so that students are able to retain and apply the skills they have learned independently.

Theme 3 indicates that many students were consciously aware of how they could apply the strategies in different contexts and some had considered what they might do to help retain the skills in the future. Overall, responses tended to focus on the strategy of clarifying vocabulary, presumably because there was a relatively clear link to using this in other lessons. While it is promising that students reported being able to take the skills they had learned into other areas of the curriculum, it was not possible to ascertain how well they could achieve this in reality.

4.6 Theme 4: Group work

An area that received considerable attention during the interviews was the role of group work and how this facilitated understanding, provided opportunities for social interaction, and built confidence with speaking. These benefits of the intervention were unexpected and have not been reported in similar research projects. This theme is composed of three subthemes: 1. Social opportunities. 2. Collaborative working. 3. Building confidence in speaking.

4.6.1 Social opportunities

In this subtheme, several students responded that they particularly valued the social opportunities presented by the intervention. Several respondents identified that working with students from different year groups was a unique opportunity to make friends with people they had not met before.

Student: "I enjoyed it [the reading group]".

Researcher: "And what did you enjoy about it?"

Student: Well, I didn't know many of the Year 10s. So I met more of the Year 10s. I also enjoyed the book" (Girl aged 13).

Student: "It was much more sociable because normally I don't like socialising as much" (Girl aged 14).

The social opportunity presented by the intervention was not something that was considered prior to the intervention. For some students this appears to be a strong motivating factor for attending the intervention.

4.6.2 Collaborative working

Many of the students reported that they found the collaborative nature of the group helpful. The responses suggest that listening to other students' comments about the story provided a scaffold to support their understanding of the text and also helped them to formulate their own contributions.

"I liked the idea where you said we were all group leader, that helped. Because when we were all doing it individually it got a little bit harder because we had to think for ourselves, but if we are all group leader...it was much easier" (Girl aged 14).

Student: "I enjoyed when we had to listen to each other's opinions of the book".

Researcher: "Why did you enjoy that?"

Student: "Because I got what they meant and I didn't know how to say mine, but mine was like what they were trying to say" (Boy aged 11).

Some students expressed a sense of team-work in their responses and acknowledged that helping others with their understanding was also beneficial for their own understanding.

Researcher: "What did you enjoy about the group?"

Student: "How we helped people answer the questions so we could understand the story better" (Boy aged 15).

Overall, there were no negative comments regarding working together with peers which is a promising finding given the significant difficulties that most of these students experienced with social interaction. Nevertheless, it was necessary to provide a considerable amount of adult assistance to facilitate successful group work. This included familiarisation and trust-building activities during the first few sessions so that participants felt more comfortable working with unfamiliar students. Furthermore, each session contained some explicit instruction how to work effectively in a group including listening skills, turn taking and non-verbal communication. This is examined in more detail in the discussion section.

4.6.3 Building confidence in speaking

The students' responses indicated that the intervention had helped them to develop more confidence discussing reading texts and some reported that this transferred to other areas of their life.

Student: "[The reading group] helped me to speak more"

Researcher: "How does it help you to speak more?"

Student: "Normally if I have to speak about a book I wouldn't go into much detail ...but in the group it helped me to go into more detail about the book. I used to just say short things about the book" (Boy aged 12).

"This group has really helped with my speaking and listening skills. Before, I didn't speak in lessons but I got into trouble for talking to my friend in science class" (Girl aged 12).

The girl in the above quote has a significant speech and language disorder and was only able to make very limited contributions to group discussions. Therefore, it was surprising that she reported such a big impact on her speaking skills as this was not immediately obvious during the intervention. Students' responses suggested that their confidence with speaking was facilitated by the small group nature of the intervention (3-4 students per group) and they were able to measure their confidence in terms of the number of opportunities they had to speak.

"I liked how I got loads of ideas out and I got what the story was about" (Girl aged 14).

"I prefer reading group to reading in class. It's comfortable and less crowded you see" (Girl aged 15).

Both of these girls experienced considerable difficulties with expressive language and would often give up speaking halfway through a sentence due to frustration at not being able to 'get ideas out'. These girls appeared to benefit from the supportive nature of a small group. Also it is likely that students found it easier to contribute ideas in the reading group because of the structure that the intervention provides. The strategies provide a clear framework for the type of contribution that was expected at each point and these were supported with visual prompts and sentence starters to further scaffold the students' contributions. Furthermore, some students reported that experiencing success and having a sense of responsibility helped to build their confidence more generally.

"When we were group leader it was kind of like a good feeling because it meant like for that day you were kind of important for that amount of time" (Boy aged 14).

In this theme, participants expressed that they valued the social opportunities that the intervention presented, often because working in mixed-age groups is unusual in secondary

schools. Also, the students reported that the collaborative nature of the intervention supported their understanding of the text and helped them to develop increased confidence in speaking. Some pupils also reported transferring this increased confidence to other areas of their lives. The responses in this theme highlight that what participants take from an intervention may be very different to what the adult intends to teach. It also emphasises the importance of capturing the views of participants in research of this kind, as these benefits would not have been identified by quantitative measures of reading comprehension alone.

Chapter 5. Discussion

The following chapter discusses each of the research questions in light of the findings identified in this study. Section one discusses the impact of the intervention on the participants' reading comprehension. Section two builds on this by further exploring the views of participants regarding the intervention. Finally, section three discusses the implementation of the intervention in order to inform professional practice in this area.

The results indicate that participants in the intervention group demonstrated a significant increase in their scores on a standardised measure of reading comprehension.

Furthermore, many students demonstrated an improvement in their ability to summarise a text from memory although these results were more variable. These findings were consistent with reports from participants that they were more aware of the importance of comprehension and felt confident applying a range of strategies to support their understanding. Furthermore, students in the intervention condition demonstrated an increased use of helpful reading behaviours during the final assessment.

5.1.1 *Research question 1: Does RT improve students' reading comprehension?*

5.1.1.1 YARC comprehension standardised scores

The results indicate that the intervention group demonstrated a significantly greater increase in their comprehension scores than the control group. In fact, the results demonstrated that students in the intervention condition made an average of 3 years' progress with their reading comprehension as measured by the YARC, whereas the control group decreased by 11 months. The improvement of the intervention group supports the view that Reciprocal Teaching is an appropriate intervention to develop the comprehension skills of adolescents with ASD. Furthermore, this evidence suggests that RT can have a positive impact for a range of children including those with entrenched comprehension difficulties and those who are already well within the average range but who may not be currently realising their potential. These results are consistent with previous small scale research on younger children (Roberts, 2013; Truelove, 2014) which indicated that RT could be a successful approach to develop the comprehension skills of children with ASD.

The finding that the control group demonstrated a decrease in their comprehension (and summarisation) scores over the course of the six-week period was unexpected. This was particularly surprising given that most of these students received some form of reading intervention during this period (such as reading with an adult or structured programmes

such as Accelerated Reader). This finding was not an artefact of YARC pre and post (A and B) forms as these were counterbalanced across the participants. Care was taken to reduce potentially confounding factors which might influence the results such as the day of the week, tiredness, and willingness of students. As the researcher was not blinded to the condition of each participant, there is some potential for researcher bias. However, this was controlled as far as possible by conducting an inter-rater reliability check on the completed YARC forms.

Therefore, the finding that the control group decreased in their comprehension skills is likely to be a negative practice effect. As Nunn (1998) suggests, repeated testing of participants may reduce motivation for a task due to the way in which they perceive their own performance. Although every effort was made to explain the purpose of the study to participants and to identify areas of strength that they had demonstrated during the assessment, it was inevitably a challenging task for many of the students. Given that most of these students have significant learning difficulties and have experienced repeated failure at learning tasks, they may exhibit a fragile self-efficacy in subjects that are relative areas of weakness for them. As a result, if the student perceived that they performed poorly on the first reading assessment (because they were unable to answer all of the questions), this may have an impact on their motivation to engage with the second reading assessment. This demonstrates how reading comprehension is a nebulous concept that is challenging to measure objectively and is very dependent on affective factors. Furthermore, it highlights some of the ethical considerations regarding the testing of young people's abilities that Educational Psychologists routinely conduct.

On a similar note, affective factors are likely to explain at least some of the improvement in reading comprehension demonstrated by the intervention group. Students in the RT intervention received 12 sessions of reading activities designed to improve not only their use of reading strategies but also their sense of self-efficacy and resourcefulness with reading. This is consistent with the reports of students, some of who noted that the intervention increased their confidence in a range of areas. As a result, it is likely that some of the improvement in reading comprehension in the intervention condition was due to positive affective factors as well the use of the RT strategies.

5.1.1.2 YARC Summarisation measure

There is evidence that at least some students improved in their ability to generate an appropriate summary of the text. However, the statistical analysis of this result for the group as a whole yielded mixed findings. While many of the students in the intervention condition demonstrated an increase in their summarisation score (mean increase of 6.27 ability scores; SD=12.68), the large standard deviation figure highlights that these results were more variable than for the comprehension questions (mean increase of 9.80 standardised scores; SD=8.99). This likely reflects the difficulty that many students experience with generating a relevant summary of what they have read. This skill is likely to tap areas of cognition that are relative areas of weakness for students with ASD. In particular, many of the students that struggled with this task reported that they simply could not remember many details of the text (the summarisation task requires students to answer from memory). This is consistent with research indicating that working memory difficulties are common for people with ASD (Hill, 2004). Furthermore, producing a summary requires the reader to identify the gist of the text and this may be particularly challenging due to the detail-focused cognitive style of many individuals with ASD (Happé & Frith, 2006). During the intervention sessions and the assessment sessions, it was apparent that understanding the gist of the text was the biggest challenge for many students when completing the summarisation task. Some students were able to recount long lists of very detailed information about what they had read; however, when questioned, it was apparent that they had entirely misunderstood the story.

A substantial portion of each intervention session was spent helping the students to develop the skill of identifying the main idea (or gist) in a text. This approach was based on the work of Roux, Dion, Barrette, Dupéré, & Fuchs (2014) whose research identified that a direct instruction approach to teaching, modelling and practice of identifying the main idea in a series of texts developed the skill of young people with ASD in this area. However, the research by Roux et al was delivered twice a week for 16 weeks, thereby allowing the students far more time to fully embed the skill of identifying the main idea. In the current study, it was apparent that some students had made progress in this area and were able to separate out the key information from more trivial details in the text; however, many students still required some adult or peer support with this skill towards the end of the intervention. Therefore, it is suggested that a longer period of intervention would enable students to consolidate this challenging skill and would be more likely to show a significant effect of the intervention condition.

5.1.1.3 Students' approach to assessment

Qualitative observations indicated that many students in the intervention condition approached the reading assessment in a qualitatively different way following the intervention. During the baseline YARC assessment, many students appeared to read the text quickly, passed on challenging questions, and did not attempt to define unfamiliar terms. Some students appeared unwilling to look back in the text for the answer even when reminded that this was permitted. However, during the outcome reading assessment it was noted that several students asked if they could read the text again, most students spontaneously scanned the text for answers, and most appeared able to attempt a definition for an unfamiliar term even if this was not always correct.

Several students took considerably more time to read the text in the second assessment session, however statistical analysis indicated that this difference was not significant for the group as a whole. Therefore, it does not appear that the reading speed contributed to increased scores in the outcome assessment. In contrast to other comprehension assessments such as the Diagnostic Reading Analysis (DRA), the YARC does not routinely measure response time, and this was not measured during the assessment sessions. However, it became apparent that many students in the intervention condition took considerably longer to answer all the questions during the outcome assessment. This appeared to be a result of the students spending more time searching for information in the text and thinking about how to define unfamiliar terms. There were no noticeable differences in the way that the control group participants approached the second reading assessment. These qualitative observations further support the conclusion that students in the intervention condition made a conscious effort to succeed in the outcome assessment. It is suggested that this reflects an increased awareness of helpful reading behaviours and the importance of comprehension.

5.1.1.4 Reading accuracy and expressive vocabulary

The lack of significant differences in the students' reading accuracy in both the intervention and control groups was an expected finding as the RT intervention does not explicitly teach decoding of words (apart from some incidental teaching when students encounter difficulties during the sessions). Furthermore, over the course of the intervention, the students read on average 20-25 pages of a standard sized novel. Therefore, the quantity of words read during the intervention was minimal and was unlikely to have a significant impact on their reading accuracy. This finding is important as it demonstrates that

improvements in comprehension are not simply due to improved reading accuracy, an effect that has confounded the findings of previous research on RT including the study by the Fischer Family Trust (2011).

The finding that both intervention and control groups demonstrated a significant increase on the measure of expressive vocabulary was unexpected. This finding contradicts the results identified by Zhou & Raiford (2011) which found that these measures produced comparable results when assessed 3-4 weeks apart. Therefore, it is likely that this represents a positive practice effect as the task (giving a definition for a word) was fairly unusual in a classroom context and therefore, students may have benefited from repeated practice with this skill. It is argued later in the discussion of the qualitative findings that the intervention supported the expressive language skills of the students. However, it was not anticipated that this would translate to a measurable increase in expressive vocabulary given the brief nature of the intervention.

5.1.2 Research question 2: What are participants' views of the intervention?

5.1.2.1 Impact of the intervention on students' reading skills

In the semi-structured interviews, many of the students reported a shift in their approach to reading with a greater emphasis on comprehension and increased use of helpful reading behaviours. The following section discusses how the participants perceived the intervention supported their reading comprehension. In order to provide an overview of how these results relate to the research in this field, the findings are discussed in relation to the five key areas of comprehension difficulty identified in the literature review: inference making, knowledge of narrative structure, anaphoric references, working memory, and meta-cognitive strategies (Cain & Oakhill, 2007).

Inference making

While participants did not refer explicitly to inference skills, many reported more confidence at inferring the meaning of unfamiliar vocabulary items from the context of the story. This was described by one boy using the language introduced in the intervention as "finding the clue in the text". This finding is particularly important given that children are thought to acquire the majority of their vocabulary through this inferential process (Nagy & Scott, 2000). Furthermore, research suggests that there is a reciprocal relationship between reading comprehension difficulties and weak vocabulary knowledge as a lack of vocabulary

inhibits the reader's ability to understand a text and therefore reduces the opportunities to acquire new vocabulary (Cain & Oakhill, 2004).

Student comments indicated that many participants had learnt the importance of identifying and understanding key words in a text and not simply skipping over unfamiliar terms which might lead to significant gaps in their comprehension. Furthermore, comments indicated that many students had developed an increased range of resources to enable them to work out the meaning of unfamiliar words and expressions and some were able to apply these skills in a range of contexts. This finding is particularly important given the difficulties that young people with ASD often demonstrate in learning new words from their context (Jing & Fang, 2013). In the current study, it is not possible to ascertain how or even whether participants will continue to use these skills. However, there is the possibility that participants will be able to use the skills in the future to support their vocabulary development and this may have an associated impact on their general language comprehension.

Inference skills are repeatedly practised during the intervention through the task of asking and answering questions about the text. Over the course of the intervention most of the students appeared to become more proficient at asking questions and discussing the feelings and perspectives of the characters in the book. However, inference was not taught as a discreet skill in the intervention and this may reflect the lack of student awareness of its use. There is some indicative evidence from previous research that direct instruction of inference skills increases the ability of children with ASD to answer inferential questions (Asberg & Sandberg, 2010). This approach to teaching inference compliments the structure of Reciprocal Teaching and was incorporated informally as part of the sessions. However, in the current study there was insufficient time to dedicate to the explicit teaching of inference skills.

Metacognitive strategies and working memory

Most of the students were able to identify how they could apply metacognitive strategies in the form of comprehension monitoring. Student comments reflected an awareness of stopping to check their understanding of what they were reading and how they could use summaries and questions to achieve this. Furthermore, participants were able to report the use of meta-cognitive strategies to support the memory demands of longer texts. These included integrating information from different parts of the text to develop a coherent

internal model of the story. This is consistent with the findings of research by Roberts (2013) which highlighted how some children with ASD initially demonstrated a low standard for text coherence, but following the RT intervention, demonstrated a greater focus on monitoring comprehension and were able to apply a range of strategies to repair understanding where necessary.

It is argued that the increased focus on comprehension that participants demonstrated in the interviews is a key outcome of the intervention. The participants' ability to retain the specific strategies and skills that they learnt on the intervention will depend on individual and contextual factors such as motivation to continue practicing and adult support to remind them to do this. Therefore, short-term gains in reading comprehension may reduce over time as students revert back to previous reading behaviours. However, if the participants adopt a higher personal standard for text coherence (recognising when they don't understand), this is more likely to be sustained over time and should encourage the use of strategies to repair understanding where necessary.

Narrative structure and anaphoric references

Consistent with the research by Diehl, Bennetto, & Young (2006) many of the students initially struggled to identify the main idea in a text and produce a structured summary with causally related events. As previous research had identified anaphoric references as an area of difficulty for children with reading comprehension difficulties (Cain & Oakhill, 2007), the participants' understanding of anaphoric references was frequently checked during the intervention. However, most of the students only experienced difficulties with this skill when also faced with complex language or content. It appeared that where students experienced difficulties with anaphoric references, this was related to the working memory demands of remembering the subject or object of a complex sentence and also failure to identify incidences in which their interpretation was not connected to the context of the story. As a result, participants did not demonstrate specific difficulties with anaphoric references, but rather with the component processes (working memory and comprehension monitoring) and this occasionally led to difficulties resolving the referent of a pronoun. Although the participants' relative strength at resolving anaphoric references was not consistent with previous research (Roberts, 2013; Roux et al., 2014), this may reflect the fact that the participants in the current research were older than participants in previous studies. It is plausible that by adolescence, most young people have developed a basic understanding

of anaphoric references and are able to resolve these successfully when the content of the text is not overly challenging.

Qualitative observations conducted during the intervention and assessments indicated that many of the students demonstrated considerable improvement in the skills of identifying the main idea and producing relevant and causally connected summaries. Furthermore, many of the students demonstrated an increased consideration of literary devices such as the author's choice of language and style. Nevertheless, during the semi-structured interviews, participants did not express a conscious awareness of their understanding of narrative structure and nobody discussed identifying the main ideas or gist of the story. This suggests that the main learning outcome for the summarisation task was not made explicit enough to students during the intervention. Furthermore, the teaching of anaphoric references was not prioritised during the intervention as many of the students appeared relatively confident with this skill.

In summary, the student responses reflected a greater overall focus on comprehension rather than a mechanical approach to decoding a text. This change of focus was illustrated by one student who indicated that she previously used to 'rush through' a reading text but was now consciously aware of taking more time and rereading parts to build up a summary of the story. It is suggested that each student will take away different aspects from the programme in relation to their own areas of need and interest with reading. Whereas some had identified that they needed to focus more on monitoring their own comprehension, others were more consciously aware of the range of strategies that they could use to read unfamiliar words. As a result, it is likely that the intervention will have had a unique impact on each student's approach to reading

5.1.2.2 Impact of the intervention on language skills

Many students reported that the intervention supported their speaking skills and some identified a more general impact on their confidence in school work and social interactions. Student responses indicated that they were able to measure their progress in terms of the quantity of contributions that they made and this helped to develop their confidence. From a psychological perspective, experiencing success at speaking in front of one's peers may have a profound impact on confidence. The quantity of contributions is often viewed by teachers and students alike as a proxy measure of understanding and general confidence with a subject. This effect can be viewed in any classroom where confident students

constantly have their hand waving in the air in the hope of being selected to answer the teacher's question, while others sit quietly at the back of the class hoping not to be noticed. This discrepancy becomes increasingly evident in secondary education as adolescent become more self-conscious, which can be a particularly challenging time for young people with Special Educational Needs (SEN). These students may be reluctant to contribute to class discussions as they may not wish to draw attention to the fact that they struggle to articulate their understanding. Furthermore, as research by Blatchford et al. (2009) demonstrated, young people who have a high level of adult support in class are often less likely than their peers to interact with the teacher and other students. As a result, it is suggested that the RT intervention supports spoken contributions from young people who may otherwise struggle to find their voice in a mainstream class.

There are several factors within the RT intervention that may support the development of expressive language. Several students indicated that the small-group nature of the intervention increased their confidence with speaking in the group. While RT is often recommended for groups of 5-6 pupils (Oczkus, 2010), discussions with other professionals during the planning phase identified that the students in the current study may benefit from smaller groups due to their significant social communication difficulties. Implementing RT as intervention for pairs or very small groups was one of the recommendations of the research by Roberts (2013). Therefore, in the current study, most groups contained three students (with one group of four), which appeared to be the optimum number given the participants' difficulties.

Each student had a unique profile of needs, however many students demonstrated significant difficulties with expressive language. Based on teacher reports and qualitative observations during the intervention, these students struggled to communicate their ideas succinctly and often appeared frustrated when they were unable to express themselves. Frequently, these students required several attempts and some adult support to construct a coherent sentence relevant to the reading text. These difficulties with communication meant that discussions about the text were not fluent and required a substantial amount of time to enable each participant to contribute their ideas. It is suggested that in a large mainstream class, many of these students would have very limited opportunities to make contributions as there would be insufficient time to enable them to formulate coherent sentences during a traditional whole-class discussion.

While the small group provided the time and space to facilitate the students' contributions, it was also necessary to provide support for the language demands of the task. One of the key advantages of the RT approach is that it provides a highly structured and predictable routine, which are both factors considered to be best practice when teaching people with ASD (Gately, 2008). The RT strategies provide a clear model and framework which helps to support the language demands of the task and the adult facilitator supports the student's developing competence at using the strategies until they are able to apply the skills independently (see below for full discussion of this process). This type of naturalistic intervention (whereby opportunities to practise language are embedded in everyday activities) are widely recommended as an effective intervention for developing expressive language skills in children with ASD (Lane, Lieberman-Betz, & Gast, 2016; Wong et al., 2015).

5.1.3 Research question 3: Which factors facilitated successful implementation of Reciprocal Teaching (RT) with students with ASD?

An important aim of the current study was to enable the participating schools to successfully adopt the intervention as a sustainable component of their literacy provision. RT has shown strong evidence of effectiveness in researcher-led trials; however, its effectiveness will be limited if teachers find it difficult to implement in real-life contexts. An unsuccessful intervention is not just ineffective but also potentially damaging for the young person. If students experience repeated failure on interventions and are not able to close the attainment gap with their peers, there is the danger they will attribute these failures to internal characteristics, and consequently develop a negative self-image of themselves as a learner. The current author has worked with numerous children who articulate a sense of hopelessness as a result of repeated failure to acquire basic literacy and numeracy skills. Very little research has been conducted into the potential negative impact of repeated unsuccessful interventions; however, there is a growing body of research on students repeating a school year which has identified that this can have a negative impact on academic self-concept, motivation and attainment (Andrew, 2014; Martin, 2011). As a result, it was considered imperative that the study not only evaluated the efficacy of RT as an intervention, but also identified which factors contributed to the success of the intervention in order to inform professional practice in this area.

The planning of the intervention took account of previous research on delivering RT to students with and without ASD, discussions with professionals experienced in using RT and

research into more general factors which influence student engagement and attainment in education. Much of the research on reading comprehension that has been conducted with children and young people with ASD has been small scale but provides some important insights into how an intervention can best be adapted to account for the needs of this population (Randi et al., 2010; Roberts, 2013; Truelove, 2014; Whalon et al., 2008). Furthermore, research on approaches to implementing reading interventions with typically developing populations was consulted (Cain & Oakhill, 2007; Hacker & Tenant, 2002; Palincsar & Brown, 1984). This research identified five key areas that would be likely to impact on the successful implementation of the intervention: student motivation, the role of the adult facilitator, student dialogue, ASD specific difficulties, and generalisation of skills. Research relating to these five areas was used to inform the design of the intervention; however, this was also an iterative process as adaptations were made during the course of the intervention in order to respond to the needs of participants. The following section discusses each of these areas in turn and makes suggestions for the successful delivery of RT with students with ASD.

5.1.3.1 Student motivation

The intervention delivered in this study was a voluntary activity for the participants and it was essential that they were motivated to both attend for the duration of the project and also to continue to use the strategies independently following the intervention. It was considered vital to explore factors which might reduce motivation for the students to attend, and one particular difficulty was withdrawal from their normal lessons. The importance of this issue was reflected in the students' responses to the final interview in which many expressed concern about missing favourite lessons and some expressed a worry about being 'treated differently' from their peers as a result of attending the intervention.

It is widely accepted that adolescents have a strong need to fit in with the social norms of their peer group (National Research Council, 2011). However, research into the views of young people with ASD highlights the difficulties that this group may experience feeling accepted by typically-developing peers. Research by Humphrey and Lewis (2008) identified that many young people with ASD are acutely aware of feeling different to their peers academically or socially and therefore may be very reluctant to do something which further identifies them as different. These issues reflect the wider debate around the most effective type of support for pupils with SEN; withdrawal from routine lessons provides opportunities to provide targeted support, but needs to be carefully balanced against the potential

disadvantages of reduced inclusion (Dixon, 2005). In the present study, concerns around timetable clashes and withdrawal from lessons were negotiated with students with the aim of enabling them to make an informed choice regarding attending the intervention.

Providing students with choices about their learning activities is considered to be a powerful tool for increasing motivation and attainment. A meta-analysis of 41 studies on children and adults by Patall, Cooper, & Robinson (2008) identified that allowing an element of choice with learning activities increased participants' intrinsic motivation, effort, task performance, and perceived competence. The relationship between choice and task performance might be explained in terms of *self-determination theory* (Ryan & Deci, 2000) which argues that a sense of autonomy is essential for developing intrinsic motivation in a task (the motivation to complete a task due to internal factors such as interest in the subject and desire to learn more about it rather than external factors such as rewards). Nevertheless, encouraging adolescents to make a 'responsible' choice remains a considerable challenge; many young people with ASD may struggle to make the leap of faith required to engage in an intervention where the activity, adult and other participants may all be unfamiliar. This view is reflected by Roberts (2013) that many young people with ASD demonstrate a restricted range of interests and may therefore be reluctant to engage in reading if it is not an established interest of theirs. In order to enable the students to make an informed choice about attending the intervention, the present study dedicated a substantial period of time during the first few sessions to explaining the purpose of the intervention and how it would assist the students in their reading. Furthermore, the first few sessions contained several familiarisation activities so that students felt more comfortable working with their peers.

The motivation of students to seek help with their reading is largely dependent on their level of self-awareness of their strengths and difficulties with learning. Students who are most likely to benefit from RT are usually competent readers (at the decoding level), but often fail to consider the importance of comprehension (Cain & Oakhill, 2004). As a result, some students may not identify a need to develop their reading skills and may be reluctant to participate in a reading intervention. During planning discussions with other professionals, the issue of motivating young people to change their approach to reading (which they have been using for many years) was identified as a key barrier to successfully implementing RT. This challenge is reflected in the literature surrounding the psychology of behaviour change, which suggests that awareness of the need for change is an essential prerequisite of any lasting change in behaviour. However, it could not be assumed that the participants were

aware of their difficulties or identified a need to change; therefore, it was necessary to find an alternative way to enhance their motivation to develop their reading skills.

A useful perspective on enhancing motivation for change comes from the literature on Motivational Interviewing (W. Miller, 1999) which emphasises that motivation for change is not a fixed construct. Rather, motivation is considered to be a dynamic and interactive process which changes in response to an individual's understanding of their needs. This approach suggests that one of the most effective tools to enhance people's motivation to change is to focus on an individual's strengths. This framework was adopted by the current study to develop the motivation of students to participate in the intervention. As a result, the intervention was not presented as addressing a deficit in reading skills as this approach would likely conflict with the students' perception of their abilities and create resistance to change. Instead, the intervention was presented as a set of strategies that the students could apply to their reading in order to gain more enjoyment from literature and to realise their potential in examinations. Furthermore, the purpose of the intervention was made explicit to students by explaining that they were learning the strategies that skilled adult readers used to assist their comprehension. This approach explicitly acknowledged the progress the students had made with their reading decoding and encouraged them to take responsibility for further developing their comprehension.

In summary, participants will need to be motivated to attend and take on board new skills and this is crucial to the success of any learning activity. However, evidence suggests that young people with reading comprehension difficulties often lack awareness of their difficulties and therefore, are less likely to be motivated to change their reading behaviours. A traditional approach to interventions which identifies a 'remedial' need is likely to be met with resistance from participants. As a result, there is an important role for Educational Psychologists to support school staff in the understanding and application of psychological theories of motivation to enable young people to successfully participate in interventions such as RT.

5.1.3.2 The role of the adult in the delivery of the intervention

During the planning stage, it was identified from the literature and discussions with other professionals that one of the most challenging aspects of the RT approach is how to ensure that the adult facilitator has the skills and confidence to be able to deliver the intervention with fidelity. Members of school staff who deliver interventions for students are usually not

qualified teachers, and this was the case with the four members of staff who participated in different schools in the present study. However, the RT approach is not just a collection of strategies, but is very much a methodology based on constructivist principles of knowledge and learning which requires some understanding of theories of learning. As Brown and Campione (1996) note, RT is susceptible to 'lethal mutations' because the procedures are relatively simple. As a result, school staff may try to adapt the procedures to fit their own theoretical approach to learning, thereby fundamentally altering the nature of the intervention and losing the 'active ingredient'. This problem of fidelity to the underlying principles was identified as one of the limitations of the large-scale Hackney Literacy Trust evaluation. Furthermore, while recruiting participants for the current study, the author spoke to several schools who were already using their own adapted versions of RT. In some of these adaptations it was apparent that teachers were overly focused on the procedures and did not demonstrate application of the theories of learning underpinning the approach. For example, one school had used the four strategies to make worksheets that students completed individually following reading a piece of text and had completely removed all discussion from the programme.

Palincsar and Brown (1984) developed the RT approach within a constructivist framework, in which the student uses the process of dialogue between the adult and peers to construct a shared understanding of the text. This is quite different from more traditional models of reading instruction in which the adult holds a definitive understanding of the text and attempts to lead the reader to the same understanding through a process of guided questioning. In comparison, RT uses a process of dialogue and modelling by the adult to shift the student's perspective of knowledge, aiming to develop an understanding that there are multiple possible interpretations of a text. As Hacker and Tenent (2002) note, it is essential that the facilitating adult in an RT group shares this constructivist perspective so that the students are able to develop in their independent interpretations of the text and do not simply become reliant on the adult to provide the 'correct' answer.

Nevertheless, during the delivery of the intervention there were numerous situations in which the students' interpretations could be considered 'incorrect'. These misunderstandings usually resulted from the students' overreliance on their own experiences of a situation and a failure to consider all potential clues in the text which might suggest alternative perspectives. These instances provided rich opportunities to discuss alternative perspectives through a process of modelling more plausible interpretations or

drawing the students' attention to relevant sources of evidence on which to base an alternative conclusion. For example, based on the previously seen exert of text: "There's only one thing worse than biting it from cancer, and that's having a kid that bites it from cancer" (Green, 2012, p. 18). Many students expressed a comment such as:

"I think Hazel's angry because I would feel really angry if I was dying from cancer".

This adult's response in this situation aimed to acknowledge any useful strategies the student had demonstrated and present an alternative perspective without suggesting that either was correct or incorrect.

"That's a very good interpretation, I like how you have thought about how you would feel in her situation, I think I would feel angry too. One way we could look at this is that maybe Hazel is feeling worried about how her parents will cope when she dies, because on this page it says that losing a child to cancer is worse than dying from cancer yourself".

In this way, the adult acknowledges the subjective nature of interpretation but also provides an alternative explanation which may help to deepen the student's understanding of the story. There were also numerous incidences in which the students contributed sophisticated and unexpected interpretations of the text, especially where the students were able to relate the experiences of the characters in the text to their own experiences of the challenges of adolescence. These instances provided useful opportunities to further reinforce how meaning is socially constructed according to an individual's personal experiences.

The development of RT is heavily influenced by Vygotsky's (1978) theory of the Zone of Proximal Development (ZPD). Within this framework, the adult helps the student to understand and internalise a set of skills through carefully structured support which is contingent on the student's level of competence (*scaffolding*). Vygotsky (1978) suggested that the skills being taught move from an interpersonal plane to the intrapersonal through the process of dialogue and modelling. Within RT, this process is facilitated by the group discussion which provides additional scaffolding as the learner's peers also discuss the application of the skills and model their use. From a Vygotskian perspective, the discussions and models by peers are likely to be one of the most effective tools for the internalisation of knowledge and skills taught during the RT sessions. An adult will need to guess the student's level of understanding and will not always be able to pitch support at the correct level. However, other students are likely to be already working in the same ZPD

and therefore, can provide a more accessible model or explanation for their peers. This view is supported by responses to the final interview in which several students reported that their peers' contributions helped them to formulate their own ideas and supported their use of the RT strategies.

Vygotsky's work provides a useful framework in which to understand the process of internalisation of skills that happen in naturalistic learning environments such as apprenticeships or reading with a parent, which RT is designed to replicate. While teachers can be expected to have a good understanding of the concept of the ZPD and how to provide contingent support, Vygotsky's framework may need to be more descriptive for non-teaching members of staff. Furthermore, in order for educational research to inform practice, it needs to be transparent and detailed so that school staff (including those who are not qualified teachers) are able to replicate the results. As such, a framework was developed to provide a detailed account of how the adult facilitator can provide appropriate contingent support.

A detailed account of the process of contingent support is provided by Wood's (2003) work on approaches to tutoring in which he identifies five levels of support, ranging from a 'general verbal intervention' at level one to 'demonstrating the action' at level five. These levels of support describe a gradual handover of responsibility to the student for applying the skill that they are learning. In order to make this process explicit for support staff in the present study, it was attempted to apply Wood's five levels to RT and provide clear examples of how each might be used. These are detailed in table 6 below. Wood's framework requires the adult to pitch their support at the lowest possible level to begin with and then gradually move up the levels as necessary. This is consistent with Palincsar, Campione and Brown's (1989) original advice that adult support is only given as and when necessary. Importantly, Wood specifies that on returning to a synonymous task or problem, the adult should pitch their support one level below that which was previously provided. For example, if the adult needs to provide a level 3 support to help a student acquire a particular skill, when the student faces a similar problem in the future, the adult should aim to provide a level two support.

Level	Description	Example of how this is used in RT
1	General verbal intervention	<ul style="list-style-type: none"> Provide feedback and specific praise on strategy or skill that student is demonstrating. “I really liked how you thought how you would feel in that situation”. Prompt for more information “What else can you tell me about that?”
2	Specific verbal intervention	<ul style="list-style-type: none"> Point out what is expected of student at this stage: “Have you thought of a question to ask about that paragraph?” Signpost the student to the correct skill or strategy: “Which fix-up strategy could you use to help you understand that word or phrase?”.
3	Specific verbal intervention with nonverbal indicators	<ul style="list-style-type: none"> Similar to level 2 but add non-verbal cues to add more clues to help the child solve the problem. This might include pointing out part of the text where student can find the answer they are looking for or pointing to the strategies poster and saying “try making a question with this phrase”.
4	Prepares for next action	<ul style="list-style-type: none"> Wood’s (2003) definition is offering the student a restricted choice with the aim of encouraging recognition (e.g. “Is it A or B?”). This is less relevant to RT so this level was defined as providing the student with the necessary tools that they need to achieve the task and then encouraging them to put them together in the correct structure. For example, if a student is struggling to make a summary, the adult might provide (or preferably encourage the other students to provide) the main idea in the text and some relevant details. Then the student puts these together to make a relevant summary.
5	Demonstrates action	<ul style="list-style-type: none"> At this level, the adult takes control of the task and models (or preferably asks a peer to model) the strategy required. When doing this it is important that the adult explicitly describes the cognitive processes using a ‘think aloud’ process. For example, “Based on what we read yesterday, we know that Hazel is worried about her parents, when we are worried about someone we might want to talk to them about it, so I predict that in the next section Hazel will discuss her cancer with her mum”.

Table 7: Levels of contingent support applied to Reciprocal Teaching.

5.1.3.3 Student dialogue

Because RT aims to teach reading skills through verbal mediation, the ability of participants to engage in meaningful dialogue with adults and peers is essential for the success of the intervention. The ultimate aim of RT is to provide the students with a toolkit of strategies

that they are able to apply independently to support their reading comprehension. Nevertheless, this aim may be more achievable for some students than others. Research by Hacker and Tenent (2002) sought the views of teachers who were delivering RT in their primary schools. Teachers in this study identified that many of the children were not able to engage in meaningful dialogue independently even after three months of practice. One third-grade teacher in Hacker and Tenent's study reported that:

"When they work with me I ask the questions. Alone, they don't ask each other.

They read the paragraph, then move on. They are satisfied even if they do have questions."

This quote neatly encapsulates one of the key challenges of successfully implementing RT: encouraging the students to use the strategies and engage in meaningful discussion can be challenging. This difficulty is also reflected in the work of Dion, Fuchs, & Fuchs (2007) who suggest that students may lack the maturity and confidence necessary to fully engage with the discussions. Many of the students in the current study were initially reluctant to use the strategies and engage in discussions about the book. This was apparent in one quote from a student who described his previous approach to guided reading style activities:

"Normally if I have to speak about a book I wouldn't go into much detail ...but in the [Reciprocal Teaching] group it helped me to go into more detail about the book. I used to just say short things about the book" (Boy aged 12).

It is suggested that this problem can be framed as a discrepancy between what the adult and the student each views as the main learning outcome, or what can be termed the *primary task*. In RT, the adult's primary task is to encourage the students to apply the RT strategies as independently as possible and arrive at a richer understanding of the text. The adult measures how well this aim has been achieved by the quality and quantity of the dialogue between students. However, the students may approach the activity with a very different primary task, such as finishing reading the text before others or arriving at some definitive 'correct' answer. This conflict between method and outcome is not surprising given the goal-oriented focus of the education system which requires students to continually produce evidence of learning in order to meet national and school-level assessment requirements. Within this context it is important to help students understand that RT is a systems-oriented approach where the focus is on the method rather than the outcome.

The current study adopted two main approaches to encouraging active participation amongst students. Firstly, the focus on the method was made explicit to students through explanations, modelling and a reward system in which students received school commendations for every contribution they made to the group. This reward system appeared to motivate students to shift their perceived primary task more towards the method of RT. Task-specific (rather than person-specific) praise was used to acknowledge the successful components of each student's contribution, thereby emphasising their success but also providing the desired model for the other participants to emulate. The dialogue below was taken from one session and is an example of how this was achieved:

Student: "I think Insensitive means that you are tough or strong, like the opposite of sensitive"

Researcher: "That's a very well thought out clarification. How did you arrive at that conclusion?"

Student: "I put the 'in' on sensitive to make it not sensitive so like the opposite"

Researcher: "I really like how you have used your 'fix-up' strategy there to break the word down and identify the prefix 'in' which usually makes a word negative. Maybe there are different meanings of sensitive and we may need to look this one up in the dictionary". (Boy aged 12).

Secondly, the adult's language and contributions were carefully designed to foster discussion. When students appear to make minimal effort to contribute or engage in discussion, there is a tendency for the adult to try to 'fill the space' left vacant by the lack of student contribution. However, this approach can have the effect of discouraging further contributions from the student. In her advice to teachers delivering literacy interventions, Clay (1993) notes the importance of an "economy of words" as too much adult talk can distract from essential problem solving and reduces opportunities for developing student contributions. As a result, the adult verbal inputs were carefully rationed to ensure that they elicited and extended student contributions, rather than replaced them.

5.1.3.4 Autism-specific adaptations

Research by Truelove (2014) suggested that it was possible to enhance the delivery of RT for children with ASD by including visual prompts and cues to support the use of reading strategies and understanding of the routine of the session. Visuals are frequently recommended as a strategy to support the learning of children with ASD (National Autistic Society, 2015). Furthermore, there is strong evidence that visuals can support children with

ASD to understand spoken language, manage the memory demands of specific tasks, and prepare for changes in their environment (Meadan, Ostrosky, Triplett, Michna, & Fettig, 2011). In light of Truelove's recommendations and following discussion with other professionals, it was decided to include several visual supports to the sessions.

One visual support included individual question cards which contained an image and word. Initially each group was provided with a large visual chart identifying a range of possible questions and students were asked to choose an appropriate question from this chart while reading. However, it quickly became apparent that this task was challenging for students, possibly because they had not developed the skills at that point to identify which question was most appropriate and therefore became overwhelmed by the range of choice. As a result, individual question cards were introduced during the first few sessions (these can be seen in Appendix C). Initially, students were randomly assigned a question card which they were encouraged to use to ask a question about the text to their group, further support was provided as necessary according to Wood's levels of contingent support (Wood 2003).

The use of individual question cards appeared to be one of the most effective adaptations in supporting students to apply the reciprocal teaching strategies and supports the findings of previous research indicating the usefulness of individual question cards (Truelove, 2014; Whalon et al., 2008). It is suggested that question cards were effective because they encouraged students to hold a question in mind while reading (and students were also given verbal prompts to encourage this process), which replicates how a skilled reader might approach a text with questions they want to find answers for. Over the course of the intervention, students were encouraged to develop their flexibility with questioning and increase their independent application of the skill by choosing their own question card which was appropriate to the text. By the end of the intervention, all students were able to pose a relevant factual question about the text (e.g. what, where etc.); most students were able to pose a relevant inferential question (how, why, etc.) and attempt to answer it, and some students were able to integrate multiple questions.

Two further forms of visual support were included in the intervention. One visual support that was identified by Truelove (2014) as a promising adaptation was the use of pictures or photographs to invoke background knowledge. This approach was adopted in the current study and appeared to support the understanding and engagement of pupils in the text.

Using multimedia resources also enabled the students to find pictures on the internet in order to enhance their clarification of unfamiliar terms.

The final visual aids used in the current study were posters for each of the strategies. These were based on the resources developed by the Fischer Family Trust and contained sentence starters which provided a prompt to scaffold students' contributions. These can be seen in Appendix C. Some students were able to demonstrate independent use of these resources by referring to them directly when they were unsure of how to structure their contribution. However, this was challenging for other students as they required adult or peer support to direct them to the correct sentence starter for the entirety of the intervention. The differences in the ability to access this resource may be partly due to the relative complexity of these posters which may have been difficult for some students to quickly scan to find the support they needed. However, these differences in the ability to access this resource may reflect what Gornall, Chambers, & Claxton (2005) term students' resourcefulness, which describes students' awareness of how they can use a range of resources in their environment to support their learning. Therefore, the use of sentence starter posters appeared to support the application of the RT strategies for some students but may have been overly challenging for others to use independently. As a result, it may be useful to adapt these to make them less complex and also to allocate more time to explicitly teaching students how to use them.

5.1.3.5 Generalisation of skills

An essential outcome of a successful intervention is that the participants are able to generalise the skills they learn to new activities in different contexts. This process of generalisation has been described as the 'Holy Grail' of education (Resnick, 1989), which reflects its desirable but often illusive nature. Students may develop a competence in one particular area but fail to identify the links with other related tasks and therefore, may appear to not transfer skills to new contexts. Research has demonstrated the importance of supporting students to make explicit links between activities so that they are able to consider how they can apply the skills in other contexts. This meta-cognitive approach has demonstrated robust evidence of effectiveness in reading (Hattie, Biggs, & Purdie, 1996), numeracy (Fuchs et al., 2003) and problem solving skills (Billing, 2007). Palincsar and Brown (1984) note that it is important to help students 'bridge' the reciprocal teaching strategies to other situations in which they are required to obtain meaning from text.

The current study aimed to achieve this generalisation of skills by regularly encouraging the students to think of situations in which they could apply the RT strategies outside of the intervention. Furthermore, it was hypothesised that if students were able to develop an automatic application of the strategies, they would be far more likely to generalise these to new contexts. Therefore, the current study implemented an adaptation to the RT approach which encouraged students to develop automaticity in their application of the strategies. As the students became more confident applying the strategies during the intervention, the role of separate group leaders was removed and all students were encouraged to take responsibility for applying the four strategies simultaneously. As a result, following reading each excerpt of text, all the students discussed what predictions they had made and whether these had been accurate. Students were also encouraged (where possible) to discuss a word or phrase they had clarified while reading and a question that they had asked themselves and what they thought the answer might be. Finally, all students contributed to the summary and were encouraged to discuss each other's contributions. This adaptation was felt to be a natural progression for the intervention and was consistent with the theoretical approach adopted by Palincsar and Brown (1984) as it provided a close model of how skilled readers interact with a text.

Although a full investigation of whether students were able to apply these strategies in other contexts was outside the scope of the current study, comments by the participants reflected an awareness of generalising the skills they had learnt. It was promising that several students reported being able to use the strategies in different lessons including Science and Geography. Furthermore, many students identified that the clarification strategy was relatively easy to transfer to new contexts and many could envisage using it. However, there was insufficient evidence to assess whether students were able to apply the comprehension monitoring strategies such as questioning and summarising in other contexts.

The format and delivery of the intervention sessions in the current study was designed to be distinct from normal classroom literature sessions. This approach was used to encourage meaningful discussion between students and help them to focus on the method of reading rather than the outcome and to develop a greater interest in literature. As a result, students may find that the different structure and expectations of reading in their normal lessons hinders the successful application of the RT strategies. This is particularly likely with exam preparation where the lesson may be more focused on identifying factual details and

producing written accounts of text. In the current study, several members of staff who participated in the intervention sessions were able to continue reinforcing the use of the strategies for some students; however, this was not possible for all the students. Therefore, future research might include a whole-school focus on RT so that all members of staff have the skills to support students to generalise the strategies to other areas of the curriculum.

Chapter 6. Conclusions

6.1.1 Limitations

The design of the study included a *treatment as usual* control group which enabled a comparison of the intervention with students' typical education. However, the limitation of this design is that it does not control for variables that are extraneous to the RT intervention. These might include the impact of the small group nature of the intervention with considerable adult input as well as affective factors such as general confidence. A more robust design would allow for the control group to participate in an intervention that focused on a different subject matter (e.g. maths) over the same period of time, in order to isolate the impact of the small group context. This alternative design was considered during the initial planning stages; however, initial discussions with schools identified that it would be very challenging to recruit participants with difficulties with both maths and reading comprehension. Furthermore, at this age it would not be appropriate for students to miss subject teaching unless there was a clearly identified need in that area. However, this alternative design may be achievable with younger children who have fewer exam pressures.

A further limitation of the current study is the lack of long-term follow up assessment to determine how well the students are able to retain and apply the skills they have learnt in new contexts. The outcome measure used in the current study (YARC) only includes two parallel forms (A and B) and therefore does not permit a longer term evaluation students' reading comprehension. Nevertheless, the YARC was decided to be the most appropriate assessment given that it had a recent standardisation and the most robust design of the available comprehension measures. Furthermore, the YARC had been used in recent similar research designs (Truelove, 2014, Fischer Family Trust, 2011). Future research may consider developing a new reading comprehension measure to use alongside the YARC that would permit a longer term follow up assessment.

A potential source of bias in the present study comes from the researcher involvement in both the delivery and evaluation of the project. This potential confound was considered during the planning stages and every care was taken to reduce the impact of researcher bias by using standardised assessment tools as many studies have shown that researcher-developed assessment measures are unintentionally biased towards a desired outcome. Strickland and Suben (2012) emphasise that when designing seemingly objective assessment measures such as questionnaires, the philosophical position of the researcher

influences what questions they ask and which ones they leave out. Furthermore, inter-rater reliability checks were conducted on the completed assessments. Nevertheless, Strickland and Suben (2012) highlight how experimenter bias often operates at a subconscious level whereby the researcher unintentionally influences the results towards a desired outcome through subtle differences in the way that they respond to participants.

It is quite possible that students in the intervention condition were unintentionally influenced by completing the assessment with the researcher, and this may be explained in terms of two psychological processes. As students had spent a considerable period of time with the researcher, it is possible that they tried harder on the outcome assessment in order to please the researcher. One student alluded to this fact in the interviews when he commented that “we would be able to show you what we had learnt”. Furthermore, as discussed above, students had made a conscious decision to participate in the group and had needed to make some sacrifices to achieve this (missing enjoyable lessons). Therefore, perceived failure on the outcome assessment would potentially devalue the personal investment they had made in the intervention. As a result, the students in the intervention condition had several incentives to try their best on the assessment and to demonstrate use of the strategies they had learnt. In contrast, the participants in the control group had no particular incentive to try harder on the second assessment, and the reduced scores on the second assessment suggest that some of them made less effort at this point.

In light of these observations, the findings in the present study could be strengthened by including a more objective outcome measure whereby the project is evaluated by somebody independent of the school and not involved in the delivery of the intervention. This approach was adopted in the study by the Fischer Family Trust (2011) in which the programme was delivered by trained teaching assistants but evaluated by the researchers who were blinded to the treatment condition of each participant. Training school staff to deliver the intervention had been the initial aim of the present study; however, following discussions between the researchers, it was decided that there was insufficient evidence on using the approach with adolescents with ASD and too few available resources to warrant a confirmatory study design. Therefore, it was decided that the current study would adopt a more exploratory design. It was thought that this approach would make a more useful contribution to the literature by testing the effectiveness of the intervention but also developing some recommendations to inform the successful delivery of the programme for this particular group of young people.

6.1.2 *Strengths*

The current study makes some important contributions to the understanding of reading comprehension for young people with ASD. The sample of students selected in this study represents an under-researched group. This study is the first to systematically evaluate the effectiveness of an RT-based reading intervention on adolescents (aged 11-15) with ASD. Furthermore, the current study includes a wide range of ages, sexes and backgrounds which make it more representative of the population as a whole. Participants attended a range of different types of schools including specialist settings and mainstream schools and represented all 5 years of secondary education. Furthermore, the current study included a relatively high number of female participants who are considered to be under-represented in the diagnosis of young people with ASD.

6.1.3 *Implications for future research*

Future research on the effectiveness of RT might benefit from using a secondary measure of reading comprehension to corroborate the results of the main outcome measure. In the present study, it was not possible to allocate any more time to additional assessment sessions due to the tight deadlines involved and concerns expressed by schools, parents, and young people themselves about missing regular school lessons. Future research might also consider innovative ways to capture the longer-term benefits of interventions and assess whether students are able to generalise the skills to new contexts. Furthermore, future research might include a more detailed analysis of the component comprehension skills that participants demonstrate throughout the intervention. This could be achieved by video recording the intervention and analysing the participants' responses using a systematic observation schedule to identify the skills they demonstrate and the progress they make with these skills.

One challenge that was identified in the current research was encouraging schools to allocate sufficient time for the intervention. This difficulty is particularly acute in secondary schools who often need to prioritise short-term interventions which can have the maximum possible impact within an already busy curriculum. The current research highlighted that there are several further adaptations which could potentially improve its effectiveness (such as increased focus on summarisation and inference skills). However, these adaptations would require a longer term intervention. Furthermore, studies using RT based interventions for young people with ASD have only been delivered by the researcher (Truelove, 2014; Roberts, 2013) and there is evidence that treatment fidelity is challenging

to maintain in larger scale studies (Education Endowment Foundation, 2014). Therefore, further research is warranted to explore what is the most effective length of intervention and how it can be further adapted to meet the needs of young people with ASD. Also, additional research is needed to establish how to ensure treatment fidelity when it is delivered by school staff.

6.1.4 Implications for practice

Reading comprehension remains an under-researched area of learning. Evidence from Garner (2011) demonstrates that many schools are unaware of comprehension difficulties with typically developing students. Furthermore, as Roberts (2013) argues, schools may prioritise the social communication needs of young people with ASD as these difficulties are often the most apparent to adults. However, there is substantial evidence that reading comprehension remains a challenging task for many young people with ASD and this may be further masked by proficient reading accuracy skills. This reflects the author's experience of recruiting schools for the current study. Very few schools routinely assessed the reading comprehension of pupils (separately from accuracy), even where pupils had an Education, Health and Care Plan (EHCP) and noticeable difficulties in this area. As a result, Educational Psychologists (EPs) have an important role in helping schools to identify the needs of their most vulnerable pupils and disseminate evidence-based practice.

Research by Hattie (2009) acknowledges that there is a rich research base in education that is rarely accessed by teachers, mostly because it is locked away in academic journals or otherwise not written in an accessible format for busy professionals. Therefore, EPs are well placed to support schools in implementing these evidence-based findings. In a real-world context, EPs might not have the capacity to deliver interventions but are more likely to train staff in the implementation of these approaches. This meets the requirements of the Special Educational Needs and Disability (SEND) Code of Practice (DfE, 2015) for schools to provide targeted support for pupils with SEND by appropriately trained members of staff.

The current study highlights some of the key aspects that EPs would need to consider when training school staff to deliver RT with young people with ASD. As well as introducing the main strategies taught in the intervention, EPs would need to inform schools of the importance of selecting members of staff who are supportive of the constructivist principles which inform the RT programme. Furthermore, school staff may require support or training

in providing contingent levels of support and developing and maintaining student motivation, commitment and generalisation of the skills to new contexts.

6.1.5 Conclusion

The current study contributes to the understanding of reading comprehension in young people with ASD. The study builds on the existing evidence base and adds further support to the use of an RT-based intervention to develop the reading skills for these young people. Furthermore, factors which contributed to the success of the intervention are discussed and recommendations are made to inform professional practice in this area. The study captures the views of participants on the implementation of the intervention and this suggests that RT may have a broader impact on participants' speaking and listening skills. These findings indicate that RT-based interventions for young people with ASD warrant further research on a larger scale and wider implementation in schools.

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Appendix A: Reading for pleasure questionnaire.

You and your reading

Hello! This is a short survey which will ask you how you feel about reading - it shouldn't take long, 10 or 15 minutes.

This is not a test and there are no right or wrong answers to this. Please just answer the questions as honestly as you can!

Thanks!

About you

What is your first name?:

.....

What is your last name?:

.....

What year are you in at school? (circle your answer):

Year 5 Year 6 Year 7 Year 8 Year 9 Year 10 Year 11

Are you a...? (circle your answer): Boy or Girl

About reading

1. How much do you enjoy reading? (Tick one box only)

Very Much Quite a lot A bit Not at all

2. On a scale of 1-10, how good a reader do you think you are?

**1 = not a very good reader to 10 = excellent reader
(Tick one box only)**

1 2 3 4 5 6 7 8 9 10

3. How often do you read?

Every day or almost every day Once or twice a week
Once or twice a month Never or almost never

Appendix B: Example lesson plan.

School x, group 1: Reading group session 5 plan	
Materials: <ul style="list-style-type: none"> • The fault in our stars pp.12-13 • Whiteboard and pens • Visuals for strategies • Chocolate • House point cards. 	Learning aims: <ul style="list-style-type: none"> • Students will be more independent in using the RT strategies. • Students will be confident taking on the role of group leader. • Students will start to identify main idea in text and keep summary relevant (but may not be succinct at this point). • Students will start to generate inferential questions.
Plenary: Students discuss what they have read at home or in school this week. When did they use one of the strategies when reading in class?	
Teaching input: Tell abridged version of <i>The Lamb to the Slaughter</i> by Roald Dahl (1953). Students brainstorm questions they might want to ask. Adult to input with other question forms, specifically focus on understanding motivations and attributions of characters, e.g...	
<ul style="list-style-type: none"> • How was she feeling? • Why did the constable say that? • How would you feel if that happened to you? • I wonder what she's thinking here... ? • I don't get why she did.... • How does the author make us feel happy / excited? 	
Motivation: students given question cards (randomly share out each time) receive one house point for every question asked and one for each questions answered. 'remember! Every question is a good question!".	
Reading activity: <ol style="list-style-type: none"> 1. Discussion: recap on what happened in the book last week. 2. Group leader makes prediction about what is going to happen next. Asks group to read half of page 12 and look for words to clarify and questions to answer. 3. Students read in silence – adult to prompt to remember to underline words to clarify in book. Give those who finish early iPad to look up new words. 4. All students share words to clarify and explain which strategy they used to find the answer – e.g. ask a friend, look for clues in the text, replace with similar word, use iPad etc.. Adult to correct if necessary (e.g. definition is completely inaccurate). 5. Group leader encouraged to take control and keep pace moving in session. 6. All students ask questions about the text. Others answer and describe what strategy they are using to find the answer (relate to own life, look for evidence in the text etc.). Adult to challenge when appropriate, but choose times which are good learning opportunities. 7. Adult models inferential questions that have not been identified by group. When providing answers model though process using a 'think aloud' so that students can see how adult has arrived at the answer. 8. Group leader gives summary – may need adult help to identify main idea and explain why that is more relevant than other information in the text 	

9. Group leader is chosen by position or volunteer and process starts with a prediction again.
10. Aim to read approximately 2 pages so that everyone gets to be group leader at least once and everyone will have read 2-3 passages of text.

Appendix C: Reciprocal teaching materials: strategy poster

Predict



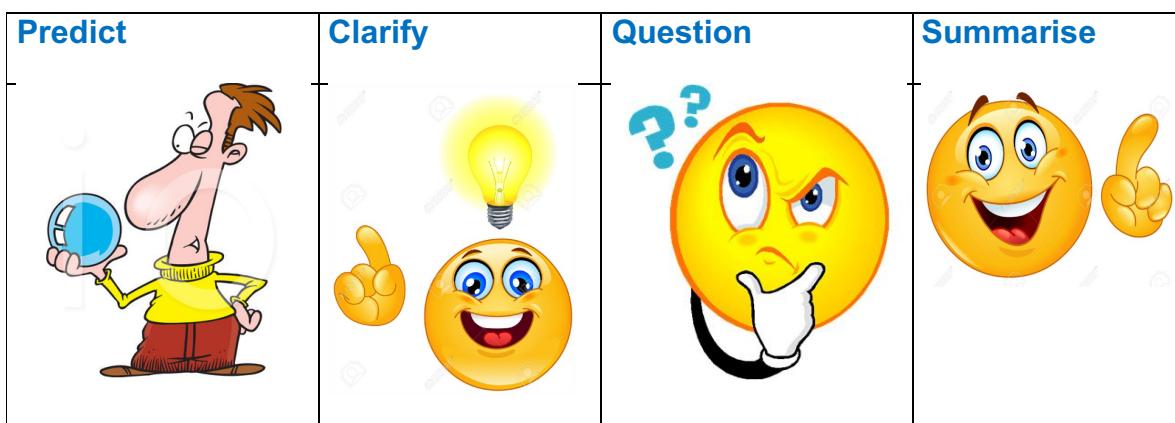
I can make predictions about what will happen in the text.

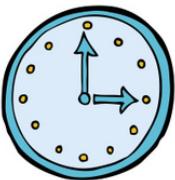
- In the next paragraph.....
- I think we will find out more about...
- Building on what happened at the end of the last chapter...
- The picture suggests that.....
- The headings tell me that.....
- In the last part....., but
- I think / suspect / wonder if

I can....

- Use what I already know about the story
- Use the headings
- Use the title
- Use the illustrations

Appendix C: Reciprocal teaching materials: strategies prompt poster and question cards.



Who? 	What? 	Where? 
Why? 	When? 	

Appendix D: Example interview transcript

R= researcher, S=student

R: Hi, tell me what you thought of the reading group.
S: I found it useful.
R: How did you find it useful?
S: because it showed me like reading strategies.
R: What strategies did you learn?
S: To clarify and predict before you read and to clarify a word you might not know.
R: Is there anything else you remember?
S: To ask a question to yourself to see if you might get the right answer.
R: How does that help us?
S: It helps us to understand the story and predict it.
R: Why does predicting help us to understand?
S: It helps us to understand because it kind of helps tells us what might happen next.
R: How does that help us?
S: See you get further into the story.
R: What does that mean?
S: You will get what's happening.
R: What else did you think of the reading group?
S: I thought it was fun.
R: How was it fun?
S: Because like we get to read together and share our opinions.
R: What did you like about sharing opinions?
S: People like listen and understand it my opinion.
R: Will that help you in any other areas of school?
S: Yes, like in group activities. You would like share more ideas with the other people in your group.
R: Why would you share more ideas?
S: You would get better grades for being confident and sharing really good ideas.
R: Apart from reading novels, did you use the street strategies anywhere else?
S: Yes, in history we read like sources.
R: How could it help you to understand those?
S: there is this activity we have to do at the start of every lesson where we have to say like what it doesn't say about and things it does say and also a question is that because you could use because you could use the predicting and all the other things.
R: Is there anything else you would like to tell me about the reading group
S: Umm! No I think that's it.
R: If I was to run the group again with some different students is there anything I could do to make it better?
S: Maybe you should include more people.
R: Can you explain?
S: More people that other people might know so that you might feel more confident in talking.
R: why would that make you more confident in talking?
S: I'm not really sure how to explain.
R: Do you mean you like to have more of your friends in the group rather than kids you don't know?
S: Well both some kids today don't know and then some of my friends. We could make new friends as well.

R: That's a good idea. Having your friends in the group how would that help you.

S: that would help me act more confident because she would feel like you were in a normal lesson.

R: How did you feel about working with me as the stranger in your school and kids you didn't know.

S: A bit weird.

R: A bit weird at the start, or for the whole thing?

S: Just for the start.

R: How did it get better for you?

S: Because I started to get to know them and know their names. And know what kind of opinions they have.

R: Is there anything else you like to tell me about the reading group?

S: No.

Appendix E: Semi-structured interview questions

1. How did you find the reading group?
2. What did you like about it?
3. What more can you tell me about that? What did you like / not like about it?
4. What do you remember from the reading group?
5. How will the strategies help your reading?
6. Will you be able to use those strategies anywhere else?
7. If I ran the reading group again, is there anything I could do to make it better?
8. Would you like to tell me anything else about the reading group?
9. Plus lots of prompting to expand on what they said.

Appendix F: Parent consent form

Reading Comprehension Project

I would like to invite your child to take part in a research study looking at reading comprehension.

Why is this research being done?

Many children experience difficulty learning to read and require extra help to develop this key life skill. Research has shown that children with Autism often have difficulty understanding what they read even when they are confident at reading individual words. Currently, there is very limited research into why some children show this profile of difficulties and the best way to improve it. This project aims to teach children techniques that they can use to improve their reading comprehension.

Your child has been identified by their school as possibly needing some extra help with their reading comprehension. I would like to ask for your permission for your child to take part in this project.

The aim of the project:

- We will be looking at whether a new type of programme helps to improve students' reading comprehension.
- The results will help us better understand how we should teach reading skills to young people.

Who will be in the project?

- Students in Years 7-10 with a diagnosis of an Autism Spectrum Condition who have some difficulties with reading comprehension.

What will happen during the research?

- Your son or daughter will be asked to complete some tasks to determine their areas of strength and difficulty with reading (results can be provided on request).
- Some students will then be offered a 6-week programme designed to improve reading comprehension, this will be taught in small groups for at least 2 sessions per week.
- The sessions will be conducted in school by myself or a member of school staff who is familiar to your child.
- Video recordings of the sessions may be made to measure the effectiveness of the programme. These videos will not be seen by anyone other than the researcher working on the project and his supervisors. Any recordings will be deleted following completion of the project.
- The programme will start in October / November 2015.

What will happen after the research?

- A summary of the overall findings will be available to all families after the project has finished.
- Any data will be presented anonymously and will be collected and stored in accordance with the Data Protection Act 1998.
- Participants can withdraw from the project at any time without providing a reason.

Who will work with my son or daughter?

My name is Horatio and I am a Trainee Educational Psychologist with the London Borough of X. I am currently completing my Doctorate in Educational, Child and Adolescent Psychology at the UCL Institute of Education in London. This project has been approved by the Ethics Committee at the Institute of Education. I have a recent DBS clearance (formerly CRB). All research will be conducted by myself or staff at your child's school.

If you are happy for your child to take part, please complete the slip below and return it to your child's school.

Please feel free to contact me on the email address below if you have any questions.

Many thanks for your support.

Horatio Turner
Trainee Educational Psychologist
UCL Institute of Education
Email: hturner@ioe.ac.uk
Telephone: 07557 106 021

Vivian Hill
Director of Professional Educational Psychology Training
UCL Institute of Education
Email: v.hill@ioe.ac.uk
Telephone: 020 7612 6296

PARENT CONSENT FORM

I am happy for my child to take part in the reading project and I understand they can withdraw at any time.

Student name.....

Parent name.....

Does your child have a Special Educational Need (SEN)? Yes / No
If yes, please write name of condition (eg. Autism / dyslexia)

Signed.....

Date.....

Appendix G: Participant consent form

Reading Project

Who?

Young people in your school are being asked to take part in a project to develop their reading skills.

Why?

Many people have difficulty learning to read and require extra help to develop this important life skill. This project is aimed at young people who might have communication difficulties and is designed to help improve their reading.

What?

- You will be asked to complete some fun reading activities with me.
- Sessions will happen at school with a member of staff you know.
- Your results will be confidential.
- I will ask to audio record your answers to some questions.
- You can stop at any time if you are unhappy.

Who will work with me?

My name is Horatio and I am a Trainee Educational Psychologist. If you are happy to join the project please sign below to say that you have read the information provided and that you agree to take part in the project.

I am happy to take part and I know that I can stop at any time.

Name.....
.....

Signature.....

Date.....

Horatio Turner, Trainee Educational Psychologist
UCL Institute of Education

Appendix H: Ethics application form

Ethics Application Form: Student Research

All research activity conducted under the auspices of the Institute by staff, students or visitors, where the research involves human participants or the use of data collected from human participants are required to gain ethical approval before starting. *This includes preliminary and pilot studies.* Please answer all relevant questions responses in terms that can be understood by a lay person and note your form may be returned if incomplete.

For further support and guidance please see accompanying guidelines and the Ethics Review Procedures for Student Research <http://www.ioe.ac.uk/studentethics/> or contact your supervisor or researchethics@ioe.ac.uk.

Before completing this form you will need to discuss your proposal fully with your Supervisor/s.

Please attach all supporting documents and letters.

For all Psychology students, this form should be completed with reference to the British Psychological Society (BPS) Code of Human Research Ethics and Code of Ethics and Conduct.

Section 1 Project details		
a.	Project title	Developing an intervention to improve reading comprehension for children and young people with autism spectrum disorders
b.	Student name and ID number (e.g. ABC12345678)	TUR07053685
c.	Supervisor/Personal Tutor	Research Supervisors: Anna Remington and Vivian Hill Personal Tutor: Dr Helen Upton
d.	Department	Department of Psychology and Human

		Development	
e.	Course category (Tick one)	PhD/MPhil <input type="checkbox"/>	EdD <input type="checkbox"/>
		MRes <input type="checkbox"/>	DEdPsy <input checked="" type="checkbox"/>
		MTeach <input type="checkbox"/>	MA/MSc <input type="checkbox"/>
		ITE <input type="checkbox"/>	
		Diploma (state which) <input type="checkbox"/>	
		Other (state which) <input type="checkbox"/>	
f.	Course/module title	Doctorate in Professional Educational, Child and Adolescent Psychology (DEdPsy). Research Thesis Module.	
g.	If applicable, state who the funder is and if funding has been confirmed.	N/A	
h.	Intended research start date	September 2015	
i.	Intended research end date	January 2016	
j.	Country fieldwork will be conducted in If research to be conducted abroad please check www.fco.gov.uk and submit a completed travel risk assessment form (see guidelines). If the FCO advice is against travel this will be required before ethical approval can be granted: http://ioe-net.inst.ioe.ac.uk/about/profservices/international/Pages/default.aspx	UK	
k.	Has this project been considered by another (external) Research Ethics Committee? Yes <input type="checkbox"/> External Committee Name: No <input checked="" type="checkbox"/> <i>⇒ go to Section 2</i> Date of Approval:		
<p>If yes:</p> <ul style="list-style-type: none"> - Submit a copy of the approval letter with this application. - Proceed to Section 10 Attachments. <p>Note: Ensure that you check the guidelines carefully as research with some participants will require ethical approval from a different ethics committee such as the National Research Ethics Service (NRES) or Social Care Research Ethics Committee (SCREC). In addition, if your research is based in another institution then you may be</p>			

required to apply to their research ethics committee.

Section 2 Project summary

Research methods (tick all that apply)

Please attach questionnaires, visual methods and schedules for interviews (even in draft form).

- | | |
|---|--|
| <input checked="" type="checkbox"/> Interviews
<input type="checkbox"/> Focus groups
<input checked="" type="checkbox"/> Questionnaires
<input type="checkbox"/> Action research
<input type="checkbox"/> Observation
<input type="checkbox"/> Literature review | <input checked="" type="checkbox"/> Controlled trial/other intervention study
<input type="checkbox"/> Use of personal records
<input type="checkbox"/> Systematic review ⇒ if only method used go to Section 5.
<input type="checkbox"/> Secondary data analysis ⇒ if secondary analysis used go to Section 6.
<input type="checkbox"/> Advisory/consultation/collaborative groups
<input type="checkbox"/> Other, give details: |
|---|--|

Please provide an overview of your research. This should include some or all of the following: purpose of the research, aims, main research questions, research design, participants, sampling, your method of data collection (e.g., observations, interviews, questionnaires, etc.) and kind of questions that will be asked, reporting and dissemination (typically 300-500 words).

Purpose of the research:

Poor reading comprehension is a common difficulty for children with autism (Randi, Newman, & Grigorenko, 2010). Typically developing children's reading comprehension increases in line with the development of their word reading skills. However, evidence suggests that a higher percentage of autistic children demonstrate a hyperlexic reading profile, whereby good phonetic decoding skills are accompanied by poor reading comprehension.

Currently, very little is known about why autistic children often show a discrepancy between their word reading and comprehension skills and which strategies are most effective at tackling this difficulty. The current study expands on the evidence base for improving the reading comprehension of students with ASD. There is substantial research supporting the effectiveness of Reciprocal Teaching (RT) with typically developing populations (Brooks, 2013; Rosenshine & Meister, 1994). And some exploratory research with individuals with ASD (Roberts, 2013; Truelove, 2014) demonstrating the potential benefits of RT with this group. The current study aims to extend this research base. It is the first study to evaluate the effectiveness of RT at improving reading comprehension in adolescents with ASD.

Research questions:

1. Does RT improve scores on the York Assessment of Reading Comprehension and will these improvements be maintained beyond the end

- of the intervention period?
2. Following an RT intervention, does the level of reading comprehension correlate with the use of RT strategies by the child?

Hypotheses

1. It is predicted that students who receive the intervention will show significantly more progress in their reading comprehension (as measured by changes in their score on the York Assessment of Reading Comprehension and the summarisation task) than students who receive treatment as usual (control group).
2. It is predicted that following intervention, there will be a significant association between the use of Reciprocal Teaching strategies (as measured by the structured observation) and maintenance of improvement in reading comprehension.

Study design:

This study employs a between-subjects, repeated-measures design to evaluate the effectiveness of the intervention in comparison to a control group. Individual differences will be explored through the use of a structured observation to assess the extent to which students are able to apply the strategies learnt during the intervention. Furthermore, statistical analyses will be used to identify whether non-verbal and verbal abilities are moderating factors in successful application of the skills taught in the intervention. Please see Appendix A for flow chart of sampling and intervention stages.

Participants:

21 secondary school pupils aged between 11 and 15 with a diagnosis of ASD and evidence of reading comprehension difficulties. These pupils will demonstrate sufficient word decoding skills to be able to access the intervention materials (minimum reading age of 8 years).

Sampling:

Opportunistic sampling of participants suggested by the school as requiring help with their reading comprehension.

Intervention design:

The intervention will be delivered by the researcher (at least 90% of sessions) in the students' own school and will take place twice a week over a period of 6-8 weeks. The sessions will be delivered in small groups of 3-4 pupils and will last approximately 40 minutes plus time for organisation and plenaries. A control group of 7 pupils will receive treatment as usual (regular support provided by the school as dictated by their Statement of Special Educational Needs) and be offered the intervention following completion the outcome measures after 8 weeks.

Data collection:

Factor Measured	Name of Measure	Developers of Measure	When administered
Reading comprehension (screening and outcome)	Diagnostic Reading Analysis, forms A and B.	Hodder Education (2008)	Screening and outcome
Word reading score	British Abilities Scales 3 rd Edition: word reading subscales A and B.	GL Assessment (2011)	Baseline and outcome
Reading comprehension	York Assessment of Reading Comprehension forms A and B.	University of York	Baseline and outcome
Autism social difficulties	Social Responsiveness Scale 2 nd Edition.	Constantino (2012)	Baseline
Estimate of verbal and non verbal IQ	Wechsler Abbreviated Scale of Intelligence, 2 nd Edition (WASI; vocabulary and matrix subtests)	Pearson Assessment (2011)	Baseline
Vocabulary outcome measure	Wechsler Intelligence Scale for Children, 4 th Edition. Vocabulary subscale.	Pearson Assessment (2004)	Outcome.
Structured observation	Use of Reciprocal Teaching strategies observation schedule.	Research developed	Outcome
Students' views of reading	Reading for pleasure survey (modified).	The National Literacy Trust (2015)	Baseline
Students' views of reading and the intervention	Semi-structured interview.	Researcher developed	Baseline and outcome

Start Date: November 2015

End date: January 2016

Reporting and Dissemination:

Following the data collection process, the findings will be written up as part of the doctoral thesis for the DEdPsy programme. All participants will remain anonymous

for the report and will be assigned a code to their individual data sets. The brief summary of the findings gathered following the research will also be disseminated to participants and interested parties, such as parents, schools and the Educational Psychology Service to help to inform future practice.

Section 3 Participants

Please answer the following questions giving full details where necessary. Text boxes will expand for your responses.

a.	Will your research involve human participants?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/> go to Section 4
b.	Who are the participants (i.e. what sorts of people will be involved)? Tick all that apply. Young people in Years 7 – 10 at secondary school.		
	<input type="checkbox"/> Early years/pre-school <input type="checkbox"/> Ages 5-11 <input checked="" type="checkbox"/> Ages 12-16 <input type="checkbox"/> Young people aged 17-18	<input type="checkbox"/> Unknown – specify below <input checked="" type="checkbox"/> Adults <i>please specify below</i> <input type="checkbox"/> Other – specify below	
c.	NB: Ensure that you check the guidelines (Section 1) carefully as research with some participants will require ethical approval from a different ethics committee such as the National Research Ethics Service (NRES).		
d.	If participants are under the responsibility of others (such as parents, teachers or medical staff) how do you intend to obtain permission to approach the participants to take part in the study? (Please attach approach letters or details of permission procedures – see Section 9 Attachments.) Participants will be identified by the child's school or parents / carer in the first instance who will provide consent to approach potential participants for inclusion in the study. Information sheets about the research will be provided, and an approach letter and consent forms will be sent to all parents to obtain consent for their child to participate in the research.		
e.	How will participants be recruited (identified and approached)? Participants will be identified by their school or parents.		
f.	Describe the process you will use to inform participants about what you are doing. A research information sheet for schools and young people (written in language accessible for young people with reading difficulties) will be shared prior to starting project.		
	How will you obtain the consent of participants? Will this be written? How will it be made clear to participants that they may withdraw consent to participate at any time? See the guidelines for information on opt-in and opt-out procedures. Please note that the method of consent should be appropriate to the research and fully explained. Written, opt-in consent will be sought from parents of the participants who will be provided with an information sheet and consent form detailing the nature and purpose of the study. Also, if using secondary age pupils, they will also be asked to provide an opt-in, written consent to take part in the study.		

	The research study and process will be fully explained to participants in an information sheet. Participants will all be informed of their right to withdraw, confidentiality, anonymity and will be debriefed following the data collection process.
g.	Studies involving questionnaires: Will participants be given the option of omitting questions they do not wish to answer? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
	If NO please explain why below and ensure that you cover any ethical issues arising from this in section 8.
h.	Studies involving observation: Confirm whether participants will be asked for their informed consent to be observed. Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A.
	If NO read the guidelines (Ethical Issues section) and explain why below and ensure that you cover any ethical issues arising from this in section 8.
i.	Might participants experience anxiety, discomfort or embarrassment as a result of your study? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
	If yes what steps will you take to explain and minimise this? If not , explain how you can be sure that no discomfort or embarrassment will arise? The experimental tasks will be carefully designed to ensure that all participants are able to complete the tasks and do not become frustrated at being unable to answer any items.
j.	Will your project involve deliberately misleading participants (deception) in any way? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
	If YES please provide further details below and ensure that you cover any ethical issues arising from this in section 8.
k.	Will you debrief participants at the end of their participation (i.e. give them a brief explanation of the study)? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> The researcher will debrief the participants at the end of their participation at follow-up, and will provide a brief explanation of the study.
	If NO please explain why below and ensure that you cover any ethical issues arising from this in section 8.
l.	Will participants be given information about the findings of your study? (This could be a brief summary of your findings in general; it is not the same as an individual debriefing.) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> A brief summary report of the main findings regarding the intervention will be provided to young people, their parents and schools following the end of the research study.

	If no, why not?
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Section 4 Security-sensitive material Only complete if applicable		
Security sensitive research includes: commissioned by the military; commissioned under an EU security call; involves the acquisition of security clearances; concerns terrorist or extreme groups.		
a.	Will your project consider or encounter security-sensitive material?	Yes <input type="checkbox"/> * No <input checked="" type="checkbox"/>
b.	Will you be visiting websites associated with extreme or terrorist organisations?	Yes <input type="checkbox"/> * No <input checked="" type="checkbox"/>
c.	Will you be storing or transmitting any materials that could be interpreted as promoting or endorsing terrorist acts?	Yes <input type="checkbox"/> * No <input checked="" type="checkbox"/>
* Give further details in Section 8 Ethical Issues		

Section 5 Systematic review of research Only complete if applicable		
	Will you be collecting any new data from participants?	Yes <input type="checkbox"/> * No <input checked="" type="checkbox"/>
	Will you be analysing any secondary data?	Yes <input type="checkbox"/> * No <input checked="" type="checkbox"/>
N/A		
* Give further details in Section 8 Ethical Issues If your methods do not involve engagement with participants (e.g. systematic review, literature review) and if you have answered No to both questions, please go to Section 10 Attachments .		

Section 6 Secondary data analysis Complete for all secondary analysis		
a.	Name of dataset/s	N/A
b.	Owner of dataset/s	N/A
c.	Are the data in the public domain?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A If no, do you have the owner's permission/license? Yes <input type="checkbox"/> No* <input type="checkbox"/>
d.	Are the data anonymised?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <i>Do you plan to anonymise the data?</i> Yes <input checked="" type="checkbox"/> No* <input type="checkbox"/> <i>Do you plan to use individual level data?</i> Yes* <input checked="" type="checkbox"/> No <input type="checkbox"/> <i>Will you be linking data to individuals?</i> Yes* <input checked="" type="checkbox"/> No <input type="checkbox"/>
e.	Are the data sensitive (DPA 1998 definition)?	Yes* <input checked="" type="checkbox"/> No <input type="checkbox"/>
f.	Will you be conducting analysis within the remit it was originally collected for?	Yes <input checked="" type="checkbox"/> No* <input type="checkbox"/>

g.	If no, was consent gained from participants for subsequent/future analysis?	Yes <input type="checkbox"/>	No* <input type="checkbox"/>
h.	If no, was data collected prior to ethics approval process?	Yes <input type="checkbox"/>	No* <input type="checkbox"/>

* Give further details in **Section 8 Ethical Issues**
If secondary analysis is only method used **and** no answers with asterisks are ticked, go to **Section 9 Attachments**.

Section 7 Data Storage and Security

Please ensure that you include all hard and electronic data when completing this section.

a.	Confirm that all personal data will be stored and processed in compliance with the Data Protection Act 1998 (DPA 1998). (See the Guidelines and the Institute's Data Protection & Records Management Policy for more detail.)	Yes <input checked="" type="checkbox"/>
b.	Will personal data be processed or be sent outside the European Economic Area?	Yes <input type="checkbox"/> * No <input checked="" type="checkbox"/>

* If yes, please confirm that there are adequate levels of protections in compliance with the DPA 1998 and state what these arrangements are below.

N/A

c.	Who will have access to the data and personal information, including advisory/consultation groups and during transcription? I will be making video recordings of all the intervention sessions this will be stored securely and seen only by myself and my supervisors. I will be recording and transcribing interviews, and will securely store the experimental measures. My research supervisor will be able to view the data and provide advice on the interpretation and analysis of the results. Participants' personal details will all be kept anonymous when reporting and disseminating the information and will be securely and safely stored.
----	---

During the research

d.	Where will the data be stored? Electronic and video data will be stored securely on the university server. Paper copies of tasks will be scanned and stored securely on the university server. Original paper copies will be destroyed in a confidential manner.
e.	Will mobile devices such as USB storage and laptops be used? Yes <input checked="" type="checkbox"/> * No <input type="checkbox"/> * If yes, state what mobile devices: A laptop will be used for collection of the experimental measures. * If yes, will they be encrypted?: Yes.

After the research

f.	Where will the data be stored? On the university server.
g.	How long will the data and records be kept for and in what format? Video data will be stored securely on the UCL server and will only be viewed by myself and my supervisors. All video data will be deleted at the end of the project.

	Data from the questionnaires and interview transcripts will be kept for 10 years after data collection (as stated by the APA guidelines) in electronic format on the university server. The data will be kept separately from the questionnaires and interview transcripts.
h.	Will data be archived for use by other researchers? <input checked="" type="checkbox"/> * No <input type="checkbox"/> * If yes, please provide details. Anonymized data will be archived in the event that other researchers may wish to query any of the findings.

Section 8 Ethical issues

Are there particular features of the proposed work which may raise ethical concerns or add to the complexity of ethical decision making? If so, please outline how you will deal with these.

It is important that you demonstrate your awareness of potential risks or harm that may arise as a result of your research. You should then demonstrate that you have considered ways to minimise the likelihood and impact of each potential harm that you have identified. Please be as specific as possible in describing the ethical issues you will have to address. Please consider / address ALL issues that may apply.

Ethical concerns may include, but not be limited to, the following areas:

<ul style="list-style-type: none"> - Methods - Sampling - Recruitment - Gatekeepers - Informed consent - Potentially vulnerable participants - Safeguarding/child protection - Sensitive topics 	<ul style="list-style-type: none"> - International research - Risks to participants and/or researchers - Confidentiality/Anonymity - Disclosures/limits to confidentiality - Data storage and security both during and after the research (including transfer, sharing, encryption, protection) - Reporting - Dissemination and use of findings
---	--

Informed Consent

- Parents will be given detailed written information about the nature of the research, and the extent of their children's participation will be outlined to ensure that they understand the aims and purpose and what their child is required to do. This is to ensure they are able to provide fully informed consent (see attached) for themselves and their child.
- The researcher will ensure that all participants have a full understanding of what is involved in the study and the exact nature of their participation. Students will be encouraged to ask questions and seek clarification. Following this, their written consent will be obtained (see attached).
- Parents, teachers and young people will be given a copy of their respective information sheets to keep. An opt-in consent form will be provided to parents with the full information sheet, and informed consent will then be sought from the young people.
- The researcher has a current CRB check to enable the possibility of working with children and young people and their families.

Confidentiality and Anonymity

- Participants will be assigned a unique code, and all assessment data, video and audio data will be stored under this. All identifying information such as family name and details, will be kept securely for family contact and correspondence only.
- All information collected will be strictly confidential, and only the researcher and research supervisor will have access to the data.
- Confidentiality and anonymity will be abided by in relation to the Children's Act 1989, and all participants will be informed of this at the beginning of the research.

Safeguarding and Ensuring Participants are Free from Psychological Harm or Distress.

- It is possible that participants may disclose information concerning their involvement in illegal activities or activities that represent a threat to themselves or others (e.g., child abuse, domestic violence, substance abuse). If this occurs, then the appropriate agencies and persons will be informed, in accordance with the Children's Act, 1989. The researcher has attended lectures at the Institute of Education relating to legislation and duty of care in these circumstances.
- Any participants who are in the control condition will subsequently be offered the opportunity to take part in the experimental condition to ensure that they are not disadvantaged by participation in the study.
-

Right to Withdraw

- All participants will be informed that they are under no obligation to take part and that if they wish to withdraw at any point of the study they are free to do so without explanation and creating no adverse consequences.
- It will be made clear to the young people in the intervention groups that they may remain part of the intervention programme if they so wish, regardless of their continued involvement in the research study.
- Participants will be informed that they can withdraw from the research study and any identifiable completed data at any time. The information and consent forms will outline statements to this effect.
- In situations where the withdrawal of a participant's data is no longer viable (for instance, it has already been included in the final report), participants who wish to withdraw their data will be informed of this.
- Any questionnaires or audio recordings of participants from interviews who subsequently wish to withdraw their data, will also be destroyed.

Section 9 Further information

Outline any other information you feel relevant to this submission, using a separate sheet or attachments if necessary.

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Section 10 Attachments Please attach the following items to this form, or explain if not attached

	<ul style="list-style-type: none"> Information sheets and other materials to be used to inform potential participants about the research, including approach letters 	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	<ul style="list-style-type: none"> Consent form 	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	<ul style="list-style-type: none"> If applicable: 		
	<ul style="list-style-type: none"> The proposal for the project 	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	<ul style="list-style-type: none"> Approval letter from external Research Ethics Committee 	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	<ul style="list-style-type: none"> Full risk assessment 	Yes <input type="checkbox"/>	No <input type="checkbox"/>

Section 11 Declaration

Yes No

I have read, understood and will abide by the following set of guidelines.

BPS BERA BSA Other (please state)

I have discussed the ethical issues relating to my research with my supervisor.

I have attended the appropriate ethics training provided by my course.

I confirm that to the best of my knowledge:

The above information is correct and that this is a full description of the ethics issues that may arise in the course of this project.

Name	Horatio Turner
Date	19 th January 2015 (updated 20 November 2015).

Please submit your completed ethics forms to your supervisor.

Notes and references

Professional code of ethics

You should read and understand relevant ethics guidelines, for example:

British Psychological Society (2009) *Code of Ethics and Conduct*, and (2014) *Code of Human Research Ethics*

or

British Educational Research Association (2011) *Ethical Guidelines*

or

British Sociological Association (2002) *Statement of Ethical Practice*

Please see the respective websites for these or later versions; direct links to the latest versions are available on the Institute of Education

<http://www.ioe.ac.uk/ethics/>.

Disclosure and Barring Service checks

If you are planning to carry out research in regulated Education environments such as Schools, or if your research will bring you into contact with children and young people (under the age of 18), you will need to have a Disclosure and Barring Service (DBS) CHECK, before you start. The DBS was previously known as the Criminal Records Bureau (CRB). If you do not already hold a current DBS check, and have not registered with the DBS update service, you will need to obtain one through at IOE. Further information can be found at
http://www.ioe.ac.uk/studentInformation/documents/DBS_Guidance_1415.pdf

Ensure that you apply for the DBS check in plenty of time as will take around 4 weeks, though can take longer depending on the circumstances.

Further references

The www.ethicsguidebook.ac.uk website is very useful for assisting you to think through the ethical issues arising from your project.

Robson, Colin (2011). Real world research: a resource for social scientists and practitioner researchers (3rd edition). Oxford: Blackwell.

This text has a helpful section on ethical considerations.

Alderson, P. and Morrow, V. (2011) The Ethics of Research with Children and Young People: A Practical Handbook. London: Sage.

This text has useful suggestions if you are conducting research with children and young people.

Wiles, R. (2013) What are Qualitative Research Ethics? Bloomsbury.

A useful and short text covering areas including informed consent, approaches to research ethics including examples of ethical dilemmas.

Departmental use

If a project raises particularly challenging ethics issues, or a more detailed review would be appropriate, you **must** refer the application to the Research Ethics and

Governance Coordinator (via researchethics@ioe.ac.uk) so that it can be submitted to the Research Ethics Committee for consideration. A Research Ethics Committee Chair, ethics department representative and the Research Ethics and Governance Coordinator can advise you, either to support your review process, or help decide whether an application should be referred to the REC.

Also see 'when to pass a student ethics review up to the Research Ethics Committee':

<http://www.ioe.ac.uk/about/policiesProcedures/42253.html>

Student name	Horatio Turner	
Student department	PHD	
Course	DEdPsy	
Project title	Developing an intervention to improve reading comprehension for children and young people with autism spectrum disorders	
Reviewer 1		
Supervisor/first reviewer name	Anna Remington	
Do you foresee any ethical difficulties with this research?	NO	
Supervisor/first reviewer signature		
Date	22/01/15	
Reviewer 2		
Second reviewer name		
Do you foresee any ethical difficulties with this research?		
Supervisor/second reviewer signature		
Date		
Decision on behalf of reviews		
Decision	Approved	<input type="checkbox"/>
	Approved subject to the following additional measures	<input type="checkbox"/>
	Not approved for the reasons given below	<input type="checkbox"/>
	Referred to REC for review	<input type="checkbox"/>
Points to be noted by other reviewers and in report to REC		
Comments from reviewers for the applicant		

Recording – supervisors/reviewers should submit all approved ethics forms to the relevant course administrator	
Recorded in the student information system	<input type="checkbox"/>

If the proposal is not authorised the applicant should seek a meeting with their supervisor or ethics reviewer.

Appendix: I: Account of a typical reciprocal teaching session.

Session number: 4.

School: Specialist Autism school.

Text: The Fault in Our Stars by John Greene (2012), pages 10-12.

Participants and ages: Ella (13), Gemma (13) and Sally (14).

This account provides an overview of a typical reciprocal reading session. This is based on the fourth session in the programme by which time the students are familiar with the method and the text. The basic process is that students take turns to be group leader. The group leader starts by making a prediction about what they are going to read and then directs the group to read a portion of the text. After reading, the students share unfamiliar words or terms they would like to clarify and discuss potential definitions either from their own ideas or using a dictionary. Following this, students ask the group questions about the text and try to answer each other's questions. Finally, the group leader summarises the main idea from the text and then the role moves on to the next student.

Plenary (5 minutes): catch up time to enable students to discuss their week and any issues they would like to discuss. Gemma describes her role in the school play and is very proud of this, Sally appears to be ignoring her. Ella explains that she is having difficulties with another girl in her class. She asks to take some time out to get water and returns after a couple of minutes. When Ella returns we recap on the rules of the session which include active listening so that "all participants feel their contributions are valued". We summarise what happened in the story during the previous session and recap on the names of characters.

First round of reading (10 minutes): Gemma volunteers to be group leader first and makes a prediction based on what happened last time "I think Hazel will be angry because the boy is staring at her"

Gemma asks the group members to read to the middle of page 10, look for words to clarify and think of a question to ask about the text. At this stage (session 4), students still find it difficult to think of appropriate questions, so I distribute question cards (see appendix C) to give students a prompt. Ella is rather quiet during this session and struggling to stay on task

so I give her a question card and suggest a part of the text she could make a question about.

When all the students have finished reading, Gemma asks the group for words they would like to clarify. Students are reminded that they should take a ‘house point’ from the pile in the middle when they ask for clarification or make a question. Sally says that she wanted to clarify what a chipmunk was and shows everyone a photo on the Ipad. Gemma asks the group to clarify the term “I’m Grand!” – Sally suggests that a grand is a lot of money so it must be something positive – “maybe Augustus is really happy because he has lots of money” I acknowledge Sally’s good thinking and suggest that we read the sentence together, I read the sentence aloud to the group. Gemma suggests that it means he is feeling well “because Hazel asked him how he was feeling”. After two more clarifying words, Gemma asks the group for questions.

Ella is still very quiet and has not been able to think of a question with the prompt card I gave her so I give her a whole question to ask the group. She hesitantly asks “what is the name of Augustus’ friend” and takes a house point. This question is answered by a member of group. Gemma is usually the most confident member of the group and says that she would like to make a high level question, she looks at the sentence starter poster and says “Why does the author say ‘grand’ instead of ‘well’?”. This is discussed in the group and one student suggests “it probably means very well”.

Finally, when all three students have asked a question, Gemma attempts a summary of the text. “In this passage we learn that Augustus fancies Hazel even though she looks odd with all the tubes in nose”. I then ask the students what they like about Gemma’s summary. At this stage they are not able to identify what is good about it so I explain how it captures the main idea and important information, identifies what new information the reader learns, and remains succinct.

Subsequent 2 rounds of reading (20 minutes)

The role of group leader then passes to the next volunteer with the aim that all three students will be able to do this at least once during the session. Ella is reluctant to volunteer so goes last so that she has more opportunity to observe others modelling the role. The process is then repeated as in the first round.

Later sessions

This process is repeated for the majority of the sessions. However, by session 9 or 10, I removed the role of group leader, telling students that “everyone is group leader now”. At this point, all the students were requested to contribute a prediction at the start, discuss clarifying and questions as before and then discuss the summary together at the end. Several students reported that they particularly enjoyed this adaptation as it felt a more natural way to discuss the text.

Appendix J: Interview transcript with initial codes and themes.

Transcript	Initial codes	Subthemes
<p>Appendix D: Example interview transcript R= researcher, S=student</p> <p>R: Hi, tell me what you thought of the reading group. S: I found it useful. R: How did you find it useful? S: because it showed me like reading strategies. R: What strategies did you learn? S: To clarify and predict before you read and to clarify a word you might not know. R: Is there anything else you remember? S: To ask a question to yourself to see if you might get the right answer. R: How does that help us? S: It helps us to understand the story and predict it. R: Why does predicting help us to understand? S: It helps us to understand because it kind of helps tells us what might happen next. R: How does that help us? S: See you get further into the story. R: What does that mean? S: You will get what's happening. R: What else did you think of the reading group? S: I thought it was fun. R: How was it fun? S: Because like we get to read together and share our opinions. R: What did you like about sharing opinions? S: People like listen and understand it my opinion. R: Will that help you in any other areas of school? S: Yes, like in group activities. You would like share more ideas with the other people in your group. R: Why would you share more ideas? S: You would get better grades for being confident and sharing really good ideas. R: Apart from reading novels, did you use the strategies anywhere else? S: Yes, in history we read like sources. R: How could it help you to understand those? S: there is this activity we have to do at the start of every lesson where we have to say like what it doesn't say about and things it does say and</p>	<p>generally useful Use of strategies Predicting and clarifying Questioning Improved comprehension Predicting Improved comprehension Enjoyment of programme Reading together Discussion with peers Feel listened to Other group activities Discussion with peers Speaking more to peers Speaking with or in front of peers Other lessons</p>	<p>General comments Greater focus on comprehension Comprehension monitoring Comprehension monitoring Collaborative working Building confidence in speaking Improved confidence in speaking</p>

<p>also a question is that because you could use because you could use the predicting and all the other things.</p> <p>R: Is there anything else you would like to tell me about the reading group</p> <p>S: Umm! No I think that's it.</p> <p>R: If I was to run the group again with some different students is there anything I could do to make it better?</p> <p>S: Maybe you should include more people.</p> <p>R: Can you explain?</p> <p>S: More people that other people I might know so that you might feel more confident in talking.</p> <p>R: why would that make you more confident in talking?</p> <p>S: I'm not really sure how to explain.</p> <p>R: Do you mean you like to have more of your friends in the group rather than kids you don't know?</p> <p>S: Well both some kids today don't know and then some of my friends. We could make new friends as well.</p> <p>R: That's a good idea. Having your friends in the group how would that help you.</p> <p>S: that would help me act more confident because she would feel like you were in a normal lesson.</p> <p>R: How did you feel about working with me as the stranger in your school and kids you didn't know.</p> <p>S: A bit weird.</p> <p>R: A bit weird at the start, or for the whole thing?</p> <p>S: Just for the start.</p> <p>R: How did it get better for you?</p> <p>S: Because I started to get to know them and know their names. And know what kind of opinions they have.</p> <p>R: Is there anything else you like to tell me about the reading group?</p> <p>S: No.</p>	<p>Use of strategy in other lessons</p> <p>More participants</p> <p>Working with unfamiliar students difficult</p> <p>Make new friends because different students</p> <p>More confident with friends</p> <p>Difficult working with unfamiliar kids at the start</p> <p>Gradual familiarisation with adult and other kids</p>	<p>Transfer of skills</p> <p>Organisation of the group</p> <p>Social opportunities</p> <p>Collaborative working</p>
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Appendix K: Glossary of terms

Attention Deficit Hyperactivity Disorder (ADHD): In the current study, ADHD refers to the diagnostic category defined in the DSM-V as ‘A persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development’ (APA, 2013b, p. 314). Reference is not made to the continued debate surrounding the validity of ADHD as a diagnosis as this is outside the scope of the current study.

Executive functions (EF). This concept is an umbrella term which describes a set of different cognitive functions that support goal-directed behaviour. Barkely (2012) provides an overview of the complex nature of this concept and concludes that there is no commonly agreed definition, but suggests that it incorporates a range of cognitive functions which support the initiation and monitoring of behaviour. Hill (2004) suggests that certain cognitive functions such as working memory, impulse control, planning skills, flexibility (or set shifting) and monitoring of activities may be relevant to understanding difficulties in individuals with ASD.

Theory of mind (ToM). This refers to the ability of an individual to impute a mental state to themselves or others as defined by Premack & Woodruff (1978). These authors suggest that this skill enables individuals to understand the beliefs and emotions of others and recognise these states within themselves. Baron-Cohen et al. (1985) further suggest that this ability enables individuals to understand another’s intentions and therefore predict their behaviour which is important for understanding social situations.

Weak central coherence (WCC). This concept is based on the definition developed by Happé and Frith (2006) which suggests that certain individuals show a preference, or bias, towards local processing (the small details of an image), often at the expense of global processing (the overall meaning or bigger picture). This is often observed in visual tests where a large picture is constructed of smaller images. Research suggests that some individuals with ASD recognise the smaller component images before the larger, gestalt, image. These findings suggest that this pattern of abilities is the opposite to that shown in the typically developing population (Happé & Frith, 2006).

Working memory (WM). The concept of WM used in this paper is based on the definition developed by Baddeley (1992, p. 556) which suggests that it is the process of ‘simultaneous storage and processing of information’. Baddeley proposes that WM is

composed of three cognitive processes: the central executive which controls and directs attention; the phonological loop which is used to store verbal information and the visuospatial sketchpad which stores and manipulates visual information.