What are the effects of interacting with, and reading to, a dog upon individual children's classroom behaviour?

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Abstract

The present research explored the impact of interacting with, and reading to, a dog on the classroom behaviour of seven primary school aged children. Relevant literature and theoretical underpinnings are discussed in line with the overarching themes of classroom behaviour and Animal-Assisted Interventions (AAI), focusing on the research which employs dogs as the chosen therapy animal. Reports from the past 27 years have shown low-level disruptive behaviour to be a cause for concern for teachers and parents (Elton, 1989; Steer, 2005; Ofsted, 2014). The literature also explores the possible theoretical unerpinnings of AAI, with a particular focus upon Attachment Theory (Bowlby, 1959). The literature considers how this theory may be applied to Human-Animal Interactions and what impact this may have for children bonding to animals in school. Currently, no research exists which explores the impact of AAI on behaviour once the child has returned to the classroom and the current study wished to address this.

A single-case experimental design (SCED) was implemented with seven participants. Weekly data was collected through observational measures regarding classroom behaviour. This data was split into four categories: on-task behaviour (where the participant was actively or passively engaged in learning); off-task motor behaviour (the participant was out of their seat unnessarily, swinging on their chair or fiddling with equipment); off-task verbal behaviour (talking out of turn, calling out or making unnessary noises); off-task passive behaviour (staring out of the window, watching another peer). The results indicated positive effects in at least one area for six participants. The highest gains were demonstrated in off-task verbal behaviour, where improvements were observed in the behaviour of four participants.

The present research provides tentative further evidence for the impact of interacting with and reading to a dog as an intervention for classroom behaviour. The discussion considered the nature of the design as a limitation, as SCEDs limit the generalisability of the findings. Furthermore, the limitations around observational measures are discussed, alongside the variables which may have affected the results, including the variability of the intervention itself

between participants and differences between predisposiitons towards dogs. The conclusions recommend additional research into the use of canine-assisted interventions in schools and the Educational Psychologist's place within this.

Dedication

This thesis is dedicated to my Granny Joan, who sadly passed away during the third year of my Doctorate course. She was always very proud of me.

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List of Abbreviations and Acronyms

Acronym	**Terminology**
AAA	Animal-Assisted Activity/Activities
AAI	Animal-Assisted Intervention/s
AAT	Animal-Assisted Therapy/Therapies
ABTC	Aggressive Behaviour Teacher Checklist
ASD	Autism Spectrum Disorder
ASSIA	Applied Social Sciences Index and Abstracts
AVMA	American Veterinary Medical Association
BFL	Assessment Aids for Teachers (Beurteilungshilfen fur Lehrer)
BOSS	Behavioural Observation of Students in Schools
CBT	Cognitive-Behavioural Therapy
DV	Dependent Variable
EBD	Emotional and Behavioural Disorders
EIQ	Eysenck Impulsivity Questionnaire
EP	Educational Psychologist
EPS	Educational Psychology Service
ERIC	Education Resources Information Centre
GWT	Gestalt Perception Test (Gestaltwahrehnehmungstest)
IECA	Index of Empathy for Children and Adolescents
IV	Independent Variable

IVE	Inventory for the Assessment of Impulsivity, Risk Behaviour and Empathy of 9-14 year old Children (Inventar zur Erfassung von Impulsivitat, Risikoverhalten und Empathie bei 9-14 jahrigen Kindern)
NOBAGS	Normative Beliefs About Aggression Scale
Ofsted	Office for Standards in Education
PEP-R	Psycho-Educational Profile Revised
PDD	Pervasive-Developmental Disorder
RCT/s	Randomised-Controlled Trial/s
SAP	Service Animal Programmes
SCED	Single-case experimental design
SENCo/s	Special Educational Needs Co-ordinator/s
TA	Teaching Assistant
WET	Vienna Development Test (Wiener Entwicklungstest)

Chapter 1: Introduction

1.1 Introduction to Current Research

1.1.1 Background to research

The topic of low-level disruptive behaviour has long been a source of frustration for teachers across the country. This area of concern was thoroughly explored by Elton (1989). Low-level disruption was described as encompassing behaviour such as talking out of turn, hindering other children and making noises. A more recent report was published by Ofsted in 2014, outlining similar issues and concerns from teachers which mirrored the report from 25 years previously.

The use of animals in educational settings as a behavioural intervention is a growing area of research (Gee, Fine & Schuck, 2015). Prior to this, there have been decades of research documenting the practice of using animals as a means of improving human physical health, emotional well-being, social functioning and educational outcomes. These areas come under the umbrella heading of animal-assisted interventions (AAI) (AAII, 2013).

According to the American Veterinary Medical Association (AVMA), there are three main categories of AAI: animal-assisted activities (AAA), animal-assisted therapy (AAT) and service animal programs (SAP), such as guide dogs for the blind. These activities are typically directed and/or delivered by trained professionals. Animal-Assisted Therapies (AAT) involve specific goals where the animal forms an integral part of the treatment process, whereas AAA is less goal-specific.

AAI is usually used as a supplementary tool or in conjunction with other treatments or interventions. In using an animal as a part of the therapeutic process, clients may be more willing to accept recommended interventions, as it could be argued that animals foster a warm and safe atmosphere (Nimer & Lundahl, 2007). AAI has been used to address a variety of issues, including behaviours associated with autistic spectrum condition (ASC) (Pavlides, 2008), psychiatric disorders (Berget, Ekeberg & Braastad, 2008) and to improve literacy outcomes with children (Jalongo, 2005). A review by Morrison (2007) indicated that AAI brings a variety of health benefits, including improved blood

pressure and heart rate and decreases in depression and anxiety. AAI has been used with people across all ages, from children and adolescents through to the elderly. The literature review in Chapter 2 will explore the practice of animal-assisted interventions with children more thoroughly.

1.1.2 Personal and professional interest

Prior to embarking upon the Doctorate in Applied Educational Psychology course, the researcher was employed as a Teaching Assistant in a specialist school for young people with Emotional and Behaviour Difficulties (EBD). Here, the researcher witnessed a broad range of behaviour, from low-level disruption (such as shouting out) to challenging behaviour (such as acts of physical aggression towards other pupils and staff). While in this setting, the researcher observed the difference the presence of the school's therapy dog seemed to make to the young people's behaviour. The times the dog was in the classroom were the times when the young people appeared to be at their most calm and more engaged with the assigned task. It seemed as if the young people did not wish to upset the dog and therefore behaved accordingly.

During year two and three of the Doctoral course, the researcher was interested to find out that dogs were being used as part of a reading intervention in local schools. The course provided the researcher with the chance to examine the area of Animal-Assisted Interventions (AAI) further through a university assignment with the aim of producing a systematic review in the area. This opportunity afforded an exploration of the evidence base for Animal-Assisted Activities (AAA) using dogs in schools based on the experiences of a few years earlier. The researcher found few peer-reviewed, empirical studies within this area, none of which had been conducted in the UK. These empirical studies will be discussed later as part of the systematic review (see Section 2.6).

From reading the published research and anecdotal reports available, the researcher wondered if there were links to be made between interacting with, and reading to, dogs and children's behaviour. Based on the researcher's previous experience of challenging behaviour in the EBD school, AAI may have a role to play within interventions for behaviour.

Ofsted's (2014) recent report has once again cast a light upon low-level disruptive behaviour within British classrooms. Indeed, the researcher has worked closely with a number of Special Educational Needs Co-Ordinators (SENCos) who frequently reported difficulties with the level of low-level disruptive behaviour within their schools and the impact this was having upon learning, both for the disruptor and for the peers around them. These conversations inspired the researcher to further explore whether the AAI of interacting with, and reading to, a dog could have an impact upon classroom behaviour.

1.2 Overview of Thesis

In pursuit of these aims, the thesis begins with a review of the literature in Chapter 2. The literature will examine behaviour in schools, alongside current interventions which are being employed. The literature will also explore the topic of Animal-Assisted Interventions and how these have been used to support positive behaviour in various settings, including schools. Chapter 3 (Methodology) provides a description of the design used and the procedures associated within the present research. Issues concerning validity, reliability and ethical considerations are highlighted and examined. The Results section (Chapter 4) presents the visual analysis of the seven single-case experimental designs employed in this study. The key findings are then discussed in Chapter 5 in light of the literature and the limitations of the present research. The significance of the results are evaluated and implications for future research and practice discussed, alongside the researcher's reflections on the research. Finally, Chapter 6 provides a summary of the present study.

Chapter 2: Literature Review

2.1 Introduction to Chapter

This chapter will begin with an exploration of low-level disruptive behaviour in schools: its history, its impact upon other pupils and teachers and behavioural interventions that are used in schools. The literature will then turn to examine the topic of Animal-Assisted Interventions, with a nod to an example of a theoretical framework which aims to underpin the effects of interaction with animals. Further to this, the literature will focus more closely on the use of animals with children and within school settings. A systematic review of the literature will be presented, with an analysis of the existing literature pertaining to dogs in schools. Finally, this chapter will close with an outline of the research question and hypotheses.

2.2 Low-Level Disruptive Behaviour in Schools

2.2.1 Historical context of low-level disruptive behaviour

The focus of behaviour in UK schools has long been a topic of debate and policy across the decades. Almost 30 years ago, Lord Elton published a report entitled “Discipline in Schools” (Elton, 1989). This enquiry was conducted amid a climate of concern around increasing reports of negative behaviour in schools. It aimed to find out more about the nature of the behaviour in schools, alongside effective discipline to overcome these barriers of poor behaviour.

The report states that, “A school's central purpose is that children should learn. Good behaviour makes effective teaching and learning possible. Bad behaviour disrupts these processes.” (p.57). The report included a survey of 3,500 teachers, asking them to define their recent experiences in the classroom. The responses suggested that the type of behaviour teachers found most troubling was persistent low-level disruption. This was outlined as being behaviours including talking out of turn, hindering other children, making unnecessary noise and ‘calculated idleness’ (p.61). In turn, the impact of this behaviour was disruptive to the learning processes of both the perpetrators and those around them, leading to a loss in learning. According to the survey, this behaviour was also found to impact upon teachers’ stress levels.

In order to counteract disruptive behaviour, the advice emphasised praising good behaviour and using “sparing and consistent” reprimands (p.72). Further advice in managing behaviour appears to focus on the development of policies within schools, with an emphasis on fairness for all pupils.

This theme of low-level disruptive behaviour continued in Steer’s (2005) report into Learning Behaviour. Again, the evidence collected quoted: “The most common forms of misbehaviour are incessant chatter, calling out, inattention and other forms of nuisance that irritate staff and interrupt learning.” (p.34; Ofsted, 2005). When compared to the Elton (1989) report, it appears that not much had changed in 16 years. Furthermore, Steer’s (2005) report made reference to similar outcomes on the impact of disruptive behaviour: it interferes with pupils’ learning and it is wearing for teachers.

More recently, Ofsted (DfE, 2014) examined pupil behaviour in UK schools and found low-level disruptive behaviour to be a cause for concern nationwide. The report took evidence from 3000 Ofsted inspections conducted between January and July 2014. Two surveys were carried out, separately eliciting the views of parents (n = 1024) and teachers (n = 1048). The respondents were asked to choose from a list which, in their opinion, were the three most prevalent low-level disruptive behaviours.

The primary school teachers surveyed characterised low-level disruption as a wide range of behaviour. The report quotes several examples, including: talking when the teacher is talking, calling out, making silly comments, fiddling, writing when they should be listening, swinging on chairs, turning around in their seat. The secondary school teachers concurred, adding issues with mobile phones in lessons as a further example of low-level disruption.

The results of both surveys agreed that pupils talking about topics other than the task set was the most common form of low-level disruption in the classroom. Primary school teachers identified the most common problems to be talking out of turn (half of the teachers), disturbing other children (just under half) and fidgeting with equipment (over a third of teachers). The examples of low-level disruption appear to be very similar to those cited in Elton’s (1989) and Steer’s (2005) report.

The report also explored frequency of the perceived issues identified by teachers to be low-level disruptive behaviour. According to the report, approximately 40% of the 723 teachers who categorised “talking and chatting” as the most prominent issue that occurred in almost every lesson. From those 397 teachers who reported “disturbing other children” to be the most prevalent low-level disruptive behaviour, a quarter stated that it happened in almost every lesson.

Teachers’ views of the impact of negative behaviour were collected. This question revealed a lot of variation between the teachers’ experiences. Just under 40% of the teachers felt that low-level disruption has a high impact on learning. Conversely, just over a third responded that this type of behaviour has a low impact on the learning of the pupils in the class. The report triangulates this difference in opinion with results from inspections, confirming a mixed picture not just between schools, but also between classrooms within the same school.

Differing views also emerged when teachers were asked how much learning time they felt was lost to disruptive behaviour. The majority of those surveyed, 41% of primary school teachers and 40% of secondary school teachers, felt that between one to five minutes were being lost each hour. Worryingly, 5% of primary school teachers and 8% of secondary school teachers reported that more than ten minutes were being lost each hour to dealing with low-level disruption.

In response to the latest government report, Bennett (2017) was appointed to develop government policy on helping teachers to tackle low-level disruptive behaviour in their classrooms. The report emphasises the importance of creating a culture across the school of positive behaviour. The recommendations include an assurance of consistency in behaviour management and high expectations for all pupils, alongside a high level of leadership support and high levels of staff and parental commitment. In terms of targeted support for pupils demonstrating difficulties with their behaviour, Bennett (2017) recommends access to training in a range of behavioural strategies and greater guidance for schools on how to manage their most

challenging pupils. However, the specifics of the behavioural strategies and 'guidance' highlighted are not provided as to what this may look like in practice.

To summarise, it is clear from the evidence available from the past 30 or so years that low-level disruptive behaviour remains an area for concern in UK classrooms and schools. The evidence further suggests that persistent low-level disruptive behaviour impacts upon learning and, in some cases, can impact upon the teacher's stress levels. The next section will explore interventions for low-level disruptive behaviour.

2.2.2 Interventions for pupil behaviour

With regard to interventions available which target disruptive behaviour, a systematic review by Evans, Harden and Thomas (2003) was conducted to explore the effectiveness of a range of strategies. The review examined 28 studies which focused on primary-school aged children in mainstream classrooms. The results of the search indicated that there were a number of strategies highlighted which were reported to have had a positive impact upon behaviour.

From the synthesised results of the review, four main themes of theoretical models emerged: behaviour, cognitive-behavioural, systemic and psychotherapeutic. The authors defined behavioural interventions as being based on the idea that if behaviour can be learned, it can be modified or extinguished through reinforcement contingencies. An example of this would be negative behaviour being issued a consequence (negative reinforcement). Cognitive-behavioural approaches, on the other hand, work on the assumption that behaviour is directed by thought processes. Therefore, modification of the thought processes will impact upon behaviour. This may include interventions such as Cognitive-Behavioural Therapy (CBT) (Beck, 1970). Systemic approaches take account of the pupil's environment and take the view that the behaviour is influenced by the situation. An example of this is that the particular layout of the classroom may be affecting behaviour. The final theoretical model explored was psychotherapeutic, which the authors describe as encompassing humanistic, person-centred and psychoanalytic perspectives. This paradigm views behaviour as being a result of complex roots which may be altered

through personal development and building relationships. Nurture groups are built on this principle (Bennathan & Boxall, 1998).

Evans, Harden and Thomas (2003) note that the majority of studies centred upon either 'off-task behaviour' or 'disruptive' behaviour. The reviewed studies' 'off-task' behaviour included things such as not engaging with the task set, wandering around the classroom or fiddling with equipment. These 'off-task' behaviours appear to be similar to those illustrated as being 'low-level disruption' by Elton (1989), Steer (2005) and Ofsted (2014).

With regard to interventions highlighted in the review as targeting 'off-task behaviour', the following strategies were found to be the most effective: behavioural strategies using rewards and sanctions and cognitive-behavioural approaches training children in self-instruction. In terms of systemic interventions, one study found that rearranging the tables into rows helped to improve on-task behaviour. However, the review reveals a gap in interventions using psychotherapeutic approaches based on building relationships. The review also makes no mention of Animal-Assisted Interventions or Animal-Assisted Therapies, an area of emerging interest underpinned by the psychotherapeutic model.

2.3 Animal-Assisted Interventions

Considerations of the benefits that interaction with animals may have upon humans has existed for centuries (see Serpell, 2015, for a more in-depth exploration). The idea that animals may be used to exert a positive influence on the lives of children and patients with mental health difficulties surfaced towards the end of the 17th Century (Thomas, 1983). Come the 19th Century, animals were a common part of institutional care facilities (Serpell, 2005).

This concept of human-animal interaction with children in therapy was further explored by Levinson in the 1960s. Levinson used his dog as a 'co-therapist' during his psychotherapy sessions. He observed that the dog appeared to have an almost immediate positive effect on the children with whom he was working, particularly those children he characterised as being mute or 'detached'. The conclusions drawn from Levinson's work were that the dog may be acting as a

'transitional object', which mediates between the known terrors of outer reality and the unknown realities of the inner world (Levinson, 1969).

However, despite Levinson's (1969; 1972) early work, the wider scientific community did not take the ideas seriously. Things changed with the publication of a pioneering study examining the outcomes of outpatients from a cardiac care unit which found that pet owners typically lived longer than those who did not. This study by Friedmann et al. (1980) appeared to lead the way to further interest in examining the health, psychological and other benefits of human and animal interaction (Serpell, 2015). From this body of research, two main findings emerged. The first was that interaction with animals appears to induce a physiological de-arousing state of relaxation (Katcher et al., 1983). Secondly, companion animals appear to provide people with a way of reducing or buffering feelings of stress through social support (Serpell, 1996).

2.3.1 Theoretical framework for Animal-Assisted Activities (AAA), Animal-Assisted Interventions (AAI) and Animal-Assisted Therapy (AAT)

Geist (2011) proposed a conceptual framework in an attempt to explain the effects of interacting with animals. The framework drew upon physiological, psychological and cognitive models.

From a physiological perspective, there is a wealth of evidence of the effects interactions with animals has upon humans. A systematic review conducted by Beetz, Uvnas-Moberg, Julius and Kotrschal (2012) of 69 peer-reviewed studies investigated the effects of human-animal interaction on physiological and psychological variables. Among the results found for physiological variables were positive effects such as the impact that animals have upon stress. The results from the studies reviewed indicated that interacting with dogs, either familiar or unfamiliar, may decrease levels of cortisol (the stress hormone). An additional positive effect noted in the review was that interaction with animals may have an impact upon self-reported anxiety and calmness, which may be related to the physiological effects of decreased cortisol and heart rate. Finally, the Beetz et al. (2012) review highlighted that oxytocin is produced when stroking an animal and therefore it may have a role in decreasing blood pressure and cortisol of those interacting with animals. Interestingly, dogs also

produce oxytocin when they are being stroked and so physical interaction with a dog may have mutually beneficial effects (Handlin et al., 2011).

The psychological perspective within Geist's (2011) framework focuses on attachment theory. Attachment may be defined as, "an inborn system in the brain that evolves in ways that influence and organise motivational, emotional and memory processes with respect to significant care giving figures" (p.67; Bowlby, 1969). Bowlby (1973) further expanded upon this to theorise that the early relationship with the primary care giver may have significant implications for later life. To understand how these early interactions may affect later life, Bowlby developed the concept of "Internal Working Models" (Bowlby, 1973). Internal Working Models are purported to encompass expectations and beliefs about the self and others and the interactional relationships between these beliefs. For example, if a baby's needs are consistently met, the baby will feel loved, that their caregiver is a positive figure and that they are worthy of love. If a baby's needs are left unmet, or met inconsistently, the caregiver will be seen as rejecting, the self as unworthy and that others cannot be trusted or relied upon to meet needs. Consequently, it was theorised that negative interactions and relationship with the primary caregiver would lead to future negative interactions and relationships with others. Bowlby (1973) concluded that there is an innate human drive for safety, security and the regulation of emotional needs, alongside the basic, primary human needs.

Depending on the quality of these early interactions, an infant may form secure or insecure attachment. Ainsworth and Bell (1970) developed the idea of three main attachment styles: secure, insecure avoidant (where the child does not seek contact when stressed) and insecure ambivalent/resistant (where the child seeks contact more frequently, while simultaneously not being able to regulate stress effectively through contact with the caregiver). This attachment history may then produce a pattern of behaviour that is replicated in future interactions and relationships with others (Bomber, 2007). Archer and Gorden (2006) believe that when a child has attachment difficulties, their thinking may be distorted and their model of the world may be that it is unsafe and unpredictable, thus linking to the cognitive aspect of Geist's (2011) framework.

When considering how attachment theory may link with Human-Animal Interactions, authors such as Melson (2001) and Levinson (1984) argue that animals act as an attachment object, through which children can learn to re-organise their thoughts and begin to feel safe and secure in the animal's presence. Results from Triebenbacher's (1998) study appears to support this hypothesis. Interviews with 174 children aged between four and 11 suggested that attachment-like behaviours were displayed by the children towards their pets. The themes indicated that the children viewed their pets as a source of emotional support and social interaction. Triebenbacher (1998) concluded that dogs may be seen as being safe, nurturing attachment figures who support the child in creating positive Internal Working Models towards themselves and others. Linking back to Bowlby's earlier work, the children described engaging in attachment-like behaviours such as proximity seeking and thinking about their pet when they were away from it. These are similar behaviours that Bowlby described infants engaging in with their primary caregiver (Bowlby, 1958).

As discussed previously, Levinson (1970) proposed that children may view dogs as 'transitional objects' and theorised that, in the same ways infants seek to decrease anxiety through proximity to their caregivers, children seek proximity with dogs for similar outcomes. Levinson (1970) believed that dogs were unique in that they appear to be non-judgemental and children's interactions with them are non-verbal.

A cognitive perspective of behaviour argues that the way in which individuals think influences feelings (Faupel, Herrick & Sharp, 2011). Individuals develop "distorted" thinking linked to the experience of negative emotions (Beck & Clark, 1988). In Geist's (2011) framework, cognitive theories are used to explain the behaviour of children and young people whose behaviour is challenging. For example, by suggesting a pupil's cognitions may develop as follows: "I'm a bad person, so my behaviour is 'bad' and society will treat me as a 'bad' person." Positive interactions with animals may help to shift this negative perspective (Messent, 1983; Siegel, 1999).

When considering cognitive, physiological and attachment theories as a whole, Geist (2011) argues that an intervention involving an animal can help to break

these cycles of behaviour and support children and young people in reframing their behaviour more positively. The physiological effects of animals may help children and young people to feel calm, thus giving them space to begin to learn to regulate their emotions and reflect on their behaviour. Through interaction, children view animals such as dogs as showing unconditional positive regard through listening, providing physical comfort and attunement through their non-verbal communication (Siegel, 1999; Friedmann et al., 2000). Results from Kurdek's (2009) study tentatively suggest that dogs may serve as an attachment figure that owners see as alleviating their stress. This hypothesis is supported by Stuart-Russell (1997), who views a child's attachment to an animal as a transitional object that makes stress manageable. Further support for this theory comes from Strand (2004) who suggests that pets may act as an 'emotional buffer' for children coping with a stressful environment.

One study which appears to encompass Geist's (2011) model is Anderson and Olson's (2006) study which examined the behaviour of six children with 'severe emotional disorders' in the presence of a dog in their classroom. Qualitative analysis of observed behaviour indicated that the children's improved emotional stability may be attributed to the dog's presence. The researchers speculated that the decrease in challenging behaviour observed for all six children may be as a result of the 'companionship' they developed with the dog. The researchers also noted that when the children were beginning to feel that their behaviour was escalating, they exhibited a level of self-control and sought out the dog to calm themselves down. Interviews with the children afterwards revealed that when they did display challenging behaviour, they felt that they ought to have petted the dog, as they recognised it as a tool for keeping calm. In relation to Geist's (2011) model, it seems that the attachment the children formed with the dog enabled them to stabilise their emotions and begin to develop emotional regulation. With regard to cognitive theories, the children expressed empathy for the dog's feelings and began to see the dog's behaviour in parallel to their own. Therefore they began to see themselves and their behaviour differently, leading to a change in their observable behaviour. Finally, in terms of the physiological component to Geist's (2011) model, the children verbalised that

petting the dog helped them to feel calm. This relates to the research found in Beetz et al.'s (2012) review.

This literature review will now turn to the current evidence base for the use of animals in different situations.

2.3.2 Evidence base for AAIs

There is a broad spectrum of literature regarding the use of AAI and several reviews (both qualitative and quantitative) have been conducted.

Dashnaw-Stiles (2001) asserts that all studies investigating AAI indicate positive outcomes. Other reviews also suggest benefits of AAI. For example, Nimer and Lundahl (2007) conducted a meta-analysis of AAT. They examined 49 studies, which looked at a range of needs (categorised as medical, mental health and behavioural difficulties) across the age range (from childhood to later life). The results found moderate effect sizes across four main areas. The first area indicated that AAT facilitates social skills in children with Autism Spectrum Condition (ASC), notably encouraging positive interactions with others and increases in communication. The second area noted gains in medical outcomes, including reduction in stress levels. This supports the findings of Beetz et al.'s (2012) review regarding the physiological effects of AAT on levels of cortisol and stress. The third and fourth areas included studies which investigated behavioural difficulties (such as aggression) and emotional well-being (such as anxiety or depression). However, the authors suggested that the effect sizes must be interpreted with caution, as there were few studies in each category and that AAT might therefore be used as an additive to established evidence-based interventions.

In terms of the impact of the different types of animals used in the AAI, analysis revealed that dogs yielded moderately high effect sizes. The authors noted that other animals did not produce such effect sizes, and that, notably, the confidence intervals for equine or aquatic animals were near or at zero. This finding appeared across outcomes (either medical, behavioural or mental health). Therefore, animal type appears to have an influence on the impact of AAI.

Findings from Maujean, Pepping & Kendall (2014) suggest that AAIs promote gains in psychosocial outcomes in a breadth of individuals, including children with autism and adults with psychological disorders, including schizophrenia. In addition to this, O'Connor (2014) presented findings which indicated that on balance, AAI provides positive contributions to the treatment of abused and/or neglected children. Moreover, AAI outcomes specific to children with ASC was investigated by O'Haire (2014), who found that there were improvements across several areas, including increased social interaction and communication and decreases in stress. Furthermore, Kamioka et al. (2014) completed a systematic review involving several randomised controlled trials (RCTs) and found that AAI appeared to have benefits for several groups of people, including those with life-limiting illnesses and serious psychiatric disorders. However, the authors offered a cautionary note stating that, "the RCTs conducted have been of relatively low quality" (p. 386) suggesting methodological weaknesses and limitations to the evidence on the impact of AAI.

2.4 Research Regarding the Impact of Animal-Assisted Interventions with Children

Very few systematic reviews investigating the effects of Animal-Assisted Interventions with children and adolescents could be found in the literature. Of those identified, Davis et al. (2015) examined the effectiveness of AAIs with children with ASC. The review looked at 20 studies and results suggested that the focus of the majority addressed 'ASC symptoms', which the authors described as encompassing behaviours such as social skills (sharing, interactions with others) and stereotypical behaviours, such as hand flapping. However, the authors were unable to draw any strong conclusions from the review, due to the mixed results shown by the included studies. The authors explained this by suggesting that AAI had worked for some individuals, but not all. Indeed, this finding relates to Melson and Fine's (2015) assertion that the results of AAI are dependent upon the individual having a positive predisposition toward animals.

A further systematic review centred on the effects of AAT with children and adolescents including those with mental health difficulties (Hoagwood, Acri, Morrissey, & Peth-Pierce, 2017). The review found that the studies involving

equine therapies with children with ASC (five studies) and canine therapies for children with trauma (three studies) gave the most positive effects. However, strong conclusions cannot be drawn from these findings as they were taken from only a small number of studies.

Studies reviewed by Davis et al. (2015) and Hoagwood et al. (2017) indicate that AAI and AAT are used in a range of settings, to treat a range of outcomes and with a variety of animals. The next section of this literature review will explore how animals are used in classrooms. It will also look at the outcomes measured in the research and where there may be gaps for future research.

2.4.1 Animals in educational settings

AAIs with children, and in particular those using dogs, are becoming increasingly popular in schools and other educational settings (Stroud, 2012; Richardson, 2014). Despite this, researchers within the field note that there has been a lack of scientific examination of the impact of using animals in the classroom upon children's learning and behaviour for learning (Gee, Fine & Schuck, 2015). Some researchers have proposed that animals may serve as a motivator for learning (Endenburg & van Lith, 2011).

Gee et al. (2007; 2010) conducted a series of experiments exploring the impact of the presence of a dog upon infants' learning skills. In one study, a group of 14 four to six year old children completed a series of tasks requiring gross motor skills (such as walking a balance beam or throwing a bean bag) either in the presence of, or without, a dog (Gee, Harris & Johnson, 2007). For each task, the children were timed and rated for accuracy, using a rating scale designed by their teacher and an occupational therapist. The results suggested that the children performed the tasks significantly more quickly when the dog was present. In terms of accuracy, there was no main effect when the dog was present. The researchers concluded that the dog may have served as a motivating factor for the children to perform the tasks more quickly (typically the dog was performing the same tasks alongside them). The authors suggest the sample size was too small to detect changes in accuracy, and/or that the ratings scale was not sensitive enough. However, the authors observe that the children saw the tasks as a 'race' against the dog. Therefore, the non-effect of accuracy

may have been due to the children concentrating more on 'beating' the dog: they were distracted away from concentrating on accuracy.

In another study, findings indicate that infants require fewer instructional prompts to complete a simple memory task in the presence of a dog (Gee, Crist & Carr, 2010). A small group of three to five year old children were asked to perform an object recognition task in the presence of either a dog, a stuffed dog or a human. The researchers highlight that the children typically touched the objects in the presence of the dog when they were showing him/her the objects, perhaps leading to the possibility that they were more focused in the presence of the dog. The researchers chose a memory-based task that would be achievable for all participants, so that the level of difficulty would not impede their adherence to the task. The study was replicated a few years later with more distracters (between one and four) added to the object recognition task. The results indicated that there was still a significant effect of the dog's presence upon object recognition.

Contrary to this, there is also evidence to suggest that the presence of animals does not always lead to academic effects. For example, O'Haire, McKenzie, McCune & Slaughter (2013) explored the use of AAA with guinea pigs in a primary school classroom. Parents and teachers rated children's social skills and problem behaviours across eight weeks, with 64 children in the experimental group and 64 children in the control group. The teachers also rated academic competence. The children were given responsibility to look after the guinea pigs (such as cleaning the hutch or grooming them), under the guidance of the programme facilitator. Results indicated that the experimental group showed significant gains in their social skills and significant decreases in their problem behaviour, as rated by their parents and teachers. However, these behavioural changes did not seem to translate into any academic gains, as the differences between the two groups were found to be non-significant. Differences in behaviour could be explained by Geist's (2011) model in that the children had time to bond with the guinea pigs and therefore develop empathy, which in turn translated into changes in observable behaviour.

Beetz (2013) aimed to examine the effect of the presence of a dog in the classroom for one day a week for a school year on social-emotional behaviours of pupils. An experimental class of 25 children was compared to a control class of 21 children, aged eight to nine years old. The study looked at three outcomes (depressive mood, attitudes towards school and anger, sadness and anxiety) using self-report measures and assessments were conducted at pre-test and post-test. The results indicated that there was no significant change in mood. However, further analyses revealed statistically significant differences in the change of emotional and social experiences in school between groups. The experimental group experienced a positive change concerning attitude towards school and attitudes related to learning. However, when investigating within-group statistics for positive emotions related to learning, no significant changes were found. These findings suggest that AAA may influence pupils' attitude to school and learning, but it is not known whether these improved attitudes translate into increased motivation for learning in the classroom.

A further way in which AAIs have been used in schools is through reading to dogs. Hall, Gee and Mills (2016) conducted a systematic review of the literature surrounding the academic impact on learning that reading to dogs may have. The search included grey literature and focused on dependent variables related to reading achievement, such as reading speed and comprehension. A total of 48 studies were reviewed.

The analysis indicated that the majority of the studies (27) were of low-quality, meaning that they were non-empirical studies. They contained "expert opinions" from teachers and dog handlers citing general improvements in the children's reading, but did not include the numbers from standardised measures to objectively uphold these opinions. A general criticism of the included studies was that the conclusions were inferred from small sample sizes and did not control for baseline scores. This means that the results of the included studies may be unreliable. Despite this, the reviewing authors concluded that reading to a dog has the potential to improve children's reading abilities, based upon the physiological benefits that interacting with a dog can bring.

The research reviewed indicates that the presence of an animal could lead to an improved educational environment for the pupils involved. However, the studies considered were typically quantitative and relied on relatively small samples of children. Therefore, the subtleties of what works in AAI/AAA, and for whom, may have been lost within previous studies.

2.5 The Present Research

These studies have indicated that the presence of an animal, and in particular a dog, may have an effect upon children's behaviour. Friesen (2010) explains that this may be because children seem to accept therapy dogs as non-judgemental participants who are independent of the complexities and expectations that human relationships can bring. Therefore, the present research aims to explore the effects dogs may have upon children's observable classroom behaviour. Consequently, a systematic review will dig deeper and allow for further insight into the potential effects of dogs in schools and, in particular, its impact upon children's behaviour.

2.6 Systematic Review of the Literature Regarding the Impact of Dogs in Schools Upon Children's Behaviour

An accurate knowledge of the effectiveness of using dogs to facilitate Animal-Assisted Activities in schools is essential in order to establish good practice and make a positive impact upon pupil behaviour. A systematic review was therefore conducted to examine what existing research indicates regarding children's interaction with a therapy dog in school. To date, no review has exclusively focused on the effects of interacting with a dog on the behaviour of children in school. The review therefore seeks to identify what outcomes may be revealed within published research about canine-assisted interventions in schools and children's behaviour.

Therefore, this literature review will now turn to a detailed examination of the existing published research, using a systematic review process. The purpose of conducting a systematic review is to locate, appraise and synthesise the available evidence in relation to a specific research question (Dickson, Cherry & Boland, 2014). In order to ensure that the systematic process was rigorous and objective, a sequence of steps were completed and documented. This process employed was influenced by Dickson, Boland and Cherry's (2014) structure.

This structure begins with identifying the review question. In this case, the review question was borne from the literature review. The next stage involves searching the literature and screening titles and abstracts, before obtaining full-text papers of studies relevant to the review question. The inclusion criteria is then applied to the full-text papers. Papers which meet the criteria are then assessed using a quality assessment tool. Data from the papers is extracted, analysed and synthesised. The findings and conclusions drawn from the systematic review will then be used inform the research question for the present study.

2.6.1 Approach to the systematic literature review

So far two clear themes have been explored in this literature review: classroom behaviour and Animal-Assisted Interventions with children, in particular those using dogs. Therefore, the search was conducted using broad terms across five major databases (see Section 2.6.3 – Research Identification). The following terms were used: children and/or adolescents, canines or dogs, animal-assisted or pet therapy. A full list of the search terms used and the numerical results may be found in Appendix 1. A decision was made not to use the search term 'school' in the first instance, as it was felt to be important to explore the full range of literature available on these topics before narrowing it down through further searches. In summary, the broad search aimed to answer the following review question: What is the impact of interacting with a dog in school? The objective of this question was to identify the evidence base for this area, in order to guide the aims and approach of the present study. The following inclusion criteria were applied in order to identify the most appropriate studies to answer the question (see Table 2.1 below).

2.6.2 Inclusion criteria

After duplicates were removed, all titles and abstracts were screened to ensure that the article focused upon AAIs in schools and with children or adolescents. Any articles which did not fit this initial criteria were removed. Examples of texts which were removed at this stage were studies involving animals other than dogs (e.g., Holmes, 2012), studies about dogs' behaviour (e.g., Arai, 2011; Lau, 2016), studies in settings other than schools (e.g., Barker, 2015) or studies involving adults (e.g., Black, 2011).

Next, full-text papers of relevant titles and abstracts were obtained. Each study's relevance was then checked against the inclusion criteria (Table 2.1). Appendix 2 gives the bibliographic details of excluded studies and the reasons for their exclusion.

Study design	Quantitative studies only
Sample population	Must be children and/or adolescents only
Intervention	Involves: EITHER AAI using dogs, OR PFT using dogs, OR Pets As Therapy dogs Furthermore, the interaction with a dog must have taken place on a minimum of three occasions
Comparators	The stated intervention to be compared with each other or to no intervention.
Outcomes	Impact on behaviour, either observable or rated by teacher or researcher
Setting	Within a school setting
Published	Published within a peer-reviewed journal and a full-text to be accessible, in English, to the researcher

Table 2. 1 Inclusion criteria for the systematic review regarding the impact of interacting with dogs in schools on children's behaviour.

These inclusion criteria were used to ensure that that the review fulfilled its aim of exploring the effect of interacting with a dog on behaviour in school. One area of particular interest was the methodologies used to explore the effects of canine-assisted activities adopted by the research reviewed. Therefore, a requirement of specific research design type was not used as one of the inclusion criteria.

2.6.3 Research identification

Once search terms and the inclusion criteria had been defined, five databases were searched in May 2017 through the University of Nottingham's NUSEARCH facility including the Web of Science, PSYCHINFO, ASSIA, ERIC and PUBMED. These databases were chosen due to their access to a large range of journals published within the realms of social science.

Initial electronic searches identified 918 citations and after duplicates were removed, 466 unique citations remained to be screened for inclusion. The titles and abstracts of these 466 citations were assessed for relevance to this review (Stage 1 screening). This resulted in 54 citations being retained and the full texts of these were obtained. Inclusion criteria were then applied to these full-text papers (Stage 2 selection) and 44 citations were excluded for reasons outlined in Appendix 2. This left 10 citations to be included in the systematic review.

2.6.4 Results

Data from each study was extracted using the form found in Appendix 3 and is summarised in Appendix 4. Having examined the results in each study, four main outcome themes were identified: social outcomes, empathy, aggression and attitudes toward school and on-task behaviour. In order to avoid repetition, results pertinent to these themes have been discussed within the synthesis presented in Section 2.6.6. A general overview of each study will be presented first. Definitions of the acronyms in this section may be found in the list of abbreviations and acronyms.

2.6.4.1 Study 1

Bassette and Taber-Doughty (2013) used a single-case experimental design (SCED) with three children: one seven year old girl and two 11 year old boys. All three had the same reading level and had a primary diagnosis of Emotional Behavioural Disorder (EBD). The intervention involved the children individually reading to a dog for half an hour every day for four weeks.

The study investigated the impact of reading aloud to a dog upon on-task reading behaviour measured using the Behavioural Observation of Students in Schools (BOSS; Shapiro, 1996) and recorded the behaviours as either on-task reading the book aloud or off-task behaviour (for example if the student looked

away from the book for more than three seconds of the ten second interval or if they were flicking through the pages). The intervals recorded as 'on-task reading behaviour' were calculated into percentages and shown as line graphs. Measures were taken each day for two weeks preceding the intervention, throughout the intervention (which ran for 30 minutes a day, five times a week for four weeks) and for two days a month after the intervention had completed. A second observer also rated the children's behaviour. Inter-observer agreement ranged from 83% to 100%, although it is not clear if the second observer was blind to the aims of the study, meaning that the results may have been affected by observer bias. The results indicated that the students were more engaged (as measured by the increases for all three students in demonstrating on-task behaviour by reading aloud) and motivation increased for reading (as demonstrated by interviews held with the participants and their teachers).

2.6.4.2 Study 2

Esteves and Stokes (2008) conducted a SCED with three children with intellectual developmental disabilities aged between five and nine. The study used repeated observational measures to assess the effects of the presence of a dog on the positive and negative and verbal and non-verbal initiations and responses of the children toward their teacher in a one to one situation. Prior to the introduction of the dog, baseline measures were taken for at least six sessions (each lasting eight minutes) with a toy dog. Experimental sessions then took place every day for four weeks. These sessions were coded by an observer, blind to the study's aims, 30 minutes after the child had returned to their usual classroom. Results indicated that the percentage of time spent positively initiating interactions with their teacher increased for all three children.

Sustainability of the changes observed was measured by way of a qualitative questionnaires completed by a (different) teacher taken 30 minutes after the child's return to class following each intervention session. The results revealed positive increases here too. A qualitative questionnaire was also used to ask the teacher about the social value of the effects following completion of the research, but for unknown reasons, the results of the questionnaire were not presented within this study.

2.6.4.3 Study 3

Fung and Leung (2014) aimed to explore the impact of using a structured Animal-Assisted Pet Therapy programme upon the social behaviour of children with Autism Spectrum Condition (ASC). Five children, aged seven to ten years old, in the experimental group were compared to five age-matched pairs. The treatment consisted of 14 20-minute sessions delivered by a trained animal therapist, employing either a dog (in the treatment condition), or a baby doll (in the control condition). The sessions were split into four sessions, with the participants interacting with the dog/doll in the first phase, developing into a triadic interaction between the child, dog/doll and therapist in phase two. This then led into the child interacting with the therapist in the presence of the dog/doll in the third phase, before gradually fading out the dog/doll in the final phase.

The participants' behaviour was recorded and coded by two independent raters, who were blind to the aims of the study. The results were statistically analysed and the researchers indicated that there was a small, but significant, increase in verbal social behaviour for the intervention group. The control group's verbal social behaviour did not show a significant increase. Therefore the authors conclude that the dog may act as a 'speech-elicitor' for children with ASC. However, closer inspection of the participants' attributes reveals differences between the participants' language delays. The experimental group was made up of two children with a 'mild delay' and three children with a 'moderate delay' in their verbal ability. In the control group, two children had a 'mild delay', two children had a 'moderate delay' and the fifth child had a 'severe delay' in their verbal ability. Therefore it could be that the significant increase in verbal social behaviour observed in the experimental group was perhaps due to the higher starting levels of verbal ability at the beginning of the study. This point is not discussed by the researchers.

2.6.4.4 Study 4

Hergovich, Monshi, Semmler and Zieglmayer (2002) looked at the effects of the presence of a dog in the classroom on field independence (the ability to act independently of a given context), social intelligence, empathy with animals, sociability, social integration and aggressive behaviour.

The methodology used an experimental group (n = 24, Mean age = 6.7 years) compared to a control group with no dog (n = 22, Mean age = 6.5 years). The dog spent all day in the classroom with the children for three months. A baseline measure of intelligence (using Raven's Coloured Progressive Matrices test) was used to ensure there was no confounding variables between the groups and no significant difference in ability was found.

Field independence was measured using the GWT (Hergovich & Horndler, 1994) and the experimental group found to have significantly higher results post-test. Social intelligence was measured using the sub-test "Fotoalbum" (WET, Kastner-Koller & Deimann, 1998). Empathy with animals was measured using a self-assessed questionnaire (Empathy With Animals; Killian, 1994). The three measures relating to social outcomes were measured using three questions that appear to have been devised independently by the researchers.

2.6.4.5 Study 5

In a follow-up to Hergovich et al.'s (2002) study and using the same participants, Kotrschal and Ortbauer (2003) investigated the short-term effects the presence of a dog had on the behaviour of a class. This study used a single group pre-test/post-test design. In the month leading up to the introduction of the dog, the children were video-taped three times a week for an hour and their behaviour was coded. Following a baseline period, a dog was introduced and present in the classroom all day, every day for a month. Data regarding the children's behaviour was collected in the same way as the control period. The main outcomes focused on social behaviour and the researchers concluded that the presence of the dog had caused the children's behaviour to become more homogeneous and significantly less aggressive compared to the control period. There were no follow-up measures.

A criticism of this study is that the observers were not blind to the aims of this study, thus potentially affecting the reliability of the conclusions drawn. Furthermore, the study does not state whether inter-rater reliability measures were taken, thus weakening the robustness of this study.

2.6.4.6 Study 6

Limond, Bradshaw and Cormack (1997) aimed to further explore the effects interaction with a dog may have upon the behaviour of eight children with Down

Syndrome. Using a within-subjects repeated measures design, the children individually interacted with a dog for seven minutes, for six consecutive weeks. This condition either preceded or followed seven minutes of the children interacting with a toy dog (the conditions were alternated each week).

Their behaviour was video recorded, and then coded into three groups (looking, responding to the handler and initiations) and statistically analysed. The results indicated that the children spent significantly longer looking at the real dog compared to the toy dog. The children responded non-verbally to the adult significantly more frequently in the presence of a real dog; however, verbal responses were similar across the two conditions. With regards to initiation, there were significantly more verbal initiations to the real dog compared to the toy dog, and more verbal initiations were made to the handler about the real dog compared to the toy dog. The authors highlighted that these results may be due to the animatedness of the real dog, which captured the children's focus. However, this study used a small sample size and does not report whether an independent rater was used to code the behaviour, meaning that the reliability of the results may have been affected.

2.6.4.7 Study 7

A study investigating the behavioural and verbal interactions of children with Pervasive Developmental Disorders (PDD) was conducted by Martin and Farnum (2002). Ten children, aged between three and 13 years old participated, with a developmental age range of 2.5 years to 6.5 years. The study employed a within-participants repeated measures design to examine the impact of 45 therapy sessions across 15 weeks. In each session, the children individually interacted with the therapist and either a dog, ball or stuffed dog. The children participated in all three conditions (dog, ball or stuffed dog). The therapist's interactions with the children were based upon the categories of the Psycho-Educational Profile Revised (PEP-R) and the children's interactions were observed and coded.

Analysis of the coded behaviours indicated that the children were more likely to hand flap and for longer and to laugh more in the presence of the dog. The children were also more likely to spend time looking at the dog and for longer, compared to the ball or the stuffed toy.

In terms of verbal behaviour, the results indicated that the children were more likely to talk to the dog (than to the ball/toy) and to comply with the therapist's request in the dog's presence. Furthermore, the children were also less likely to ignore the therapist in the presence of the dog, although they appeared to give less detailed answers to the therapist when talking to her compared with the toy/ball.

The researchers concluded that the results suggest tentative support to the idea that there are some benefits of interacting with dogs for children with PDD. It seems that the dog's presence initiated more 'on-task' related verbal initiations from the children to the therapist. In addition, the children were more likely to give relevant answers to the therapist's questions when the dog was present. However, due to its small sample size, it is difficult to draw any firm conclusions from the findings of this study. Furthermore, as there were no measures of generalisability or sustainability of the behaviours, it is difficult to tell whether these positive interactions persisted outside of the therapy sessions.

2.6.4.8 Study 8

Redefer and Goodman (1989) introduced 12 autistic children aged between five and ten years old to pet-facilitated therapy, with the aim of increasing social behaviour. The study employed a within-subjects design and used repeated observational measures to examine changes in the children's behaviour.

The study took part across four phases: baseline (three sessions), treatment (18 sessions), post-treatment (3 sessions) and follow-up (the number of sessions was not reported) a month after the study had finished. Each session lasted between 15 and 20 minutes long. It was not reported how many sessions per week the children completed. The children's social behaviour and 'isolation behaviour' was recorded and coded. The first author was also the therapist and designed the intervention. The first six treatment sessions consisted of the therapist modelling and encouraging the children to approach the dog. In the next six sessions, the children were encouraged and supported in making contact with the dog and in the final six sessions, the therapist facilitated games with the child and the dog, with a focus on turn-taking.

The results indicate that as soon as the dog was introduced, there was a sharp and significant increase in social behaviour and a decrease in isolation. This immediate effect was sustained over the course of the intervention. The post-treatment and follow-up results however indicate that the social behaviours decreased without the presence of the dog, but were still above baseline levels.

The study admits bias in utilising the first author as researcher, therapist and coder. The study also recognises that it is only a short course of therapy and that it did not explore generalisation of the pro-social behaviours outside of the intervention sessions.

2.6.4.9 Study 9

Sprinkle (2008) examined whether employing a rescue dog could increase empathy and decrease violent and aggressive beliefs and behaviours in children. This study used the Healing Species programme (www.healingspecies.com) in order to achieve these aims.

Participants included 310 students from 4th grade to 6th grade (mean age not reported) in a single group pre-test post-test experimental design. The impact of the rescue dog on the empathy and violent/aggressive behaviour of children was investigated. Empathy was measured through the use of the self-assessed IECA (Bryant, 1982). The students also reported their own perceptions of their own violent and aggressive beliefs and behaviours using the NOBAGS (Huesmann & Guerra, 1997; Huesmann, Guerra, Miller, & Zelli, 1989). This tool consists of two sub-scales: Retaliation Aggression and Open Aggression and one composite scale called Total Aggression. These measures were taken one week prior to the beginning of the programme and one week after the completion of Healing Species. Teachers assessed their pupil's behaviour prior to, and after, the programme using the ABTC (Dodge & Coie, 1987). The validity of these measures was not commented upon, but all three were reported to be reliable.

Violent behaviour was measured through the number of suspensions for physical fights in the month proceeding compared to the month after completion of the programme. These decreased from 13 to six although this change was not tested for significance.

Sprinkle (2008) concluded that the programme taught the children a means of responding to confrontational situations. The results also revealed that females, younger children, from a white background and from higher SES backgrounds gained the most from the programme.

2.6.4.10 Study 10

Tissen, Hergovich and Spiel (2007) compared three methods of promoting children's social-emotional aptitudes. Groups were randomised to one of the following conditions: social training in the presence of a dog (n = 79, mean age = 8.2 years), social training without a dog (n = 75, mean age = 8.2 years) and the presence of a dog with no social training (n = 76, mean age = 8.3 years). The social training programme (Petermann, Jugert, Rehder, Tänzer & Verbeek, 1999) was administered by the class teacher. The programme consists of one 90 minute session a week for ten weeks. The group who experienced the presence of the dog without the social training had the dog in their class for the same length of time.

Social behaviour was measured through teacher assessment using the complete scale "Social behaviour" from the BFL (Janowski, Fittkau & Rauer, 1981). The pupils assessed their own levels of empathy using the "Empathy" scale from the adapted German version IVE (Stadler, Janke and Schmeck, 2004) of the EIQ (Eysenck & Eysenck, 1980). Neither validity nor reliability of these measures was reported in this study. Measures were taken just before the start of the experiment, immediately after the completion of the ten week programme and lastly three weeks after the programme had ended, in order to investigate sustainability of the results.

The authors concluded that all three interventions had positive effects on empathy and social behaviour, but that there was a clear advantage of using a dog. However, it is not indicated whether the authors had any financial affiliation to and investment in the social training programme cited, which may have impacted upon their interpretation of the findings.

2.6.5 Quality assessment

A rating system taken from Thomas (2003), called “Quality Assessment Tool for Quantative Studies” was used to assess the quality for each of the ten included studies. This tool uses a series of questions to establish the quality across six aspects of a study. The judgements from the six criteria are then used to inform an overall “global” rating.

The six criteria and what they entail are:

- Selection bias (How representatitive of the target population are the participants?)
- Study design
- Confounders (Were there confounding variables between the groups prior to the intervention?)
- Blinding (Were the outcome assessors blinded to the intervention? Were the participants blinded to the research question?)
- Data collection (Were the data collection tools shown to be valid and reliable?)
- Withdrawals (What percentage of participants completed the study?)

First author	Selection bias	Study design	Confounders	Blinding	Data collection	Withdrawals	Global rating
Bassette (2013)	Weak	Mod	Strong	Weak	Strong	Strong	Weak
Esteves (2008)	Weak	Mod	Strong	Mod	Weak	Strong	Weak
Fung (2014)	Weak	Mod	Mod	Strong	Weak	Strong	Weak
Hergovich (2002)	Weak	Mod	Strong	Mod	Weak	Strong	Weak
Kotrschal (2003)	Weak	Mod	Strong	Weak	Weak	Strong	Weak
Limond (1997)	Weak	Mod	Strong	Mod	Weak	Strong	Weak
Martin (2002)	Weak	Mod	Weak	Mod	Weak	Strong	Weak
Redefer (1989)	Weak	Mod	Weak	Mod	Weak	Strong	Weak
Sprinkle (2008)	Mod	Mod	Strong	Weak	Mod	Strong	Mod
Tissen (2007)	Mod	Strong	Strong	Weak	Weak	Mod	Weak

Table 2. 2 A table summarising the quality assessment ratings for the studies included in the systematic review.

The tool is accompanied by a 'dictionary', which informs the reviewer whether to rate each criterion as weak, moderate ('mod') or strong. A narrative is provided following Table 2.2, which summarises the quality assessment ratings for each criterion and each study's global rating.

2.6.5.1 Selection bias

The review above highlights that none of the studies had a sufficient sample size in order to be judged as being fully representative of the target population. Those with relatively small sample sizes were therefore judged as 'weak' for selection bias. The two exceptions to this judgement were Sprinkle (2008) and Tissen et al. (2007), which employed moderate sample sizes and were therefore judged as having 'moderate' selection bias, according to the definition by Thomas (2003).

2.6.5.2 Study design

Details about each included study's design are described above in the results section of this systematic review. Of the 10 studies reviewed, only Tissen et al.'s (2007) employed randomisation to allocate participates to the treatment conditions and so its study design was rated as 'strong'. The other nine studies used designs allocated as 'moderate' according to the guidelines for this quality assessment tool. The designs rated as moderate come under four headings: two-group pre and post, one group pre and post and interrupted time series (where the participants have multiple observations over time).

2.6.5.3 Confounders

Thomas (2003) defines confounders as being variables associated with the intervention, which are causally related to the outcome measures. Examples of possible confounding variables are age, gender or pre-intervention score for an outcome measure. The quality assessment tools asks the reviewer to decide whether the included studies discussed confounding variables between groups. Seven of the studies indicated that there were no confounding variables between groups, or that the confounding variables were controlled for and therefore were rated as strong. For example, in Limond et al.'s study (1997), all of the children had Down Syndrome and were from classes of similar ability from a specialist provision.

Confounders was rated as 'moderate' in one study. Fung and Leung (2014) controlled for gender and intellectual disability, but they did not control for verbal ability. This is discussed above in the results section of this systematic review.

Three studies were rated as 'weak' because there were confounding variables. For example, in Martin and Farnum's (2002) study, all of the participants had PDD, yet they had a range of developmental ages (from 2.5 years to 6.5 years). Furthermore, the verbal abilities of the participants were not described, despite this being one of the outcome measures. Another 'weak' study for confounders was Redefer and Goodman (1989). Although all children had ASC, the study did not specify whether there was a confounding variable between participants for social interaction to begin with.

2.6.5.4 Blinding

The quality assessment tool rates studies as strong where the outcome assessor is unaware of the participants' intervention status and that the participants are unaware of the research question. Only one of the studies were considered to be strong by this definition (Fung and Leung, 2014). Blinding was considered to be "moderate" for five of the studies, according to the quality assessment tool, as it was not reported and so it was difficult to ascertain whether or not the outcome assessors and/or the participants were aware of the research question. Four studies were considered to be 'weak', as the outcome assessor was aware of the intervention status of the participants and the study participants were aware of the research question.

2.6.5.5 Data collection

A 'strong' rating for data collection denotes that the tools for measuring outcomes were demonstrated to be both valid and reliable. Only Bassette and Taber-Doughty's (2013) study met this criteria and was therefore deemed to be strong. One study was given a 'moderate' rating, as the data collection tools were said to be valid, but the reliability was not mentioned by the researchers (Sprinkle, 2008). Eight studies were judged to have weak data collection methods, as the validity nor reliability was not reported. This is likely to be due to fact that the majority of these studies used observational methods as the outcome measure, with codes created by the researchers.

2.6.5.6 Withdrawals

Nine of the ten included studies demonstrated a 'strong' rating for withdrawal, as more than 80% completed the intervention. Only Tissen et al.'s (2007) study was rated as 'moderate', as 66% of the participants completed the study.

2.6.5.7 Global rating

None of the studies were rated as 'strong', meaning that they would have had no weak ratings for any of the above six criteria. Sprinkle (2008) was rated as 'moderate' overall, as it only had one 'weak' rating (blinding). The other nine studies were rated as 'weak' overall, as they had two or more 'weak' ratings.

2.6.5.8 Inter-rater reliability

In an attempt to increase the objectivity of the quality assessment ratings, an independent reviewer cross-checked the ratings of the studies. This

independent reviewer was a fellow Trainee Educational Psychologist (TEP) who was given Thomas' (2003) questionnaire and the accompanying dictionary which objectively lays out the terms and conditions for each criterion. The findings from the independent reviewer matched the author's.

2.6.6 Synthesis: A summary of the findings of the review

2.6.6.1 Social outcomes

Eight studies investigated the effect of the presence of a dog on social behaviour. Esteves and Stokes (2008) examined social behaviour through observation. The discussion commented that each child produced an increased number of positive initiated interactions toward the teacher in the presence of the dog. Likewise, results from Limon et al.'s (1997) study indicate that there was a similar number of verbal and non-verbal initiations towards the adult between the two conditions of a real dog versus a stuffed dog. However, a very small sample size was used in both studies and so these results must be interpreted cautiously.

Fung and Leung (2014) further suggest that the children displayed a significant increase in social behaviour in the presence of a dog. The researchers also note that the experimental group experienced a significant increase in verbal social behaviour compared to the control group. However, closer inspection of the groups reveals a confounding variable that may have affected this result. In the experimental group, there were no children characterised as having a 'severe' language delay, whereas in the control group there was one participant with such a diagnosis. Furthermore, there were only five participants in each group which will have influenced the statistical power of this study.

Verbal social behaviour was also investigated in Martin and Farnum's (2002) study. Analysis of the results of the dog condition indicated that the children provided less detailed answers in response to the therapist's questions, and talked about the therapist and themselves less. However, the children did talk to the dog for longer. Redefer and Goodman (1989) also noted a significant increase in social behaviour following the introduction of the presence of a real dog. The authors reported that this increase was sustained over the course of the intervention. However, follow-up measures revealed that there was a decline in the level of social behaviour once the intervention had finished.

Kotrschal and Ortbauer (2003) also investigated social behaviour through observation. Analyses suggested that the children spent significantly less time alone and were in a group more often when the dog was present, compared to pre-test measures. Overall, the researchers interpreted these results as indicating that the group had become more socially integrated in the presence of the dog. However, again, a small sample size was used which limits the strength of the findings and any conclusions drawn.

In Tissen et al.'s (2007) study, analyses suggested a minor significant temporal effect for social behaviour, irrespective of the intervention. This is unsurprising for the two groups who received a social training programme. It is perhaps more surprising for the group who received no social training, but who had a dog in their classroom for the same amount of time as the others received in social training.

Hergovich et al. (2002) examined three categories of social behaviour: social intelligence, social integration and sociability. Analyses indicted that the presence of a dog condition had no significant effect on social intelligence. Social integration was measured by asking the class teachers the question, "How well is the child integrated into the class?" (p. 43). There is no report as to whether this measure is valid or reliable. It appears that this question was devised by the investigators and, despite this limitation, the study reported that there was a significant within-group increase of social integration for the experimental group, but not for the control group. This may be because the experimental group were less socially integrated when the pre-test measures were taken (1.96 for the experimental group compared to 1.7 for the control group). Each group scored 1.6 post-test. However, it could be argued that the dog's presence did have an effect on the social integration of the class. Conversely, differences in teacher were noted across groups and so the effect of this confounding variable cannot be discounted and may have influenced the results. Furthermore, an argument could be made that the spectrum of social integration cannot be solely measured via a single question.

Similarly, Hergovich et al. (2002) looked at sociability of the children by asking the teachers, "How well do you get along with the child in class?" (p. 43) Again,

this question was devised by the researchers and no mention is given to its validity or reliability. Despite this, significant differences were reported for both groups from pre-test to post-test and so the possibility of the effects being due to maturation cannot be ruled out.

2.6.6.2 Empathy

Three studies examined the effect of the presence of a dog on empathy. Hergovich et al. (2002) looked at the children's empathy towards animals. At post-intervention, there was a significant interaction for time and group, with the mean scores for the experimental group being higher than the control group's post-intervention. This suggests that the presence of a dog supported the development of the children's empathy with animals.

In addition, analyses from Sprinkle's (2008) study using a sample size of 296 suggested that children's levels of empathy significantly increased from a mean score of 10.6 to 19 pre-test to post-test. However, these measures were self-reported and so the reliability of these results may be threatened by a Hawthorne effect.

In Tissen et al.'s (2007) study, analyses revealed that all three programmes experienced a low, yet significant temporal effect for increases in empathy measured immediately after the intervention ended. However, it is important to note these effects were seemingly short term, as there was no significant effect reported when comparing time 1 (pre-test) and time 3 (follow-up after 3 weeks).

Empathy was reported as having significant increases across the three studies. However, these results must be interpreted with caution as in one study, the result here may have been due to maturation. Furthermore, only one study looked at sustainability of improvement in empathy following the intervention and found that the scores had decreased just three weeks after the intervention had completed. Therefore, more longitudinal research is needed to to see whether the impact on empathy is sustained over time.

2.6.6.3 Aggression

Four studies investigated the effect of the presence of a dog on aggression. Hergovich et al. (2002) asked the teachers of the experimental and control

groups, “Are there children who exhibit aggressive behaviour?” For the experimental group, the number of children rated as aggressive decreased from four to two post-intervention, following the introduction of a dog, who was in the classroom for the full school day, everyday for 12 weeks. Although there was a decrease in the experimental group ratings relative to control, the change was too small to reach statistical significance. Furthermore, the validity nor the reliability of this measure were mentioned, which limits the interpretation of this finding. The authors also do not explain how they defined “aggressive behaviour” for the teachers involved and therefore the measure may have been affected by subjectivity.

Sprinkle (2008) examined aggression in two ways using validated and reliable tools. The ABTC and NOBAGS scores indicated a significant decrease in aggression post-intervention. However, these results must be interpreted with caution, as it is not known if the children and the teachers were aware of the purpose of the study and so demand characteristics cannot be ruled out.

The results of Tissen et al. (2007) also found a significant effect of programme (Social training with dogs) on the reduction in open aggression of children. Furthermore, a significant effect for the same programme was found for relational aggression (defined as being the actual damage to social relationships or the threat of damage to social relationships). It is also noted that the group undergoing “Dog attendance without social training” experienced a non-significant decline in open and relational aggression. The “Social training without dogs” group actually experienced non-significant increase in open and relational aggression. Therefore it appears that the presence of the dog had an effect on the decrease in the children’s aggression levels.

Although aggression was found to have significantly decreased across these three studies, it was measured through pre-test and post-test questionnaires. Therefore there may have been a threat of testing to the internal validity of the results. If so, this may have caused the children to consider their own behaviour more deeply, or for the teachers to change their behaviour toward potentially aggressive pupils. Consequently, these results must be interpreted with care.

Analyses of the coded observations recorded in Kotrschal and Ortbauer (2003) revealed that the children displayed significantly less aggressive behaviour when the dog was present across all categories, defined by the researchers as mild, intermediate, strong or escalating. They also found that when the children displayed aggressive behaviour, the duration was shorter.

2.6.6.4 On-task behaviour

In terms of on-task behaviour, the results from Bassette and Taber-Doughty's (2013) study indicated that reading out loud to a dog may help children to focus more on task. It was commented that all three children made moderate to significant improvements in on-task behaviour when reading aloud to a dog, based on visual analysis.

With regard to attitude towards school, observations in Limond et al.'s (1997) study indicated that children with Down Syndrome were more responsive to the dog handler in the presence of a real dog (compared to a stuffed dog). The children were also more co-operative towards to the handler's requests in the presence of a real dog. Likewise, in Martin and Farnum's (2002) study, the children with PDD were more likely to comply with the therapist's requests in the presence of a real dog, compared to a stuffed dog or a ball. These results suggest potential for increased on-task behaviour in the classroom, but the generalisability of these indications were not explored in either of these studies.

2.6.6.4.1 Focus of attention

Kotrschal and Ortbauer (2003) found that the children paid more attention to the teacher in the presence of the dog. However, the children concentrated less on their individual work. Furthermore, girls were also in their assigned seat less often, which seems to suggest that less attention was being paid to their individual work. The children in Limond et al's (1997) study were also more attentive to the dog. A further similar effect was observed in Martin and Farnum's (2002) study, where children spent more time looking at the dog and looked more frequently, than at the stuffed dog or the ball. Although it is possible that the children were distracted by the novelty of the dog's presence and therefore the effects might have decreased over time.

This leads to the tentative suggestion that the presence of a dog enables children to have a more positive time in the classroom and to higher levels of engagement over all.

2.6.7 Conclusions from the systematic review of the literature exploring the relationship between canine-assisted activities and children's behaviour in school settings

It was surprising how little empirical evidence there was pertaining to the research question, despite the amount of anecdotal evidence published. Literature searches revealed other studies examining various outcomes of a dog's presence, but these tended to be conducted in a lab (such as Gee et al., 2010) or in an inpatient mental health setting (such as Prothmann et al., 2005) and so arguably lacked ecological validity. Nonetheless, the fact that the search strategy was broad in its implementation across several databases gives confidence that all relevant studies were identified and so conclusions from this review are founded on the available and pertinent evidence.

The review indicates that a dog's presence in an educational setting has favourable outcomes. With regard to social behaviour, increases were witnessed across all of the studies. This finding relates to results found in the research explored in the wider literature review that animals may act as social catalysts (Endenberg & van Lith, 2011).

All studies assessing the impact upon empathy found significant increases. Furthermore, positive outcomes were reported across studies regarding decreases in aggressive beliefs and behaviours. Finally, the review revealed that a dog's presence seem to enable higher levels of on-task behaviour. These findings are in line with previous research published on the subject on AAI, as dicussed in Section 2.4 of the lit review, although this review specifically investigated the effect of dogs.

However, the overall quality of the sample sizes of the included studies was poor. Therefore the generalisability of their findings is limited and replications are needed with larger samples before any strong conclusions can be made. In addition, only one of the studies (Bassette & Taber-Doughty, 2013) investigated the generalisability of the children's behaviour when they returned to the classroom without the dog. This indicates a potential gap in the research.

One potential threat to validity of the studies reviewed is the effect of the classroom teacher. It would be almost impossible to control for the confounding variable that the teacher's style brings to their classroom. Another threat to validity was that some of the effects reported may have been due to maturation. However, a notable strength of the studies reviewed is their high ecological validity, as all were conducted in "real-life" educational settings.

This review has several notable strengths. Firstly, the search strategy attempted to be rigorous. A further strength was that the quality of the included studies was robustly assessed and cross-checked by an independent reviewer. This review also has limitations. For example, the inclusion criteria were narrow with regard to the way in which data was collected, with a focus on behaviour observed by either the researcher or the teacher (or both in the case of Hergovich et al., 2002). Therefore, this review could be repeated and widened with the inclusion of child self-report data and parent-report data.

The included studies also lacked homogeneity in terms of how much time the children spent with the dog, how the dog was used and the outcomes measured. Therefore it was difficult to compare outcomes across the studies with any degree of confidence using the data available. Consequently, the review highlights that current evidence for the presence of a dog in educational settings is equivocal, as too little high-quality published evidence exists currently.

The review also indicates that future research should ensure that valid and reliable data collection measures are used and that the teachers are blind to the aims of the study, so that their behaviour toward the children does not act as a confounding variable. Despite this, the effects of interacting with a dog appear to be positive and therefore future research should aim to examine in more detail the influence that a dog has on children's behaviour in school.

2.7 The Present Research

2.7.1 Research rationale

Many opinion pieces and anecdotal reports have been published regarding the use of animals in schools, but there is little robust research within the field (Palley, O'Rourke & Niemi, 2010). Indeed, it appears from media reports that

the use of dogs in schools is increasing (Dennison, 2015; Pidd, 2017). This is despite a lack of firm research within the field.

In addition, the systematic review identified a potential gap in the research as to whether or not the effects of interacting with a dog on children's behaviour was maintained and generalised after the interaction with the dog ceased. A gap has also been identified by Gee, Fine and Schuck (2015) who indicated that the current published research focuses upon "the emotional and adaptive behavioural benefits that animals provide rather than addressing how the interaction with the animal might impact the readiness for cognitive activities." (p. 198).

The research reviewed also investigated a range of canine-assisted activities, from reading to a dog to the dog being in the classroom to a therapeutic programme of activities designed by the researchers carrying out the study. This makes it difficult to pick out what activity might work for the child returning to the classroom. Therefore the activity in the present research will be expanded and generalised to include "interacting with and reading to a dog".

The present study therefore seeks to generate evidence in the area of AAI in schools and expand understanding of this area. More specifically, it aims to gain a better understanding of what impact interacting with, and reading to, a dog might have upon children's behaviour in the classroom. Previous research has looked at on-task behaviour while reading to a dog (Bassette & Taber-Doughty, 2013) and so this study seeks to extend this to see what impact it has on children's classroom behaviour. This study also aims to add to previous research by examining in more detail the impact of reading to a dog upon the classroom behaviour of children in a mainstream school reported to be a concern to their teacher. It will aim to focus upon changes in indvidual's behaviour, as opposed to averages of group behaviour from a small sample size, as is the case in the majority of the reviewed literature.

2.7.2 Research aims

The purpose of this research is:

- To add to the knowledge base when considering interventions for children's classroom behaviour

- To explore the potential impact that interaction with a dog may have upon children's behaviour in the classroom

Therefore, this study proposes to answer the following question: what effects does interacting with, and reading to, a dog have on individual children's behaviour in the classroom?

Chapter 3: Methodology

3.1 Introduction

This chapter begins with a consideration of the concept of Real World research, before moving onto the theoretical position taken within this study. Methodological considerations are then outlined and the rationale behind the chosen methodology is given. Following this, threats to validity and reliability have been highlighted, alongside explanations as to how this study attempted to overcome them. Finally, the chapter ends with a summary of the ethical considerations within this study.

3.2 Real World Research

As an applied researcher, the notion of 'real world research' (Robson, 1993) is perhaps as important an influence on this research as the philosophy of science. The present study was carried out within a usual school setting. Reading is a core aspect of the National Curriculum (2013), which emphasises "reading widely and often" and practising reading aloud. The present research was in a natural school setting with a dog handler delivering the intervention. The setting was naturalistic rather than being conducted in a laboratory and carried out under realistic, rather than optimum, conditions (Robson & McCartan, 2016).

3.3 Theoretical Paradigms and Philosophical Assumptions

Hanson, Creswell, Plano Clark, Petska & Creswell (2005) maintain that paradigms are world views that are defined by several clear elements, including ontology (the nature of reality), which brings about epistemology. Epistemology may be defined as the nature of knowledge and the relation between the knower and the would-be known (Mertens, 2010). A third element is methodology, which may be expressed as the process of research (Hanson et al., 2005).

The three main paradigms found within educational and psychological research are: post-positivism, constructivism and pragmatism (Mertens, 2010).

3.3.1 Constructivism

Constructivism refers to the ontological view that reality is constructed through the shared interactions between people, as opposed to existing separately

(Robson & McCartan, 2016) and therefore creates multiple realities. A constructivist epistemological standpoint believes that reality is fluid and unique to each individual (Cohen, Manion & Morrison, 2011). The methodologies that sit within the constructivist view are typically qualitative and focus on social constructions within given settings. Interviews are often used as a method of data collection (Mertens, 2010).

3.3.2 Post-positivism

Ontology within a post-positivist paradigm affirms that objectivity is key to understanding reality, however it is recognised that a researcher could only ever be capable of understanding the nature of reality imperfectly. The researcher's knowledge and beliefs may influence their observations (Robson, 2011). Mertens (2010) therefore explains that designs which restrict extraneous variables are used by post-positivists to increase the likelihood of objectively measuring the reality of the situation under study. Consequently, it is important that researcher bias is reduced through outlining and following clear procedures (Mertens, 2010). Post-positivism employs objective measurement and quantifiable measurement in order to distinguish causal relationships (Doyle, Brady & Byrne, 2009). Furthermore, it is accepted that the researcher's own knowledge and values may affect the research (Robson, 2011). Consequently, it is asserted that the researcher's limitations mean that reality may only be known imperfectly (Mertens, 2010).

3.3.3 Pragmatism

Pragmatism appears to find common ground between post-positivism and constructivism. With regard to ontology, pragmatism states there are multiple realities, with everyone having their own distinctive interpretation of reality (Mertens, 2015). The epistemology behind pragmatism notes that the research is guided by the individual researcher's value systems and the conclusions drawn can be fallible (Robson & McCartan, 2016; Teddlie, 2005). Methodological implications associated with a pragmatic paradigm tend to lead to a mixed method approach (Mackenzie & Knipe, 2006).

3.3.4 The rationale for the philosophical basis of this study

Central to the aims of this study is establishing a cause and effect: if children interact with and read to a dog, what effect will this have on their classroom behaviour? Furthermore, the research question aimed to explore observable behaviour. In order to investigate the relationship between these variables, it was felt that the post-positivist stance was most suitable for the proposed study. A post-positivist epistemological standpoint takes that view that knowledge is objective and can be measured, albeit imperfectly. Field experiments taking place in 'real world' settings such as classrooms have many variables. Therefore, this knowledge can only ever be known imperfectly as it would not be possible to control for every variable present within a field experiment, such as this one. Consequently, an important part of the present study is to define and measure behaviour as objectively as possible and therefore the researcher plans to adopt an ontological and epistemological stance and methodology that suits this purpose.

3.4 Methodology

The epistemology of the research contributes to the methodological considerations. Post-positivist approaches lend themselves to fixed experimental designs (Robson, 2011). Typically, these are quantitative designs, which have objective measures and quantifiable analyses. Robson (2011) notes that because these designs are restrained by their attempts to limit extraneous variables, they are reduced in their capacity to capture human behaviour's complexities and subtleties.

3.4.1 Fixed experimental designs

There are many different types of fixed experimental designs, including Randomised Controlled Trials (RCTs), experimental and quasi-experimental group designs and single-case experimental designs (SCEDs).

3.4.1.1 Group designs

Robson (2011) argues that Randomised Controlled Trials (RCTs) are seen to be the "gold standard" of experimental designs when attempting to establish whether or not an intervention is successful. As defined in the criteria for experimental designs, participants are randomly allocated to the control or

experimental conditions. Consequently, threats to internal validity are reduced, thus strengthening the argument that the intervention led to the outcome.

Cohen, Manion and Morrison (2011) explain that for a design to be considered experimental, it must meet a key set of criteria:

- one or more control groups;
- one or more experimental groups;
- participants are randomly allocated to control or experimental groups;
- groups have pre-tests and post-tests to demonstrate the effect of the dependent variable;
- the experimental group being engaged in at least one intervention;
- "isolation, control and manipulation of independent variables" (p. 316);
- the researcher must ensure that there is no contamination between the control and experimental groups.

If a study does not meet all of these criteria, then it is considered to be a quasi-experimental design. For example, quasi-experimental may include designs such as the one group pre-test post-test or the non-equivalent control group design. Quasi-experiments lack random allocation and therefore they may be subject to threats to internal validity such as regression to the mean (Robson & McCartan, 2016).

3.4.1.2 Single Case Experimental Designs (SCEDs)

SCEDs are characterised by experimental phases which take repeated measures of an individual's behaviour throughout the baseline stage (A) and the intervention stage (B) (Barlow, Nock & Hersen, 2009; Cohen, Manion & Morrison, 2011). Robson (2011) notes that SCEDs arguably demonstrate high levels of internal validity, as participants act as their own controls. Moreover, Horner, Carr, Halle, McGee, Odom and Wolery (2005) suggest that SCEDs may be used as a method of evaluating educational practices and interventions at the level of the individual.

The baseline phase constitutes of a series of observations of the natural incidence of the target behaviours to be studied. The B phase introduces the intervention and variations in the dependent measure are recorded. One advantage of using repeated measures is that it provides the researcher with a

comprehensive analysis of progress. Consequently, any changes may then be cautiously attributed to the effects of the intervention (Barlow, Nock & Hersen, 2009).

Such repeated measures of an individual's behaviour tend to be conducted through observation, meaning that fluctuations in day-to-day behaviour can be monitored and examined further (Barlow, Nock & Hersen, 2009). Consequently, the overall trends and patterns of the data can be analysed, with a stable baseline being established prior to the introduction of the intervention (Kazdin, 2003).

Therefore, it may be possible to establish cause-and-effect relationships, which links into the post-positivist approach. This is because the repeated measures taken across both the baseline and intervention phases can show any minor changes in the participant's behaviour. Due to the repeated measures, it may be possible to draw inferences regarding the effectiveness of interventions (Cohen, Manion & Morrison, 2011). Therefore SCEDs may be the experimental design of choice for a researcher wishing to investigate what does or does not make an intervention effective.

3.4.1.2.1 SCED Variations

There are several forms of SCED designs: AB designs, ABA and ABAB designs and multiple baseline designs.

AB designs

In this design, repeated measures are taken across baseline and intervention phases (Barlow, Nock & Hersen, 2009). The baseline phase (A) measures behaviour prior to the introduction of the intervention, while the intervention phase (B) measures behaviour during the intervention.

There are limitations associated with the use of an AB design. For example, Risley and Wolf (1972) argue that it is possible that any changes in behaviour observed during the 'B' phase (intervention) may have occurred without the implementation of the intervention. They further add that this could be due to an event in the participant's life that cannot be controlled. Kratochwill (1978) further notes that there may be issues with concluding an intervention effect where the baseline trend line has indicated that the effect may have occurred regardless.

Counter to these points, Kratochwill (1978) argues that the presence of a stable baseline allows for stronger conclusions to be drawn from any change observed during the intervention phase.

ABA and ABAB designs

After the first intervention phase (B), the intervention is removed (A) and measures are continued to be taken during the second baseline phase (ABA). The ABAB then re-introduces the intervention (B) and aims to strengthen the confidence in any causal relationship demonstrated (Barlow, Nock & Hersen, 2009).

Multiple baseline designs

Multiple baselines are used across different settings, behaviours, participants, or time points. Causal relationships identified during the intervention phase may be strengthened if there are no other changes in conditions (Kazdin, 2003).

3.4.2 Rationale for this study design

For the present study, fixed group designs were not considered to be appropriate, as the focus is on changes in individual, as opposed to group, behaviour. A further reason for rejecting a group design is that although the term 'low-level disruptive behaviour' is used, the behaviours are specific to each child in this study (for example, one child may engage more in calling out, another may regularly get out of his/her seat). This study wishes to investigate how different types of low-level disruptive behaviour may differ and change from one individual to the next and a group design would not allow for such exploration of these finer details. Furthermore, Robson (2011) suggests that random allocation requires large numbers of participants and due to the practical constraint of the dog handler's time, it was not possible to employ a large group of participants to read to a dog.

A SCED approach is proposed for this study, as evidence suggests that there are individual differences in behaviour in the classroom (Ofsted, 2014). For example, one individual may engage in frequent calling-out; another may passively stare out of the window, but both are behaviours which may be affected following intervention. Therefore, SCEDs allow for the exploration as to what works and for whom (Barlow, Nock & Hersen, 2009). This rationale

supports part of the EP's role in promoting effective intervention for individuals and working on the basis of evidence-based practice (Stoiber & Waas, 2002). A further reason for using a SCED is that it allows for the exploration of changes in behaviour at an individual level. In this study, the participants are not a homogeneous group; each of their patterns of behaviour is likely to be different and so using a group design would be inappropriate and thus the differences may be examined.

Subsequent consideration was given to the most effective type of SCED. With regard to the ABA/ABAB designs, it would be potentially unethical to withdraw an intervention where the children may have bonded with the dog. It would also have been impractical to implement an ABA/ABAB design as the intervention was implemented in the half term before Christmas, meaning that there would have been a four week break in collecting data due to the Christmas holidays and the usual commitments to extra-curricular activities that are common in UK primary schools during December. Furthermore, one of the class teachers was leaving after Christmas, meaning that any data collected on the children's behaviour after Christmas would have been greatly influenced by the presence of a new class teacher. It would not be possible in this instance to use a multiple baseline design, as the intervention would be occurring within one class.

Therefore, an AB design was chosen for the present study. Barlow, Nock and Hersen (2009) explain that an AB design necessitates that the repeated measures take the form of a clearly defined target behaviour, which will be measured across the baseline (A) and intervention (B) phases. Therefore, the usual day-to-day frequency of the behaviour may be ascertained during 'A' phase and compared to any changes in the 'B' phase once the intervention has been introduced. Consequently, Barlow, Nock and Hersen (2009) maintain that if changes do occur in the dependent variable when the intervention is introduced and implemented, then this may be very cautiously attributed to the effects of the intervention.

3.5 Methods

This section will detail the specific methods used in this study, beginning with details regarding the schools and the selection of participants. This section will then move onto a description of the independent and dependent variables and

how they will be measured in this study. Finally, a depiction of the intervention will be outlined, with details of the limitations placed around the lengths of the baseline and intervention phases.

3.5.1 Stakeholders

The following were identified as stakeholders when planning the research:

- The University of Nottingham
- The Educational Psychology Service (EPS) where the researcher was on placement during the time the study took place
- The two schools who participated in the study
- The dog handler who worked with the children throughout the intervention phase
- The wider community of educational and psychological research

3.5.1.1 Selection of Schools and Participants

3.5.1.1.1 Schools

As a trainee Educational Psychologist on placement with an allocation of schools, it was possible to identify schools who were interested in this research. Prior to the set-up of the study, other schools within the researcher's placement area were using "Reading to Dogs" as an intervention for reading. Other schools with whom the researcher was working had expressed interest in setting up a reading to dogs programme in their own schools. Therefore, the schools who had informally mentioned an interest were contacted and Appendix 5 shows the letter that was sent to Headteachers formally inviting them to participate in the research study.

A national charity currently runs a programme where dogs are invited into schools to 'listen' to children read. Through the website, it was possible to identify and liaise with a local volunteer, who was able to visit each school once a week for the period of the intervention.

3.5.1.1.2 Description of schools

The two primary schools were located in the North West of England.

The first school was a large primary school (449 pupils) in the centre of a large town. Within the school's population, 20% receive Pupil Premium. In comparison, the national average for primary school-aged children in receipt of

Pupil Premium is 15.3% for state-funded primary schools or 16.3% for primary academy schools (DfE, 2016).

The second school was an average-sized primary school (216 pupils) within a market town, with 4.6% of pupils in receipt of Pupil Premium.

3.5.1.1.3 Participants

Robson and McCartan (2016) note that one way of sampling in a small-scale study is to use purposive sampling. This principle was applied in the current study, as no statistical generalisations are being made. The purpose of the current study is to investigate the effect that the "interacting with, and reading to, dogs" intervention has on each individual participant's behaviour.

The participants were identified in discussion between the schools' Special Educational Needs Co-ordinators (SENCos) and the class teachers. They were provided with the following criteria for inclusion:

The children must

- Be in year 3
- Be attending school full-time
- Engage in frequent low-level disruptive behaviour (in line with the definitions and examples given in Ofsted's (2014) report, Section 3.5.2 Independent and Dependent Variables)
- Not be involved with any other interventions targeting classroom behaviour

In total, eight children were identified by the SENCos who were provided with the inclusion criteria for participants. This worked out as four children in each school. Informed parental consent was sought via a letter (Appendix 6), outlining the research and what reading to a dog would entail. Verbal assent was gained from the children at the point of intervention. A set script was read to each child by either the researcher or the class Teaching Assistant (TA) (*"If you would like to read to the dog, then that's ok and if you don't, then that's ok too."*). This was done individually prior to each session and it was made clear to the child that if they did not wish to read to the dog, they did not have to do so.

3.5.1.1.4 Description of participants

There were eight participants in total (four from each school), all of whom were in Year 3. There were six boys and two girls, seven of whom were White British and one of whom was White European. All spoke English as their first language, with one speaking an additional language at home. All of the participants were identified by the schools' SENCos using the criteria to guide them in identifying pupils who would be suited to an intervention aimed at improving classroom behaviour. Further details regarding each participant are included in Chapter 4: Results.

Table 3.1 displays a summary of key participant information. Pseudonyms have been given to maintain the participants' anonymity. The participants' gender has not been specified as it could potentially lead to the participants becoming identifiable.

School	Child	Age at start of baseline phase	SENCo/class teacher reported frequent engagement in low-level disruption
1	1 - Alex	7y 6m	✓
	2 - Bailey	7y 6m	✓
	3 - Charlie	7y 11m	✓
	4 - Dylan	7y 8m	✓
2	5 - Eric	8y 0m	✓
	6 - Flynn	7y 7m	✓
	7 - George	7y 7m	✓
	8 - Harley	7y 1m	✓

Table 3. 1 A table summarising key participant information.

One of the eight participants (School 1; Participant 4) was excluded from analysis in this study, as the average of his baseline on-task behaviour data was >75%. Therefore it was deemed that the frequency of off-task behaviour

was not high enough during the 20 minute observation to be able to see a difference in the data.

3.5.2 Independent and dependent variables

The independent variable in this study was interacting with, and reading to, a dog. The dependent variables (DV) were:

- DV 1: On-task behaviour
- DV 2: Off-task motor behaviour
- DV 3: Off-task verbal behaviour
- DV4: Off-task passive behaviour

The following definitions of these behaviour have been paraphrased from Shapiro (1996), who devised an observational schedule relating to on-task and off-task classroom behaviour.

According to Shapiro (1996), on-task behaviour includes both active and passive forms and it is where the pupil is engaged and attending to the assigned task. Examples of active on-task behaviour include talking to a teacher or peer about the assigned task, putting a hand up to answer a question, or writing or drawing as directed by the teacher. Example of passive on-task behaviour include listening to the teacher (signified by looking at the board or the teacher's face while they are talking), listening to a peer talk about the assigned task or reading material (such as a book or a worksheet) to do with the assigned task.

Off-task motor behaviour may be defined by any motor activity the participant engages in which is not related to the assigned task. This includes any out-of-seat behaviour (where the participant is not directly sitting in their assigned seat), turning around in their seat, fiddling with objects not related to the task (such as twirling a pencil), or doodling or writing while the teacher is talking. Off-task motor behaviour does not include instances where the participant is walking across the classroom to get equipment needed for the task or walking to sit in another area of the classroom, as directed by the teacher (this would be on-task behaviour).

Off-task verbal behaviour encompasses any audible verbal behaviour that is not related to the assigned task, or that is not authorised by the teacher. This includes behaviours such as shouting out, talking to a peer about a topic that is not related to the assigned task or humming or singing. This does not include shouting out when the teacher has explicitly permitted this behaviour or laughing at a joke told by the teacher.

Off-task passive behaviour may be categorised by the instances where a pupil is passively off-task for three consecutive seconds. This passive off-task behaviour includes staring out the window, watching other pupils in the classroom (unless explicitly directed by the teacher) or listening to peers talk about off-task topics. Passive off-task behaviour is not reading (unless it is reading material unrelated to the assigned task) or listening to peers talk about task-related topics.

3.5.2.1 Measuring the dependent variables

The dependent variables within single-case experimental designs are usually observable behaviours (Horner et al., 2005). These behaviours are operationally defined and repeatedly measured. Robson and McCartan (2016) note that observations are highly advantageous, in that they hold directness and allow for the real world to be viewed. Therefore, the present research employed observational measures. In line with the dependent variables, the observational data measured on-task behaviour, off-task verbal behaviour, off-task motor behaviour and off-task passive behaviour.

However, observations have also been criticised. For example, McCall (1984) suggests that a common feature of observational studies is the issue of the observer affecting the situation being observed ("reactivity"). In the present study, reactivity was reduced by the observer spending time in each classroom during the pilot phase.

A further criticism of observational measures, highlighted by Robson and McCartan (2016), is that selective attention of the observer may affect what is attended to, as directed by their interests, experiences and expectations. This selective attention may create bias in the data collected. Other ways in which observations may become biased is selective encoding (how the observational

data is interpreted and encoded) and selective memory (if there is a time delay between observation and the recording of it, memory may impact upon the accuracy and completeness of the data). In the present study, selective encoding was reduced by creating a list of exhaustive and mutually exclusive codes during the pilot phase. Selective memory was reduced by using interval recording, which determined the percentages of intervals the participants were engaging in on-task and off-task behaviour for both the A and B phases of the study. Interval recording is where an observational period is divided into a number of intervals (in this case 15 seconds), so that the percentages of intervals where the target behaviour occurs can be calculated (Alberto & Troutman, 2006).

During both A and B phases, the participants were observed in the classroom and the percentage of intervals for on-task, off-task verbal, off-task motor and off-task passive behaviour were recorded. Behaviour was directly observed and recorded using the smartphone application version of the Behavioural Observation of Students in Schools (BOSS; Shapiro, 1996). The BOSS schedule is a measure used to log academic behaviour, which automatically computes the percentages of intervals for the four different target behaviours. The BOSS application was used as it is straightforward and provides the researcher with a way of recording behaviour easily.

3.5.2.2 Data collection procedure

The observational period was set for a minimum of 10 minutes and a maximum of 20 minutes. This period was set as the pilot phase indicated that it generally allowed for an observation across different activities in the classroom. The duration was dependent on the classroom activities; at times it was shorter due to the children going out to play earlier or coming in late from reading to the dog. The occurrence of on-task or off-task behaviour was recorded using interval recording. Every 15 seconds, a quiet, unobtrusive tone sounded and the observer recorded whether the participant was engaged in on-task or off-task behaviour, based on the operational definition.

On-task behaviour is divided into two codes: actively on-task or passively on-task. Off-task behaviour is divided into three codes: motor off-task behaviour,

verbal off-task behaviour or passive off-task behaviour. In order to ensure that these codes were appropriate, the coding scheme was piloted two weeks prior to the onset of the baseline stage, which is detailed further in Section 3.6.1.

If the participant was engaged in more than one behaviour this was recorded as two notations. For example, if the participant was out of their seat and talking to another pupil about something other than the task, this was recorded as off-task motor and off-task verbal. The BOSS application then automatically calculated the percentages of behaviour.

The participants were observed on a weekly basis by the researcher, while they were engaged in their usual lesson activities. The observations took place in the participants' classrooms; this aimed to ensure that the observations were naturalistic. Prior to the baseline phase, the researcher had spent time at the back of the classroom with a smartphone and a notebook so that the participants and other pupils became accustomed to the researcher's presence. This practice sought to diminish the potential for reactivity to occur once the weekly measures were initiated.

Weekly measures were taken throughout the baseline and intervention phases. The researcher kept observation logs of the lesson, the activity in which the participants were engaged and any other variables (such as illness) which may have had an impact upon the participant's on or off-task behaviour (Appendix 7).

Although each participant was measured using the same dependent variables, the baseline data will reveal a unique profile of on-task and off-task behaviours. For example, one participant's level of off-task verbal behaviour may be higher, with relatively low levels of off-task passive and off-task motor behaviour. This may be compared to another participant who may display high levels of observable off-task motor and verbal behaviours. Therefore the baseline data for each participant will signify an individual pattern of behaviour and the extent to which it is changed over the course of the intervention.

3.5.3 Intervention

The 'interacting with, and reading to, a dog' intervention employed in this study included the use of a therapy dog, the dog handler and reading a book of the

pupil's choice. Therefore, it is the combined package that was being evaluated as the intervention.

The dog involved was a trained therapy dog, which according to the handler, "It's all about the temperament of the dog, which is assessed." (Personal communication 5/4/17). The intervention itself is based on research suggesting that pupils reading to dogs feel calmer, as interacting with dogs lowers blood pressure and heart rate (Friedmann, Katcher, Thomas, Lynch & Messent, 1983).

The trained therapy dog (a female Basset Fauve de Bretagne) and volunteer came from a charity providing therapy dogs to care homes, hospitals and schools, and were recruited to be part of the present study. The dog and the handler had been assessed in accordance with the charity's stipulations. The dog handler worked with all eight participants, who individually read aloud to the dog once a week for 15 to 20 minutes.

It was recognised in the planning stages that some children may find dogs intimidating and so an informal conversation was held between the class teachers and the intended participants' parents regarding their child's experiences and comfort levels with dogs. All of the participants were prepared for meeting the dog by being shown photographs of her. The participants were given an opportunity to withdraw at this stage; all wished to continue. Two weeks prior to the introduction of the intervention, the participants were given an opportunity to informally meet and pet the dog in their classrooms and ask the handler questions about the dog and the intervention. The participants then returned after the half term holiday to begin the intervention phase of the study.

The participants met the dog (Pebbles, a pseudonym) and the handler individually on six occasions for 15 to 20 minutes. This occurred on a weekly basis, over an academic half term. The intervention sessions were overseen by a TA in School 1 and the dog handler in School 2. The participants were informed that they could leave at any time. The dog was kept on a lead.

The procedure for the sessions was as follows:

1. The participant is invited by the TA (School 1) or by the researcher (School 2) if they would like to read to the dog, Pebbles ("If you would like to read to the dog, then that's ok and if you don't, then that's ok too.")
2. The participant leaves the classroom with the TA (School 1) or the researcher (School 2) and is introduced to the dog and its handler
3. In School 1, the TA remained with the participant and the dog handler, as specified in the school policy. In School 2, the researcher returned to the classroom, leaving the participant with the dog handler in the open plan library.
4. The participant has an opportunity to pet the dog
5. The participant selects a book from the school library to read to the dog (the child has free choice; the books were different to their usual reading books, thus providing the children with the opportunity to read something novel). This is because the intervention was not being employed with a focus on reading
6. The child is then invited by the dog handler to say which book they have chosen and to introduce the book to Pebbles
7. The child then reads the book to Pebbles:
    a. Whether or not errors are corrected is dependent on the child's perceived confidence by the dog handler
    b. If the child is perceived to be a proficient reader, then the dog handler may say, "You're loving the book so much you've gone a bit fast and so let's just check that word again"
    c. If the child is perceived by the dog handler to be an under-confident reader, then the dog handler will select perhaps one or two mistakes across the book and say, "That's nearly it, let's just have another look and see if we can spell it out to Pebbles"
8. Once the child has finished reading to Pebbles, they are invited to pet her
9. The child says goodbye to Pebbles and the dog handler, and is given a sticker by the dog handler from Pebbles to say thank you for reading to her
10. Either the TA (School 1) or the researcher (School 2) return with the next participant and take the child back to class

11. Throughout the intervention, the researcher remained in the classroom. This meant that the researcher would be observing the first participant in the classroom, while the second participant was doing the intervention. When the second participant returned, the researcher would then observe him while the third participant did the intervention and so on.

3.6 Procedure

Figure 3.1 outlines a summary of the overall procedure as an overview for the present study. It is then described in further detail in the following sections. Further details for the procedure for each participant is outlined in Appendix 7.

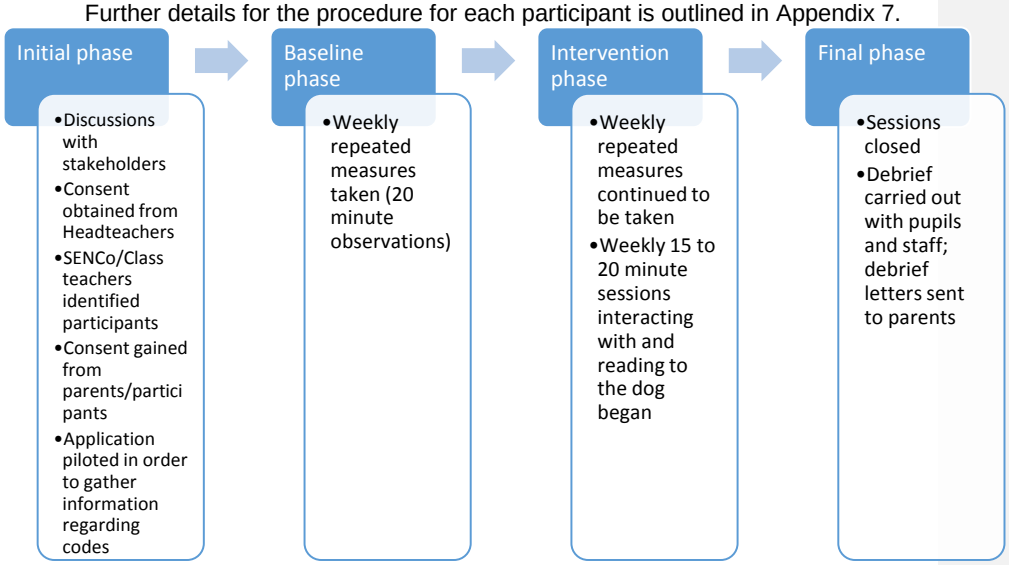


Figure 3. 1 A figure to show the summary of the procedure for the present study.

3.6.1 Length of phases

Three phases were included in this study design: the pilot phase, the baseline phase (A) and the intervention phase (B).

The length of the baseline and intervention phases took into account previous research by Kratochwill et al. (2010) which emphasised that each phase must have a minimum of three data points. Practical restrictions of half term holidays and the researcher's time constraints for collecting data meant that baseline

data would be collected weekly across the first half of the Autumn term. Due to the difference in half term dates between the two schools involved in the study, baseline data was collected across four consecutive weeks in School 1 and across five consecutive weeks in School 2.

The half term holiday week provided a natural break between the baseline and intervention phases. The intervention length in previous research involving children interacting with and/or reading to a dog has lasted between five times a week for four weeks (Bassette & Taber-Doughty, 2013) to once a week for six weeks (Limond & Farnum, 1997). Due to practical restrictions of the dog handler's time, staffing commitments and school holidays, it was agreed in consultation between the researcher, the dog handler and the two schools that the intervention would be carried out once a week for six weeks. This time limit may have impacted upon the difference it could have made to the participants' behaviour and this has been considered in within Chapter 5: Discussion. However, the limit was necessary because of the demands upon the two schools.

3.6.2 Pilot phase

The initial phase of the research involved discussions between the researcher and potential stakeholders within the local authority with whom she was on placement. This included the Principal Educational Psychologist and the SENCos from local schools. From this, potential participants were identified and approached and parental consent obtained, as outlined in Sections 3.5.1.1.3 and 3.10.

3.6.2.1 Piloting the observational schedule

Two weeks prior to the baseline stage, the researcher used the application to observe classroom behaviour in the two schools on four separate occasions. Alongside the written guidance from the application (see Section 3.5.2), information gained from these observations was used to produce a coding schedule, which may be found in Appendix 8. For an evaluation of this observational schedule's validity and reliability, see Section 3.9.

The aim was to pilot the use of the application and to ensure that the participants' behaviour could be identified using one of the four codes. A list of

mutually exclusive list of behaviours was formed (Appendix 8). This stage allowed for the pupils in the classrooms to become accustomed to the presence of the researcher sitting at the back of the room, holding a smartphone, which was without a SIM card, and a notebook. The purpose of this was to decrease the impact of the researcher's presence upon the participants' naturalistic behaviour.

3.6.3 Baseline phase (four to five weeks)

Following the pilot phase, the researcher conducted weekly observations of the participants using the BOSS application. These baseline data points were collected for approximately five weeks in School 1 and four weeks in School 2. The discrepancy in baseline data points was due to the difference in dates for the Autumn half term holiday.

3.6.4 Intervention phase (six weeks)

In the intervention phase, data continued to be obtained through weekly repeated observational measures. The participants interacted and read to the dog for approximately 15 to 20 minutes and were observed following the intervention at the same time in the school day as the baseline stage. This was to ensure consistency of the lesson content between each week and also to ensure that the participants were being observed at the same time point after lunch or during the lesson. This is because lesson content or timings during the lesson may otherwise have been confounding variables. The observations continued for five to six weeks, consistent with the usual length of a school half-term.

3.6.5 Final phase

The sessions were closed by thanking the class teachers, participants and dog handler for their time and commitment to the study. Debrief procedures were then conducted with the staff, pupils and their parents (Appendix 9).

In order to support interpretation of individual children's responses to the intervention and the SCED data, the views of their teachers were sought in a semi-structured interview following the intervention. Anonymised, handwritten notes were made by the researcher. The interviews took place prior to the debrief regarding results so as not to potentially influence the class teachers'

responses. The teachers' views were used in the Discussion to triangulate the SCED data (see Section 5.3).

3.7 Intervention and measure integrity & fidelity

3.7.1 Intervention integrity

Intervention integrity was maintained through the use of one dog handler with three years' experience running the intervention in other schools. The procedure was discussed with the dog handler prior to the introduction of the intervention and treatment fidelity checks were carried out by the dog handler. This also ensured continuity between each participant. Furthermore, by each child reading to the same dog and dog handler at the same time each week, continuity was ensured for each participant.

3.7.2 Measure integrity

In order to ensure the integrity of the repeated measures, the observations aimed to be conducted at the same time each week. It was not always possible to conduct the measures at exactly the same time each week, due to the variability of the time play was announced in the afternoons. The researcher took the measures each week and the intervention was overseen by the dog handler in each school to ensure consistency of the procedure.

3.8 Analysis of Data

3.8.1 Analysis of repeated measures

Visual analysis is a commonly used method to interpret data (Kratochwill et al., 2013) and has been used in other animal-assisted therapy studies using a SCED to analyse the effects on participants' behaviour (e.g., Bassette & Taber-Doughty, 2013). However, other researchers have proposed that statistical analysis may be an alternative or supplementary method when considering SCED data (Kazdin, 2016). The following sections will discuss visual and statistical analysis, finishing with a statement regarding the data analysis method chosen for the current research.

3.8.1.1 Visual analysis

The process of visual analysis comprises of graphing the data, usually with a simple line graph, where the data points are connected within each phase (Kazdin, 2016). Visual analysis then involves scrutinising the data for potential patterns and from this, making inferences as to what the data might represent

(Kennedy, 2005). Kratochwill et al. (2013) have developed criteria to determine whether the changes in the data displayed by the line graph are reliable. Table 3.2 identifies six criteria used in visual analysis, as discussed by Kratochwill et al. (2013).

Criteria used in visual analysis	Description of each criterion
Level	The 'level' is the average score across a phase.
Trend	Trend may be the slope (whether it be upward or downward). It may also be the magnitude (whether the data's increase or decrease is gradual or rapid).
Level of variability	This is the extent of the deviation of the data points from the overall trend.
Immediacy of effect	This is how rapidly a difference in the data pattern is witnessed following a phase change. This tends to be analysed through changes in the level or trend.
Overlapping data	The proportion of data from the intervention phase which overlaps with data from the baseline phase
Consistency of similar phases	The degree of consistency in the data patterns from phases with the same conditions (i.e., if there are multiple baseline phases or different interventions are being compared within the same SCED)

Table 3. 2 A table to show the different criteria used in visual analysis (Kratochwill et al, 2013).

3.8.1.2 Limitations of visual analysis

Although visual analysis is widely used in SCEDs, there are limitations with its use (Kazdin, 2016). For example, Brossart et al. (2006) note that the judgements incurred from visual analyses can be unreliable. To illustrate this, results from a study by Park et al. (1990) indicated that inter-rater agreements between experts were 67% for graphs with no statistically significant results and 27% for graphs with results reaching statistical significance. A further limitation of visual analysis is that it may be confounded by several attributes, including autocorrelation (Brossart et al., 2006). Autocorrelation is signified by a correlation between successive data points separated by different time intervals

(Kratochwill, 1978). Gottman and Glass (1978) note that autocorrelations may lead to issues with estimating intervention effects, as one data point may predict subsequent data points. If autocorrelation exists, then the opportunity of making a Type 1 error increases (Barlow, Nock & Hersen, 2009).

3.8.1.3 Statistical analysis

Kazdin (2016) reports that statistical analysis of SCED data offers an alternative way of identifying intervention effects, as it may be more sensitive to subtle intervention effects unidentifiable through visual inspection alone. Despite this, Kratochwill et al. (2013) notes that a consensus for criteria for statistical analysis of single-case data does not yet currently exist. Further to this, different statistical analyses have been found to produce different results for the same data (Kazdin, 2016). The following section explores the prominent analyses available to SCED data and their appropriateness for use within the current research.

3.8.1.3.1 Conventional t and F Tests

In group designs, t tests and F tests are often used to calculate the effectiveness of an intervention. However, Kirk (1995) explains that t and F tests cannot be used when the data has a value of zero. This may be the case in the present study, as there will be times when the dependent variable is not observed. Therefore this type of analysis was deemed not be appropriate in the present research.

3.8.1.3.2 Interrupted Time Series Analysis (ITSA)

ITSA uses a t test to calculate the differences between means for the baseline and intervention phases of the study (Barlow, Nock & Hersen, 2009). However, a major limitation of this form of analysis is that it requires a minimum of 50 observations per phase. Therefore it was felt to be inappropriate for use in the present research.

3.8.1.3.3 Split-Middle Technique

According to Kazdin (1982), the split-middle technique analyses the number of intervention data points which lie above or below the trend line of the baseline phase. Its major limitation is that previous demonstrations of its use have indicated that this analysis is very susceptible to autocorrelation (Barlow, Nock & Hersen, 2009).

3.8.1.3.4 Effect Sizes

One way of measuring the strength of an experimental effect is by calculating the effect size (Kazdin, 2016). However, there is considerable disagreement regarding the correct way to calculate effect sizes with SCEDs (Shadish, Rindskopf & Hedges, 2008). Furthermore, disagreement also exists over the most appropriate way to interpret effect sizes, with some researchers arguing that this may lead to concerns over the objectivity of the interpretations of the results (Brossart et al., 2006). Therefore the calculation of effect sizes was deemed to be inappropriate for this study, as the robustness cannot be proven.

3.8.2 Rationale for Method of Analysis

Visual analysis was considered the most suitable form of analysis for the current research for the following reasons. To begin with, visual analysis has been applied to the data from the majority of SCEDs (Kratochwill, Levin, Horner & Swoboda, 2014). Furthermore, researchers within the field are currently unable to agree on criteria for statistical analysis of SCED data (Kratochwill et al., 2013). Ultimately, current researchers within the field have established a set of criteria to use when employing visual analysis (Table 3.2; Kratochwill et al., 2013). This set of criteria aims to strengthen the validity of the visual analysis.

3.9 Validity and Reliability

3.9.1 Internal validity

Internal validity is described as being the demonstration of cause and effect between intervention and outcomes (Robson, 2011). Cook and Campbell (1979) put forward twelve potential threats to internal validity.

Threat to internal validity	Explanation of threat	How the study design controlled for the threat
History	External factors which change in the participants' environments other than those directly related to the research.	The school were asked not to introduce any other interventions to the participants which aimed to change classroom behaviour during the time of the study.
Testing	Changes following practice and experience gained on pre-tests by the participants.	The participants were not tested in any way other than through their observable behaviour.

Instrumentation	Certain features of the way participants were measured differed between pre-test and post-test. In this study, this may lead to a definition of behaviour being widened or narrowed as the observer becomes familiar with the situation.	Joint observations with an independent observer were used to reduce this threat to validity. It was planned that this data would be analysed using Cohen's Kappa, however, technical issues with the application did not allow for this.
Regression	If atypical participants are recruited, scores tend to show regression to the mean.	Due to the nature of SCEDs, multiple measures over the baseline and intervention phases should control for this threat to validity, as the participants are being measured over time. Due to this threat, Participant 4 was eliminated as his results showed that the average for his on-task behaviour was above 75% (see Section 3.5.1.1.4).
Mortality	Participants dropping out of the study.	Using multiple SCEDs helps to reduce this threat to validity.
Maturation	Growth or change in the participants which is unrelated to the conditions of the study.	As the data was collected over a period of time, maturation is a real possibility in the present study. This will be highlighted as a limitation to the research in Chaper 5: Discussion.
Hawthorne effect	The psychological effects which may occur simply from knowing that you are participating in an intervention.	Blinding will not be possible in this study and therefore this potential threat will be a point for discussion in the conclusions drawn.

Table 3. 3 A table summarising the proposed threats to internal validity (Cook & Campbell, 1979).

3.9.2 External validity

Due to the nature of SCEDs, in that they investigate changes at the individual level, generalisability becomes almost impossible, despite using multiple cases. Therefore, the aim of this study is to investigate the effects that interacting with, and reading to, a dog might have on ***individual*** children's behaviour, not on group behaviour.

3.9.3 Reliability

Robson (2011) notes several sources which may threaten the reliability of a study. How this study plans to overcome them is described in Table 3.4.

Potential source of unreliability	Explanation	How this study attempted to overcome it
Participant error	Participants' behaviour may fluctuate from occasion to occasion.	Due to school timetabling of lessons, it was possible to measure the behaviour at the same day and same time each week.
Participant bias	Participants may adapt their behaviour if they are aware that it is their behaviour that is being observed for the purposes of the study.	The intention of explaining to the participants that it was their learning that was being observed should help to partially overcome this, although this does indicate that a degree of deception was used in this study. This ethical issue has been discussed under the heading of "Ethical considerations." Furthermore, repeated measures of behaviour was used to help to control for fluctuations in behaviour that may occur when there is an additional adult in the room.
Observer error	It may be possible that behaviours may be coded incorrectly.	Joint observations were used to help to overcome this and it was planned that inter-rater reliability data would be analysed using Cohen's Kappa, had it not have been for technical issues with the application.
Observer bias	It may be possible that the observer coding the behaviour is unconsciously or consciously biasing the codes being recorded (or not recording behaviours).	A list of exhaustive and mutually exclusive codes was drawn up in preparation for the observations (Appendix 8). This list was initially developed using the list of descriptors offered with the Behavioural Observation of Students in Schools guidance (see Section 3.5.2). This list was then expanded upon during the pilot phase of the study, based on the participants' observable behaviour. It was shared with the independent observers prior

		to the two observations which were undertaken.

Table 3. 4 A table to show potential sources of unreliability (Robson, 2011).

3.9.4 Validity and reliability of structured observation

In order to increase the reliability of the observational data, inter-observer agreement was gathered (Robson & McCartan, 2016). Inter-observer agreement refers to the statistical degree of similarity between the results of two or more observers employing the same coding system to measure the same behaviour (Robson & McCartan, 2016). Typically Cohen's Kappa (Cohen, 1960) is used to assess the degree of similarity. It was planned that the inter-observer agreement data would be analysed. However, due to technical difficulties with the way in which the data was stored on the application, it was not possible to access the details of the data in order to calculate this. Evidently, this has implications for the confidence in the reliability of the observational data. This may mean that the results have limitations in that observer error may have impacted the results and this is discussed in Section 5.5.6.

3.10 Ethical Considerations

Approval from the University of Nottingham Ethics Committee was obtained on the 12th July 2016 (see Appendix 10).

The BPS (2010) Code of Human Research and Ethics was used in order to carefully consider various ethical considerations in this study. These have been summarised in Table 3.5.

Ethical issue	How it was considered in this study
Informed consent	Letters were sent to the identified children's parents, inviting them to participate in the study (Appendix 6). Verbal consent was gained individually from the children themselves both at the start of the baseline phase and again at the start of the intervention phase.
Right to withdraw	In the parental consent letter and in conversation with the children themselves, it was made explicit that they have no obligation to participate and that if they do not want to carry on at any time, then they have the right to withdraw from the study, without needing to provide a reason for doing so. It was made clear that this was consent to the research, of which the intervention was a part.

Confidentiality	The children's names and the names of the schools have been anonymised throughout the study. This included notes made during the period of identifying the participants and on the BOSS application's observation schedules. Furthermore, this was made clear in the consent letter sent to parents. The notebook used to write any additional notes during the observations was kept a locked filing cabinet. The electronic data collected through the application was anonymised and password-protected. Once the numerical data had been transferred into an anonymised Excel Spreadsheet, the data on the application was deleted. In accordance with the Data Protection Act (1998), consent for collecting observational data was obtained from the participants' parents and is outlined in the parental consent letters (Appendix 6). Verbal consent was obtained from each participant when asking them to share their information with their parent. The school staff did not have access to the data and results were shared anonymously with them, using the pseudonyms.
Safeguarding	Copies of the researcher's and the dog handler's DBS certificates were made available to the school. It was agreed that usual Local Authority and school protocols and procedures would be followed in situations where safeguarding disclosures or concerns were raised.
Debriefing	Following the procedures set out in the ethics proposal, the researcher sent a debrief letter to the parents at the conclusion of the field work associated with the study (Appendix 9). The researcher also met with each child individually to thank them and share the results of the study. The researcher then met with school staff to share an overall picture of the anonymised results.

Table 3. 5 A table summarising the ethical considerations for the present study.

3.11 Summary of Methodology

This chapter has discussed the concept of 'real world' research, before exploring theoretical paradigms which exist within this area of research. A post-positivist stance was adopted for the present research, as the research question prompted thinking around observable behaviour. Various methodological designs associated with post-positivism were examined, with a single-case experimental design being chosen as the most appropriate for this research question. A discussion of how the data was collected through repeated

observational measures was put forward. This data will be analysed using visual analysis, a commonly used tool in single-case experimental designs. Statistical analyses were rejected, as they required a substantial number of data points and time constraints in the present research did not allow for this. The threats to validity and reliability were investigated, before ending the chapter with details of the ethical considerations for this study. The following chapter will outline the results found for each of the seven participants.

Chapter 4: Results

4.1 Introduction

This chapter will begin with a reminder of the research question. This will be followed by a discussion of how the results will be analysed using visual analysis. Further to this, each participant's results will be presented in turn, with a brief summary accompanying each graph to weave the results together.

4.2 Research Question

The overarching question that the present research wishes to explore is: what effects does interacting with, and reading to, a dog have on individual children's behaviour in the classroom?

The observational data collected allowed this question to be examined in four component parts:

- What effects does interacting with, and reading to, a dog have on each participant's:
    - on-task behaviour?
    - off-task motor behaviour?
    - off-task verbal behaviour?
    - off-task passive behaviour?

4.3 Analysis of Results

As set out in Section 3.5.2.2 (Data collection procedures), repeated observations were used to collect data for each of the seven participants. Microsoft Excel was then used to create line graphs for each participant, using the data collected for on-task behaviour, off-task motor behaviour, off-task verbal behaviour and off-task passive behaviour. The possible types of analysis were discussed in Chapter 3 (Section 3.8) and it was concluded that visual analysis would be used to examine each graph. Following the recommendations of Kratochwill et al. (2013), each graph was examined using the five outcome feature measures: level, trend, variability, immediacy of effect and overlap (Table 4.1).

Outcome-measure feature	Description (Kratochwill et al., 2013)	Indicators of an effect between the baseline and intervention phases
Level	Level refers to the overall mean average of the percentages of behaviour for each phase.	If an effect of intervention has occurred, there will be a difference between the means of the baseline and intervention phases.
Trend	Trend describes the slope of the line of best fit for each phase's data.	Trend lines of the data may be described as accelerating, decelerating, or stable. The steepness of the slope must also be taken in account, thus indicating rate of progress. An effect may also be indicated by the change of the trend line between phases.
Variability	Variability refers to the variance, range or standard deviation of the data about the line of best fit. In this study, variability refers to the range and standard deviation.	Low variation in the data and a low standard deviation is indicative of a reliable data set.
Immediacy of the effect	The last three data points of the baseline phase and the first three points of the intervention phase are examined and the change in level between them indicates the immediacy of the effect.	A difference between the last three data points of the baseline and the first three data points of the intervention phase suggests that the intervention has had an immediate effect upon the participant's behaviour.
Overlap	Overlap refers to the amount of data from the baseline phase which overlaps with data from the intervention phase.	The smaller the percentage of overlapping data, the more indicative this is of an intervention effect. Conversely, if there is a high percentage of overlapping

	This percentage is calculated by dividing the number of overlapping points by the total number of data points and multiplying the figure by 100.	data, it is unlikely there is an intervention effect.

Table 4. 1 A table to show the five outcome measures for visual analysis (Kratochwill et al., 2013).

Kratochwill et al. (2013) suggest that the outcome measures should be analysed individually and collectively in order to determine if the results of a single-case can reliably demonstrate a causal relation. Visual analysis of these five outcome measures is used to evaluate whether the data exhibits at least three indications that the outcome measures have been met when analysing the baseline and intervention phases for each line graph. An inference that the change in behaviour is directly related to the intervention (independent variable) may only be made if this criterion is met (Kratochwill et al., 2010).

In order to conduct the visual analysis, the data for each participant's on-task behaviour, off-task motor behaviour, off-task verbal behaviour and off-task passive behaviour were plotted onto four separate graphs. Microsoft Excel was used to create the graphs, using guidance from Carr and Burkholder (1998). Each graph displays the trend lines and the mean level for each phase. Therefore four graphs will be presented and visually analysed for each participant according to Kratochwill et al.'s (2013) criteria.

Following the guidance set out by Kratochwill et al. (2013), the graphs were analysed for mean level, trend, variability, immediacy of effect and data overlap (Table 4.1). Consistency of similar phases was not analysed, as the present research uses an AB design. The way in which each of these criteria has been calculated will be presented later, in Section 4.3. Following each graph is a table outlining the quantitative values for each of Kratochwill et al.'s (2013) five visual analysis criteria. A narrative description for each graph is also presented to illustrate each measure. In order to strengthen the validity of the results, a second rater used visual analysis for each graph, which is discussed in Section 4.11.

This chapter continues with a presentation of the main findings of this study for each of the seven participants. The graphed results for each participant's observed on-task behaviour, off-task motor, off-task verbal and off-task passive behaviour is presented in turn, meaning that there are four graphs for each participant. Each graph shows the raw data, the means and the trend lines for the baseline and intervention phases.

4.4 Participant 1: Alex

4.4.1 Alex's profile

Alex, who was White British, was aged 7 years 6 months at the start of the baseline phase. Alex was in School 1, in a class of 26 pupils, supported by one teacher and one classroom assistant. In terms of groupings, Alex was placed on a table of four pupils, alongside three girls.

Alex was identified for the intervention due to his reported frequent refusal to engage in tasks during lessons. Alex's behaviour was described by his teacher as being 'withdrawn'. He was said to often refuse to speak to adults, ignore his teacher and refuse to follow adult instructions. The SENCo also indicated that Alex found it difficult to listen to the teacher during teacher-directed input. Alex was said to hum and make other noises which distracted his peers. The school had implemented a reward chart focusing on rewarding Alex for 'sitting quietly' and ignoring negative behaviour. Alex was described by the school SENCO as doing well academically and that he seemed to particularly enjoy writing.

4.4.2 On-task behaviour

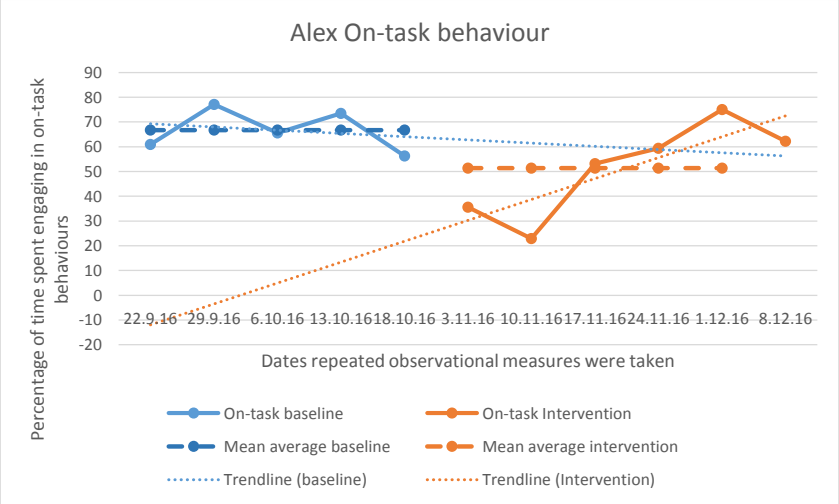


Figure 4. 1 A line graph to show the percentage of on-task behaviour across the baseline and intervention phases, with mean lines and trend lines (Alex).

Feature	Visual Analysis of Alex's On-Task Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	66.69%	51.36%	No
Changes in trend	Slight deceleration	Steeper acceleration	Yes
Changes in variability	Range = 20.83%	Range = 52.08%	No
	Standard deviation = 8.61%	Standard deviation = 18.98%	
Immediacy of effect	There is no evidence of an immediate effect, as the first three data points of the intervention phase are not higher than the last three data points of the baseline phase.		No
Overlap of data	There are nine overlapping data points (81%).		No

Table 4. 2 A table summarising the visual analysis of the line graph for Alex's on-task behaviour.

4.4.2.1 Summary of Alex's on-task behaviour

The visual analysis indicates that there was no observable increase in Alex's on-task behaviour when comparing the mean levels of the baseline phase and the intervention phase (a decline of 16%). However, the decelerating trend line in the baseline phase suggests that this behaviour may have continued to decrease without the introduction of the intervention. Furthermore, there is a large variation in the data points across the intervention phase, which means that it is hard to determine whether there is a reliable effect or not. There does not seem to be an immediate effect of the intervention. The overlapping data equates to 81%, which is high and thus suggests that the intervention had no effect. According to Kratochwill et al.'s (2010) guidance, with only one indication of an observable effect, it would suggest that there is no evidence of an impact of the intervention upon Alex's on-task behaviour.

4.2.3 Off-task motor behaviour

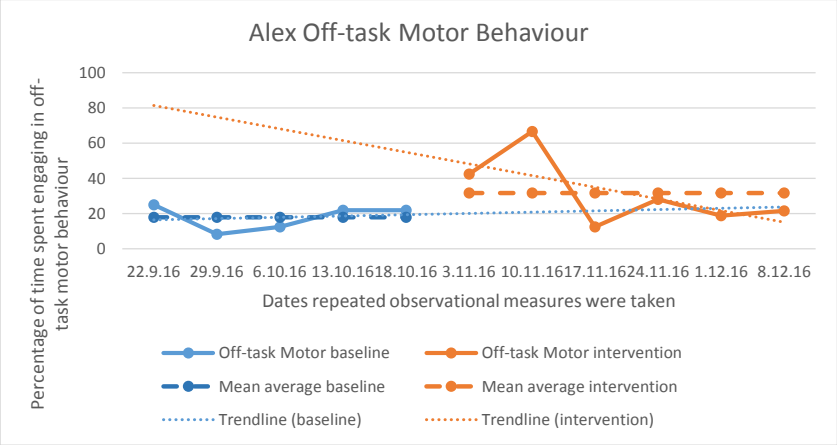


Figure 4. 2 A line graph to show the percentage of off-task motor behaviour across the baseline and intervention phases, with mean lines and trend lines (Alex).

Feature	Visual Analysis of Alex's Off-task Motor Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	17.92%	31.67%	No
Changes in trend	Very slight acceleration	Steeper deceleration	Yes
Changes in variability	Range = 16.67%	Range = 54.17%	No
	Standard deviation = 7.12%	Standard deviation = 19.94%	
Immediacy of effect	There is no evidence of an immediate effect, as two of the first three data points of the intervention phase are not lower than the last three data points of the baseline phase.		No
Overlap of data	There are five overlapping data points (45.5%)		Yes

Table 4. 3 A table summarising the visual analysis of the line graph for Alex's off-task motor behaviour.

4.2.3.1 Summary of Alex's off-task motor behaviour

The visual analysis indicates that there was no decrease in Alex's off-task motor behaviour as a result of the intervention, as the mean level increased by 14%. However, the accelerating trend line in the baseline phase suggests that this behaviour may have continued to increase without the introduction of the intervention. There is a large variation in data points across the intervention phase, which means that it is hard to determine whether there is a reliable effect or not. There does not seem to be an immediate effect of the intervention. The percentage of overlapping data possibly indicates that there was a small effect of intervention, although this is questionable. According to Kratochwill et al.'s (2010) guidance, there are only two indications of an observable effect, thus suggesting that there is no evidence of an impact of the intervention upon Alex's off-task motor behaviour.

4.2.4 Off-task verbal behaviour

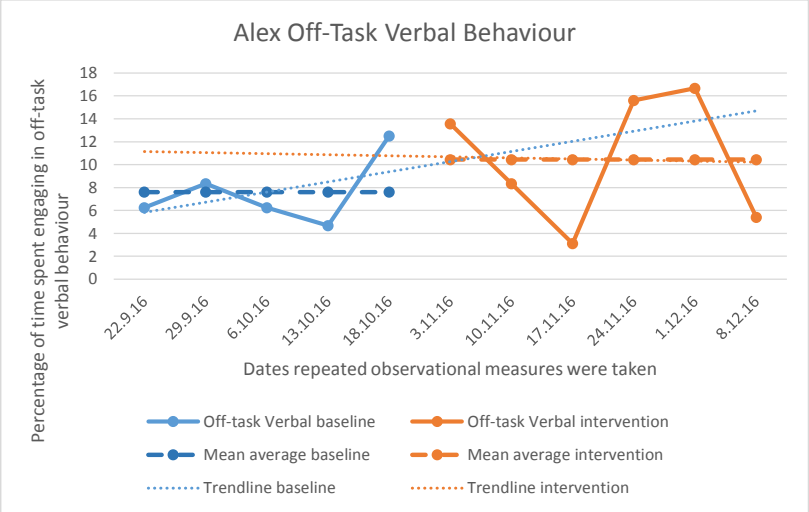


Figure 4. 3 A line graph to show the percentage of off-task verbal behaviour across the baseline and intervention phases, with mean lines and trend lines (Alex).

Feature	Visual Analysis of Alex's Off-Task Verbal Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	7.6%	10.45%	No
Changes in trend	Steep acceleration	Slight deceleration	Yes
Changes in variability	Range = 7.81%	Range = 13.55%	No
	Standard deviation = 3.21%	Standard deviation = 5.96%	
Immediacy of effect	There is a no evidence of an immediate effect, as only one of the first three data points of the intervention phase is lower than the last three data points of the baseline phase.		No
Overlap of data	There are six overlapping data points (54.5%).		No

Table 4. 4 A table summarising the visual analysis of the line graph for Alex's off-task verbal behaviour.

4.2.4.1 Summary of Alex's off-task verbal behaviour

Visual analysis indicates that the slight observable increase in the mean average of Alex's off-task verbal behaviour from baseline to intervention phase indicates a small, negative effect of the intervention. However, the steep, accelerating trend line for the baseline phase indicates that this behaviour may have increased further without the introduction of the intervention. In spite of this, the large variability in the data points across intervention phase compared to the baseline phase limits the reliability of these findings. There is no evidence of an effect between the baseline and intervention phases. There is a moderate amount of overlapping data, however, as this occurs across the intervention phase, it is difficult to establish whether the intervention had an effect. According to Kratochwill et al.'s (2010) guidance, there is only one indication of an observable effect, thus suggesting that there is no evidence of an impact of the intervention upon Alex's off-task verbal behaviour.

4.2.5 Off-task passive behaviour

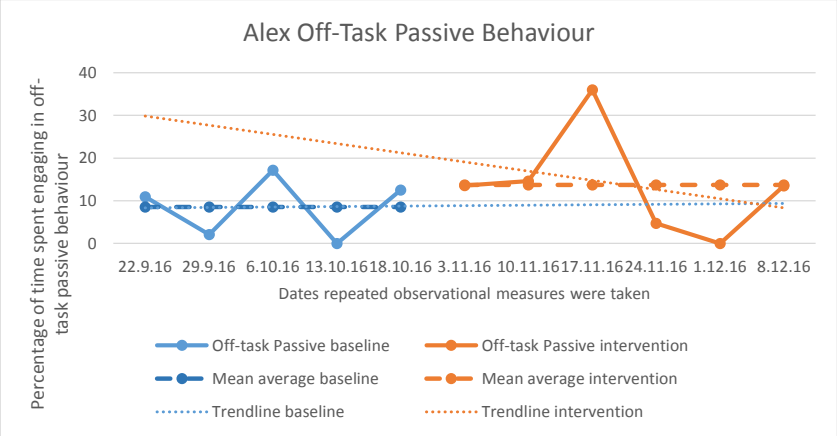


Figure 4. 4 A line graph to show the percentage of off-task passive behaviour across the baseline and intervention phases, with mean lines and trend lines (Alex).

Feature	Visual Analysis of Alex's Off-Task Passive Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	8.54%	13.71%	No
Changes in trend	Very slight acceleration	Steeper deceleration	Yes
Changes in variability	Range = 17.19%	Range = 35.94%	No
	Standard deviation = 7.3	Standard deviation = 12.35	
Immediacy of effect	There is no evidence of an immediate effect, as the first three data points of the intervention phase are not lower than the last three data points of the baseline phase.		No
Overlap of data	There are eight overlapping data points (72.7%).		No

Table 4. 5 A table summarising the visual analysis of the line graph for Alex's off-task passive behaviour.

4.2.5.1 Summary of Alex's off-task passive behaviour

The visual analysis of level indicates that there was an increase of 5.17% between the baseline and intervention phases, suggesting that the intervention had a small, negative effect on Alex's off-task passive behaviour. However, the accelerating trend line in the baseline phase suggests that this behaviour may have continued to increase without the introduction of the intervention. Despite this, there is a large amount of variation in the data across both phases, which means that it is hard to determine whether there is a reliable effect or not. There is no evidence of an immediate effect. There is also a high percentage of overlapping data points, indicating that Alex's behaviour largely remained at pre-intervention levels. According to Kratochwill et al.'s (2010) guidance, there is only one indication of an observable effect, thus suggesting that there is no evidence of an impact of the intervention upon Alex's off-task passive behaviour.

4.5 Participant 2: Bailey

4.5.1 Bailey's profile

Bailey, who was White British, was aged 7 years 6 months at the start of the baseline phase. Bailey was in School 1, in a class of 26 pupils, supported by one teacher and one classroom assistant. In terms of groupings, Bailey was placed on a table of four pupils, alongside one girl and two boys.

Bailey was identified for the intervention due to his behaviour which was described by his teacher as being 'easily distracted'. He was said to be more engaged in watching to see what his peers were doing, as opposed to the task set. In the researcher's initial observations as part of the pilot phase, Bailey would frequently look to see what the researcher was doing. Bailey appeared to decreasingly look for the researcher as the observations for the pilot phase and the beginning of the baseline phase were conducted. With regard to academic attainment, the school SENCo explained that Bailey was below age-related expectations in reading. Therefore, Bailey was receiving a literacy intervention, three times a week, as part of a small group with the classroom assistant.

4.5.2 On-task behaviour

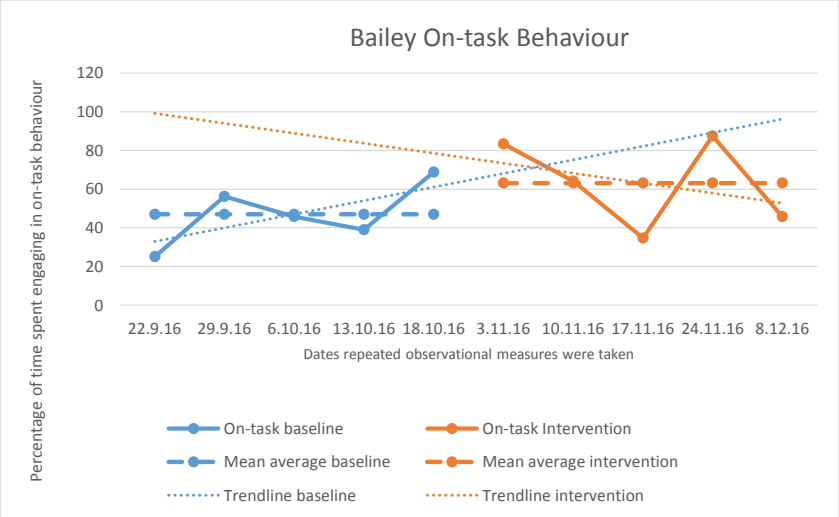


Figure 4. 5 A line graph to show the percentage of on-task behaviour across the baseline and intervention phases, with mean lines and trend lines (Bailey).

Feature	Visual Analysis of Bailey's On-Task Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	46.98%	63.07%	Yes
Changes in trend	Steady acceleration	Steady deceleration	No
Changes in variability	Range = 43.76%	Range = 52.88%	No
	Standard deviation = 16.67%	Standard deviation = 22.99%	
Immediacy of effect	There is no evidence of an immediate effect, as only one of the first three data points of the intervention phase is higher than the last three data points of the baseline phase.		No
Overlap of data	There are five overlapping data points (50%).		No

Table 4. 6 A table summarising the visual analysis of the line graph for Bailey's on-task behaviour.

4.5.2.1 Summary of Bailey's on-task behaviour

The visual analysis indicates an observable increase in the level of Bailey's on-task behaviour with 16% difference in the means from baseline to intervention phase. However, the accelerating trend line for the baseline phase suggests that Bailey's on-task behaviour was increasing before the introduction of the intervention and so the change in level cannot be conclusively linked to the intervention. There does not seem to be an immediate effect of the intervention. Furthermore, there is a large variation in data points across both baseline and intervention phase, which means that it is hard to determine whether there is a reliable effect or not. According to Kratochwill et al.'s (2010) guidance, with only one indication of an observable effect, it would suggest that there is no evidence of an impact of the intervention on Bailey's on-task behaviour.

4.5.3 Off-task motor behaviour

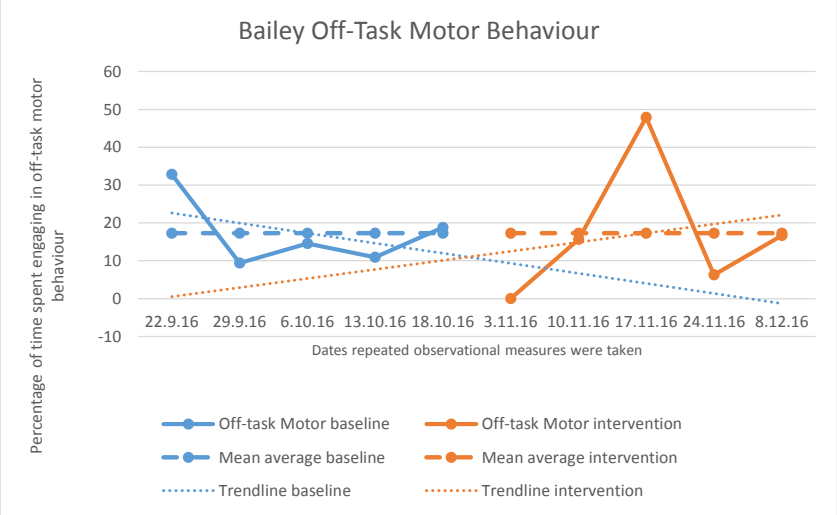


Figure 4. 6 A line graph to show the percentage of off-task motor behaviour across the baseline and intervention phases, with mean lines and trend lines (Bailey).

Feature	Visual Analysis of Bailey's Off-Task Motor Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	17.29%	17.29%	No
Changes in trend	Steady deceleration	Steady acceleration	No
Changes in variability	Range = 23.43%	Range = 47.92%	No
	Standard deviation = 9.38%	Standard deviation = 18.48%	
Immediacy of effect	There is no evidence of an immediate effect, as only one of the first three data points of the intervention phase is lower than the last three data points of the baseline phase.		No
Overlap of data	There are seven overlapping data points (70%).		No

Table 4. 7 A table summarising the visual analysis of the line graph for Bailey's off-task motor behaviour.

4.5.3.1 Summary of Bailey's off-task motor behaviour

The visual analysis of level indicates that there was no difference in the amount that Bailey was engaging in off-task motor behaviour across the baseline and intervention phases. This is denoted by the mean remaining at 17.29%. The decelerating trend line in the baseline phase suggests that this behaviour may have continued to decrease without the introduction of the intervention. Furthermore, there is a large variation in data points across the intervention phase, which means that it is hard to determine whether there is a reliable effect or not. There does not seem to be evidence of an immediate effect of intervention. There is also a high percentage of overlapping data points, indicating that Bailey's behaviour largely remained at pre-intervention levels. According to Kratochwill et al.'s (2010) guidance, there are no indications of an observable effect, thus suggesting that there is no evidence of an impact of the intervention upon Bailey's off-task motor behaviour.

4.5.4 Off-task verbal behaviour

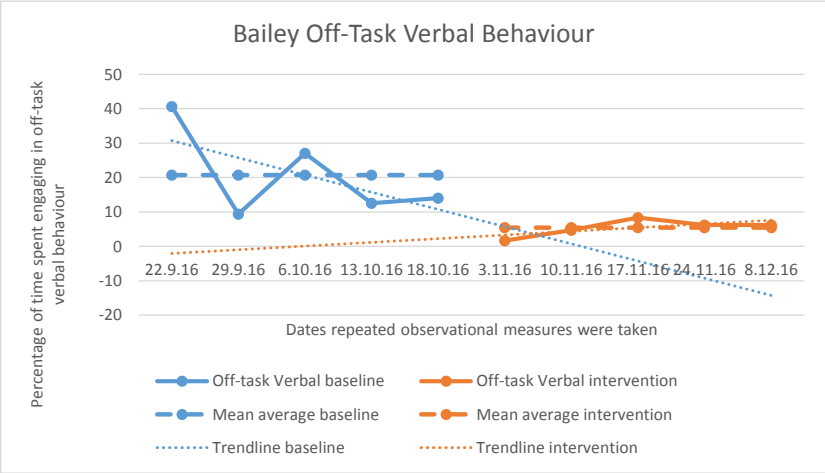


Figure 4. 7 A line graph to show the percentage of off-task verbal behaviour across the baseline and intervention phases, with mean lines and trend lines (Bailey).

Feature	Visual Analysis of Bailey's Off-Task Verbal Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	20.73%	5.44%	Yes
Changes in trend	Steep deceleration	Slight acceleration	No
Changes in variability	Range = 31.24%	Range = 6.66%	Yes
	Standard deviation = 12.99%	Standard deviation = 2.46%	
Immediacy of effect	The first three data points of the intervention are all below the last three data points of the baseline phase, suggesting an effect.		Yes
Overlap of data	There are no overlapping data points.		Yes

Table 4. 8 A table summarising the visual analysis of the line graph for Bailey's off-task verbal behaviour.

4.5.4.1 Summary of Bailey's off-task verbal behaviour

The visual analysis suggests that there was an observable decrease in the level of Bailey's off-task verbal behaviour between baseline and intervention, with a decrease of 15.3% between means. The trend line for the baseline phase is steeply decelerating, suggesting that there may have been a decrease in this behaviour despite the introduction of the intervention. There appears to be an immediate, positive effect of intervention on Bailey's off-task verbal behaviour. Although there is a large variation in the data of the baseline phase, there is less variation in the data in the intervention phase. This possibly indicates that the intervention had an effect. There are no overlapping data points. According to Kratochwill et al.'s (2010) guidance, there are four indications of an observable effect and so it would suggest that there is evidence of an impact of the intervention on Bailey's off-task verbal behaviour.

4.5.5 Off-task passive behaviour

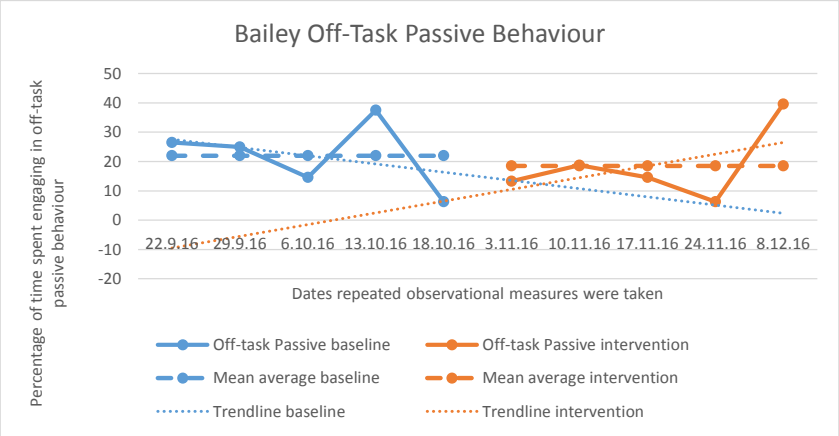


Figure 4. 8 A line graph to show the percentage of off-task passive behaviour across the baseline and intervention phases, with mean lines and trend lines (Bailey).

Feature	Visual Analysis of Bailey's Off-Task Passive Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	21.97%	18.5%	Yes
Changes in trend	Steady deceleration	Steady acceleration	No
Changes in variability	Range = 31.25%	Range = 33.33%	No
	Standard deviation = 11.95	Standard deviation = 12.61	
Immediacy of effect	There is no evidence of an immediate effect, as the first three data points of the intervention phase are not lower than the last three data points of the baseline phase.		No
Overlap of data	There are eight overlapping data points (80%).		No

Table 4. 9 A table summarising the visual analysis of the line graph for Bailey's off-task passive behaviour.

4.5.5.1 Summary of Bailey's off-task passive behaviour

The visual analysis of level indicates that there was a slight decrease of 3.5% between the baseline and intervention phases. However, the decelerating trend line for the baseline phase suggests that Bailey's off-task passive behaviour was decreasing before the introduction of the intervention and so the change in level cannot be conclusively linked to the intervention. Furthermore, there is a large amount of variation in the data across both phases, which means that it is hard to determine whether there is a reliable effect or not. There is also a high percentage of overlapping data points, indicating that Bailey's behaviour largely remained at pre-intervention levels. According to Kratochwill et al.'s (2010) guidance, there is only one indication of an observable effect, thus suggesting that there is no evidence of an impact of the intervention upon Bailey's off-task passive behaviour.

4.6 Participant 3: Charlie

4.6.1 Charlie's profile

Charlie, who was White European, was aged 7 years 8 months at the start of the baseline phase. Charlie was fluent in English and spoke an additional language at home. Charlie was in School 1, in a class of 26 pupils, supported by one teacher and one classroom assistant. In terms of groupings, Charlie was placed on a table of four pupils, alongside two girls and one boy.

Charlie was identified for this intervention due his behaviour which was described by his teacher as "silly" and "immature". He was said to be more engaged in talking to his peers about off-task topics, as opposed to the task set. The teacher also indicated that Charlie found it difficult to listen to the teacher during teacher-directed input, as he would often talk to his peers around him, swing on his chair or doodle in his exercise book. The school had implemented a reward system for Charlie: he would be rewarded with time spent playing on the iPad linked to completion of set tasks.

4.6.2 On-task behaviour

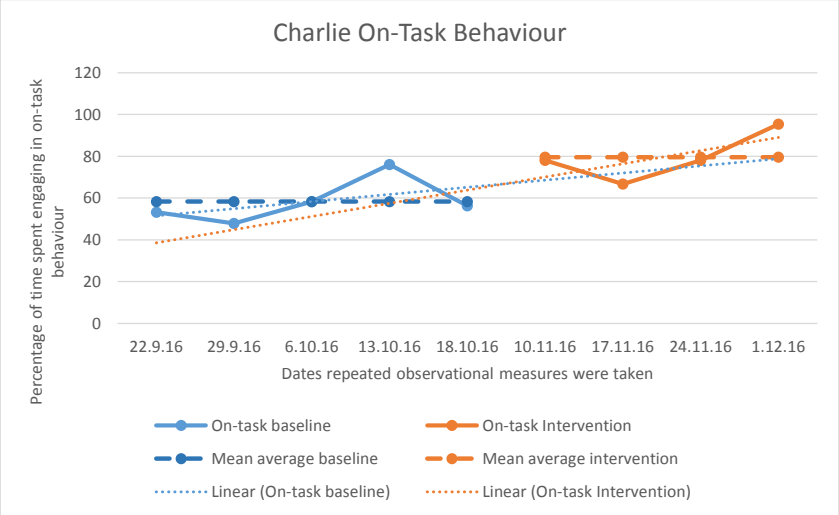


Figure 4. 9 A line graph to show the percentage of on-task behaviour across the baseline and intervention phases, with mean lines and trend lines (Charlie).

Feature	Visual Analysis of Charlie's On-Task Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	58.35%	79.55%	Yes
Changes in trend	Steady acceleration	Steeper acceleration	No
Changes in variability	Range = 28.08%	Range = 28.65%	No
	Standard deviation = 10.62%	Standard deviation = 11.81%	
Immediacy of effect	There is some evidence of an immediate effect: two of the intervention data points are higher than the last three baseline data points.		Yes
Overlap of data	There is one overlapping data point (11.1%)		Yes

Table 4. 10 A table summarising the visual analysis of the line graph for Charlie's on-task behaviour.

4.6.2.1 Summary of Charlie's on-task behaviour

The visual analysis indicates that there was an observable increase in the level of Charlie's on-task behaviour between baseline and intervention, with an increase of 21.2% between means. However, the trendline for the baseline phase is steadily accelerating, suggesting that there may have been a increase in on-task behaviour despite the introduction of the intervention. The variation between the data points is large, yet the figures show a similar pattern across both of the phases. There appears to be an immediate, positive effect of intervention on Charlie's on-task behaviour and there is just one overlapping data point. According to Kratochwill et al.'s (2010) guidance, there are three indications of an observable effect and so it would suggest that there is moderate evidence of an impact of the intervention upon Charlie's on-task behaviour.

4.6.3 Off-task motor behaviour

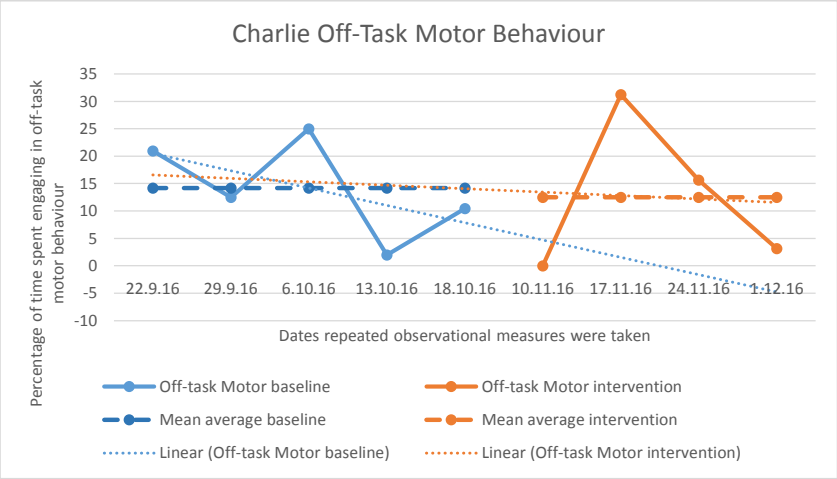


Figure 4. 10 A line graph to show the percentage of off-task motor behaviour across the baseline and intervention phases, with mean lines and trend lines (Charlie).

Feature	Visual Analysis of Charlie's Off-Task Motor Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	14.18%	12.5%	No
Changes in trend	Steep deceleration	Fairly horizontal line, with a slight deceleration	Yes
Changes in variability	Range = 23%	Range = 31.25%	No
	Standard deviation = 9.06%	Standard deviation = 14.01%	
Immediacy of effect	There is no evidence of an immediate effect, as only one of the first three data points of the intervention phase is lower than the last three data points of the baseline phase.		No
Overlap of data	There are six overlapping data points (66.6%)		No

Table 4. 11 A table summarising the visual analysis of the line graph for Charlie's off-task motor behaviour.

4.6.3.1 Summary of Charlie's off-task motor behaviour

The visual analysis indicates that there was a small observable decrease in the level of Charlie's off-task motor behaviour between baseline and intervention, with a decrease of 1.67% between means. The trend line for the baseline phase is steeply decelerating, suggesting that there may have been a decrease in this behaviour despite the introduction of the intervention. There is a large variation in the data across both baseline and intervention phases, which means that it is hard to determine whether there is a reliable effect or not. Despite the first data point of the intervention phase indicating an initial effect of intervention, the second and third data points of the intervention phase do not indicate an effect. According to Kratochwill et al.'s (2010) guidance, there is only one indication of an observable effect. Therefore, it would suggest that there is no evidence of an impact of the intervention upon Charlie's off-task motor behaviour.

4.6.4 Off-task verbal behaviour

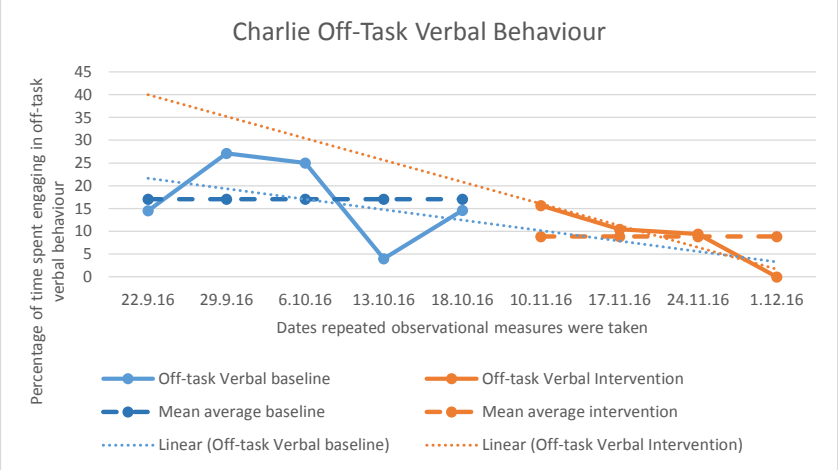


Figure 4. 11 A line graph to show the percentage of off-task verbal behaviour across the baseline and intervention phases, with mean lines and trend lines (Charlie).

Feature	Visual Analysis of Charlie's Off-Task Verbal Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	17.04%	8.86%	Yes
Changes in trend	Steady deceleration	Steep deceleration	No
Changes in variability	Range = 23.08%	Range = 15.62%	No
	Standard deviation = 9.31%	Standard deviation = 6.5%	
Immediacy of effect	There no evidence of an immediate effect, as the first three data points of the intervention phase are not lower than the last three data points of the baseline phase.		No
Overlap of data	There are seven overlapping data points (77.77%).		No

Table 4. 12 A table summarising the visual analysis of the line graph for Charlie's off-task verbal behaviour.

4.6.4.1 Summary of Charlie's off-task verbal behaviour

The visual analysis suggests that there was an observable decrease in the level of Charlie's off-task verbal behaviour between baseline and intervention, with a decrease of 8.18% between means. The trend line for the baseline phase is steadily decelerating, suggesting that there may have been a decrease in this behaviour despite the introduction of the intervention. There is a large variation in the data across both baseline and intervention phases, which means that it is hard to determine whether there is a reliable effect or not. There does not seem to be evidence of an immediate effect of intervention. There is a high level of overlapping data. According to Kratochwill et al.'s (2010) guidance, there is only one indication of an observable effect. Therefore, it would suggest that there is no evidence of an impact of the intervention upon Charlie's off-task verbal behaviour.

4.6.5 Off-task passive behaviour

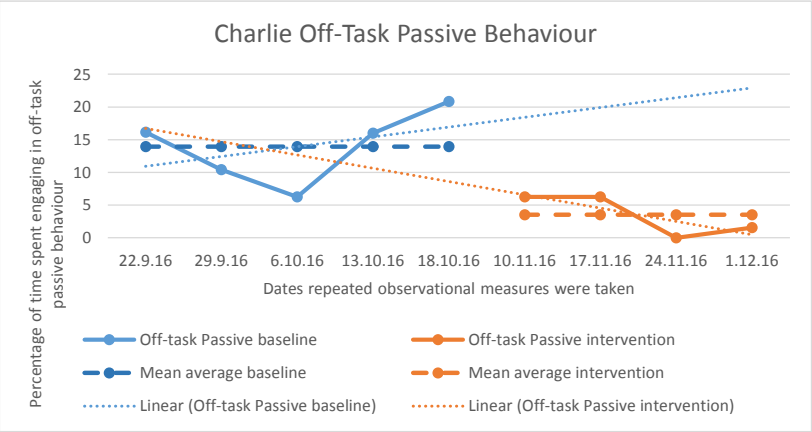


Figure 4. 12 A line graph to show the percentage of off-task passive behaviour across the baseline and intervention phases, with mean lines and trend lines (Charlie).

Feature	Visual Analysis of Charlie's Off-Task Passive Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	13.93%	3.52%	Yes
Changes in trend	Steady acceleration	Sharp deceleration	Yes
Changes in variability	Range = 14.58%	Range = 6.25%	No
	Standard deviation = 5.66%	Standard deviation = 3.22%	
Immediacy of effect	There is evidence of an immediate effect, as the first three data points of the intervention phase are lower than, or equal to, the last three data points of the baseline phase.		Yes
Overlap of data	There are three overlapping data points (33.33%).		Yes

Table 4. 13 A table summarising the visual analysis of the line graph for Charlie's off-task passive behaviour.

4.6.5.1 Summary of Charlie's off-task passive behaviour

The visual analysis suggests that there was an observable decrease in the level of Charlie's off-task passive behaviour between baseline and intervention, with a decrease of 10.41% between means. The trend line for the baseline phase is steadily accelerating, suggesting that the off-task passive behaviour may have increased further without the introduction of the intervention. The variation in the baseline phase data is large, meaning that a stable baseline was not established prior to the intervention being introduced. This therefore affects the reliability of the data. There appears to be an immediate, positive effect of intervention on Charlie's off-task passive behaviour. There are some overlapping data points, indicating a moderate effect of intervention. According to Kratochwill et al.'s (2010) guidance, there are four indications of an observable effect. Therefore, it would suggest that there is evidence of a moderate impact of the intervention upon Charlie's off-task passive behaviour.

4.8 Participant 5: Eric

4.8.1 Eric's profile

Eric, who was White British, was aged 8 years 0 months at the start of the baseline phase. Eric was in School 2, in a class of 24 pupils, supported by one teacher and one 1:1 teaching assistant. In terms of groupings, Eric was placed on a table of six pupils, with three girls and two boys.

Eric was identified for the intervention due to his reported off-task behaviour. He was said to frequently engage in talk about off-task topics with his peers. According to his teacher, Eric would regularly be out of his seat in order to go and talk to his friends about off-task topics. Eric was also said to frequently sharpen his pencil; the teacher thought that this may be a work-avoidance tactic.

4.8.2 On-task behaviour

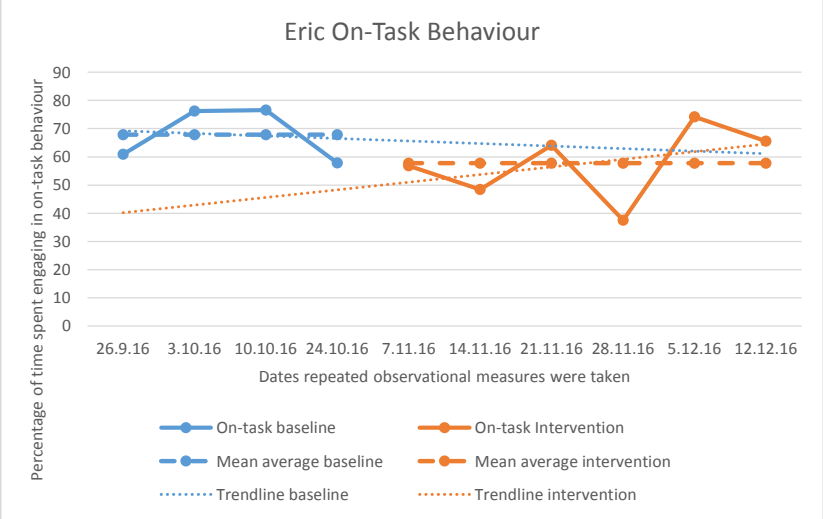


Figure 4. 13 A line graph to show the percentage of on-task behaviour across the baseline and intervention phases, with mean lines and trend lines (Eric).

Feature	Visual Analysis of Eric's On-Task Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	67.88%	57.77%	No
Changes in trend	Steady deceleration	Sharp acceleration	Yes
Changes in variability	Range: 18.74%	Range: 36.69%	No
	Standard deviation: 9.9%	Standard deviation: 13.19%	
Immediacy of effect	There is no evidence of an immediate effect, as the first three data points of the intervention phase are not higher than the last three data points of the baseline phase.		No
Overlap of data	There are eight overlapping data points (80%).		No

Table 4. 14 A table summarising the visual analysis of the line graph for Eric's on-task behaviour.

4.8.2.1 Summary of Eric's on-task behaviour

The visual analysis indicates that there was no observable increase in Eric's on-task behaviour when comparing the mean levels of the baseline phase and the intervention phase (a decline of 10.11%). However, the decelerating trend line in the baseline phase suggests that this behaviour may have continued to decrease without the introduction of the intervention. The data set for the intervention phase is variable, highlighted by the large range for on-task behaviour measured. There is no immediate effect of intervention: the first three data points of the intervention phase are not higher than the last three data points of the baseline phase. The overlapping data equates to 80%, which is high and thus suggests that the intervention had no effect. According to Kratochwill et al.'s (2010) guidance, there is only one indication of an observable effect. Therefore, it would suggest that there is no evidence of an impact of the intervention on Eric's on-task behaviour.

4.8.3 Off-task motor behaviour

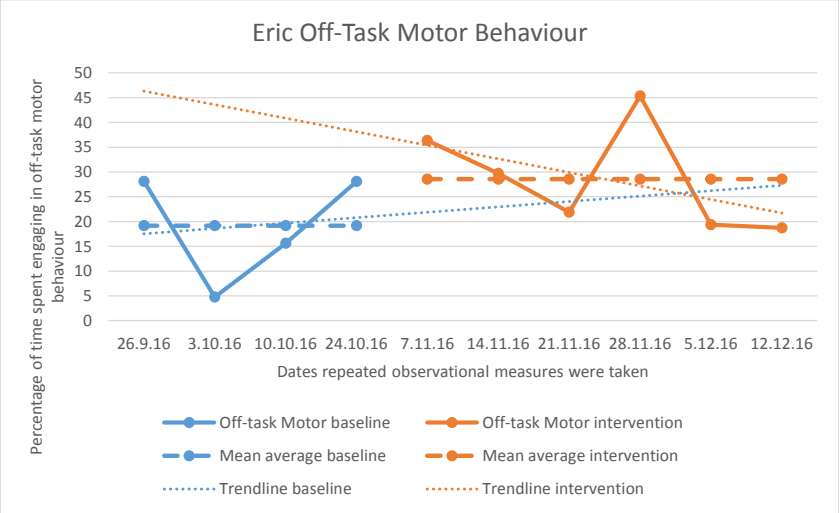


Figure 4. 14 A line graph to show the percentage of off-task motor behaviour across the baseline and intervention phases, with mean lines and trend lines (Eric).

Feature	Visual Analysis of Eric's Off-Task Motor Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	19.2%	28.6%	No
Changes in trend	Steady acceleration	Steeper deceleration	Yes
Changes in variability	Range: 23.36%	Range: 26.56%	No
	Standard deviation: 11.26%	Standard deviation: 10.66%	
Immediacy of effect	There is no evidence of an immediate effect, as the first three data points of the intervention phase are not lower than the last three data points of the baseline phase.		No
Overlap of data	There are five overlapping data points (50%).		Yes

Table 4. 15 A table summarising the visual analysis of the line graph for Eric's off-task motor behaviour.

4.8.3.1 Summary of Eric's off-task motor behaviour

The visual analysis suggests that there was no observable decrease in Eric's off-task motor behaviour when comparing the mean levels of the baseline phase and the intervention phase (a decline of 9.4%). The trend line for the baseline phase is steadily accelerating, suggesting that the off-task motor behaviour may have increased further without the introduction of the intervention. There is a large variation in the data across both baseline and intervention phases, which means that it is hard to determine whether there is a reliable effect or not. There does not seem to be an immediate effect of the intervention. The overlapping data equates to 50%, suggesting that there was some evidence of an intervention effect, but this is questionable. According to Kratochwill et al.'s (2010) guidance, there are only two indications of an observable effect. Therefore, it would suggest that there is no evidence of an impact of the intervention upon Eric's off-task motor behaviour.

4.8.4 Off-task verbal behaviour

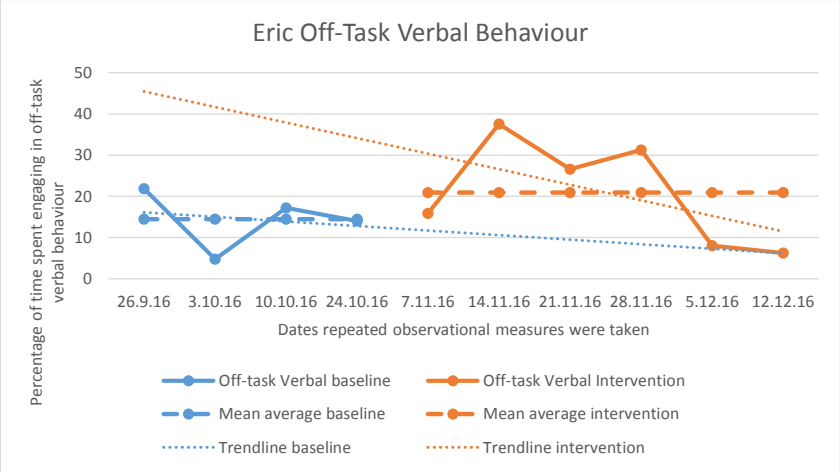


Figure 4. 15 A line graph to show the percentage of off-task verbal behaviour across the baseline and intervention phases, with mean lines and trend lines (Eric).

Feature	Visual Analysis of Eric's Off-Task Verbal Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	14.47%	20.92%	No
Changes in trend	Steady deceleration	Steeper deceleration	No
Changes in variability	Range: 17.12%	Range: 25%	No
	Standard deviation: 7.23%	Standard deviation: 12.79%	
Immediacy of effect	There is no evidence of an immediate effect, as the first three data points of the intervention phase are not lower than the last three data points of the baseline phase.		No
Overlap of data	There are five overlapping data points (50%).		Yes

Table 4. 16 A table summarising the visual analysis of the line graph for Eric's off-task verbal behaviour.

4.8.4.1 Summary of Eric's off-task verbal behaviour

The visual analysis of the levels indicates that there was no observable decrease Eric's off-task verbal behaviour when comparing the mean levels of the baseline phase and intervention phase (an increase of 6.44%). The trend line for the baseline phase is steeply decelerating, suggesting that there may have been a further decrease in this behaviour without the introduction of the intervention. There is a large variation in the data across both baseline and intervention phases, which means that it is hard to determine whether there is a reliable effect or not. There does not seem to be evidence of an immediate effect following the introduction of the intervention. The overlapping data equates to 50%, suggesting that there is some evidence of an intervention effect, but this is questionable. According to Kratochwill et al.'s (2010) guidance, there is only one indication of an observable effect. Therefore, it would suggest that there is no evidence of an impact of the intervention upon Eric's off-task verbal behaviour.

4.8.5 Off-task passive behaviour

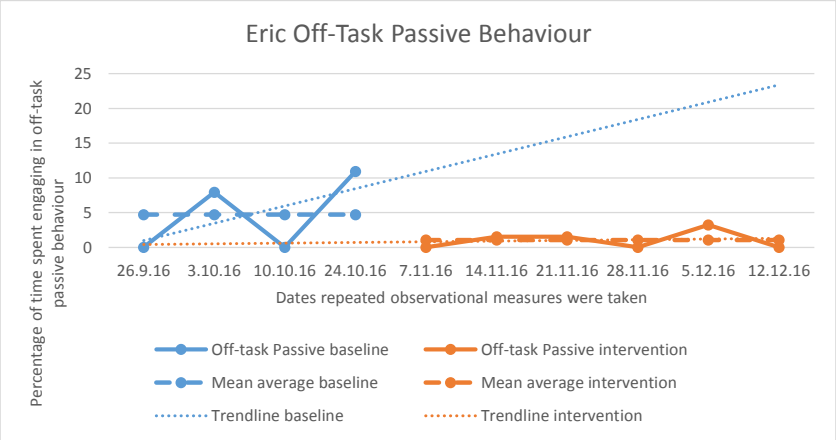


Figure 4. 16 A line graph to show the percentage of off-task passive behaviour across the baseline and intervention phases, with mean lines and trend lines (Eric).

Feature	Visual Analysis of Eric's Off-Task Passive Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	4.72%	1.06%	Yes
Changes in trend	Steep acceleration	Fairly horizontal, with a very slight acceleration	Yes
Changes in variability	Range: 10.94%	Range: 3.23%	No
	Standard deviation: 5.59%	Standard deviation: 1.31%	
Immediacy of effect	There is some evidence of an immediate effect, as the first three data points of the intervention phase are lower than two of the last three data points of the baseline phase.		Yes
Overlap of data	There are eight overlapping data points (80%).		No

Table 4. 17 A table summarising the visual analysis of the line graph for Eric's off-task passive behaviour.

4.8.5.1 Summary of Eric's off-task passive behaviour

The visual analysis indicates that there was an observable decrease in the level of Eric's off-task passive behaviour between baseline and intervention, with a decrease of 3.66% between means. The trend line for the baseline phase is steeply accelerating, suggesting that the off-task passive behaviour may have increased further without the introduction of the intervention. The variation in the baseline phase data is large, meaning that a stable baseline was not established prior to the intervention being introduced. This therefore affects the reliability of the data. There appears to be an immediate, positive effect of intervention on Eric's off-task passive behaviour. However, there is a large amount of overlapping data. According to Kratochwill et al.'s (2010) guidance, there are three indications of an observable effect. Therefore, it would suggest that there is evidence of a moderate impact of the intervention upon Eric's off-task passive behaviour.

4.9 Participant 6: Flynn

4.9.1 Flynn's profile

Flynn, who was White British, was aged 7 years 7 months at the start of the baseline phase. Flynn was in School 2, in a class of 24 pupils, supported by one teacher and one 1:1 teaching assistant. In terms of groupings, Flynn was placed on a table of six pupils, with two girls and three boys.

Flynn was identified for the intervention due to his frequent calling out during teacher input and teacher-directed time. The school SENCo reported that he had "poor social communication skills". There were also concerns that Flynn could have an autistic spectrum condition (ASC) and so he was on the ASC pathway for diagnosis. The class teacher reported that Flynn found friendships "tricky" and could "overwhelm others, invade their space and be very abrupt with them." This led Flynn to experience difficulties with friendships in the classroom. Flynn was said to frequently voice concerns about other children's behaviour and their infringements of school rules (as perceived by Flynn). Flynn's school had implemented the use of social stories and comic strip conversations to try to help him to understand other people's behaviour and feelings.

4.9.2 On-task behaviour

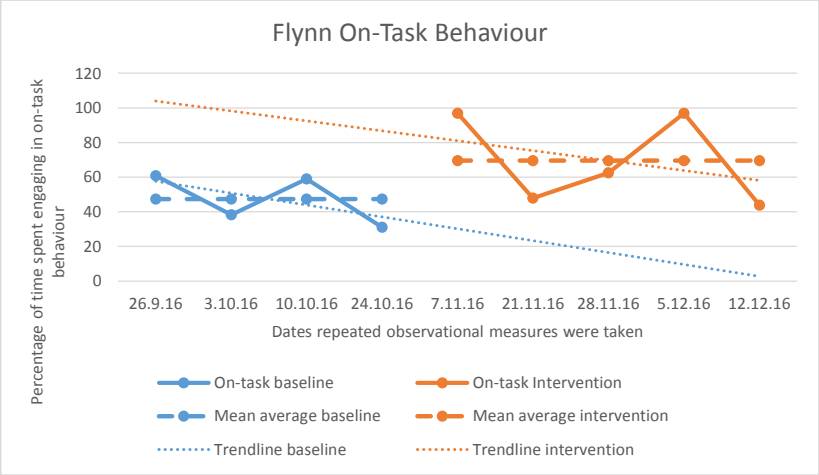


Figure 4. 17 A line graph to show the percentage of on-task behaviour across the baseline and intervention phases, with mean lines and trend lines (Flynn).

Feature	Visual Analysis of Flynn's On-Task Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	47.36%	69.58%	Yes
Changes in trend	Steady deceleration	Steady deceleration	No
Changes in variability	Range: 29.78%	Range: 53.12%	No
	Standard deviation: 14.88%	Standard deviation: 25.87%	
Immediacy of effect	There is some evidence of an immediate effect, as two of the first three data points of the intervention phase are higher than the last three data points of the baseline phase.		Yes
Overlap of data	There are two overlapping data points (22.22%).		Yes

Table 4. 18 A table summarising the visual analysis of the line graph for Flynn's on-task behaviour.

4.9.2.1 Summary of Flynn's on-task behaviour

The visual analysis indicates that there was an observable increase in the level of Flynn's on-task behaviour between baseline and intervention, with an increase of 22.22% between means. The trend line for the baseline phase is steadily decelerating, suggesting that the level of on-task behaviour may have continued to decrease without the introduction of the intervention. However, there appears to be a large amount of variation in the data across both phases. There seems to be an immediate, positive effect of intervention on Flynn's on-task behaviour. The percentage of overlapping data is low. According to Kratochwill et al.'s (2010) guidance, there are three indications of an observable effect and so it would suggest that there is moderate evidence of an impact of the intervention upon Flynn's on-task behaviour.

4.9.3 Off-task motor behaviour

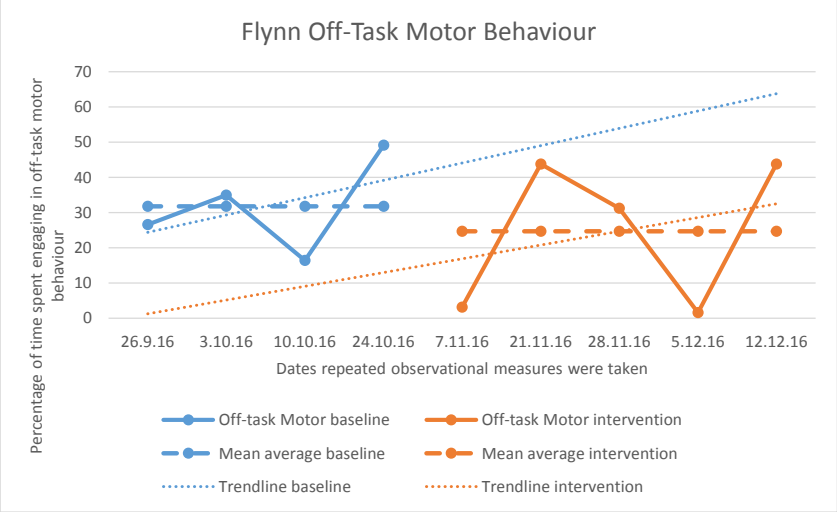


Figure 4. 18 A line graph to show the percentage of off-task motor behaviour across the baseline and intervention phases, with mean lines and trend lines (Flynn).

Feature	Visual Analysis of Flynn's Off-Task Motor Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	31.78%	24.69%	Yes
Changes in trend	Steady acceleration	Steady acceleration	No
Changes in variability	Range: 18.61%	Range: 42.19%	No
	Standard deviation: 13.87%	Standard deviation: 21.03%	
Immediacy of effect	There is no evidence of an immediate effect, as only one of the first three data points of the intervention phase is lower than the last three data points of the baseline phase.		No
Overlap of data	There are seven overlapping data points (77.77%).		No

Table 4. 19 A table summarising the visual analysis of the line graph for Flynn's off-task motor behaviour.

4.9.3.1 Summary of Flynn's off-task motor behaviour

The visual analysis suggests that there was an observable decrease in Flynn's off-task motor behaviour between baseline and intervention, with a decrease of 7.09% between means. The trend line for the baseline phase is steadily accelerating, suggesting that the off-task motor behaviour may have increased further despite the introduction of the intervention. There is a large variation in the data across both baseline and intervention phases, which means that it is hard to determine whether there is a reliable effect or not. There does not seem to be an immediate effect of intervention, despite the initial data point of the intervention phase being lower than the last three data points of the baseline phase. There is a high percentage of overlapping data between the baseline phase and the intervention phase. According to Kratochwill et al.'s (2010) guidance, there is only one indication of an observable effect. Therefore, it would suggest that there is no evidence of an impact of the intervention upon Flynn's off-task motor behaviour.

4.9.4 Off-task verbal behaviour

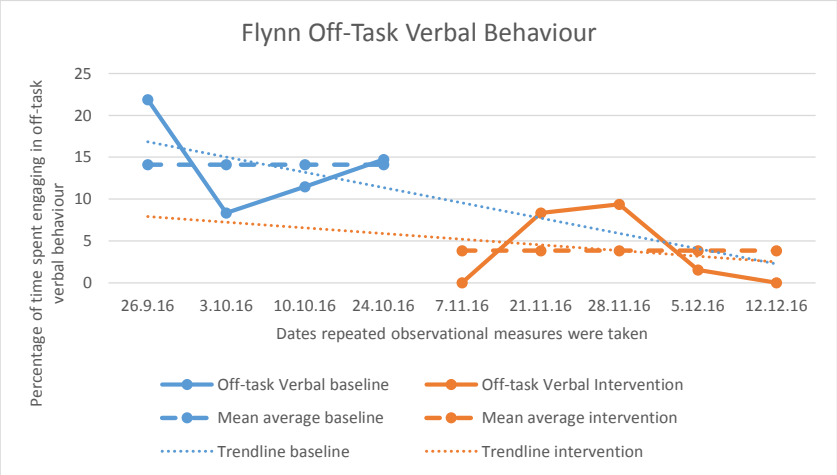


Figure 4. 19 A line graph to show the percentage of off-task verbal behaviour across the baseline and intervention phases, with mean lines and trend lines (Flynn).

Feature	Visual Analysis of Flynn's Off-Task Verbal Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	14.11%	3.85%	Yes
Changes in trend	Steep deceleration	Slight deceleration	No
Changes in variability	Range: 13.55%	Range: 9.38%	No
	Standard deviation: 5.81%	Standard deviation: 4.62%	
Immediacy of effect	There is some evidence of an immediate effect, as the first three data points of the intervention phase are lower than the last two data points of the baseline phase.		Yes
Overlap of data	There are three overlapping data points (33.33%).		Yes

Table 4. 20 A table summarising the visual analysis of the line graph for Flynn's off-task verbal behaviour.

4.9.4.1 Summary of Flynn's off-task verbal behaviour

The visual analysis suggests that there was an observable decrease in the level of Flynn's off-task verbal behaviour between baseline and intervention, with a decrease of 10.26% between means. However, the trend line for the baseline phase is steeply decelerating, suggesting that there may have been a decrease in this behaviour despite the introduction of the intervention. Furthermore, there is a large variation in the data across both baseline and intervention phases, which means that it is hard to determine whether there is a reliable effect or not. There appears to be an immediate, positive effect of intervention on Flynn's off-task verbal behaviour. There is a low percentage of overlapping data points. According to Kratochwill et al.'s (2010) guidance, there are three indications of an observable effect and so it would suggest that there is evidence of an impact of the intervention upon Flynn's off-task verbal behaviour.

4.9.5 Off-task passive behaviour

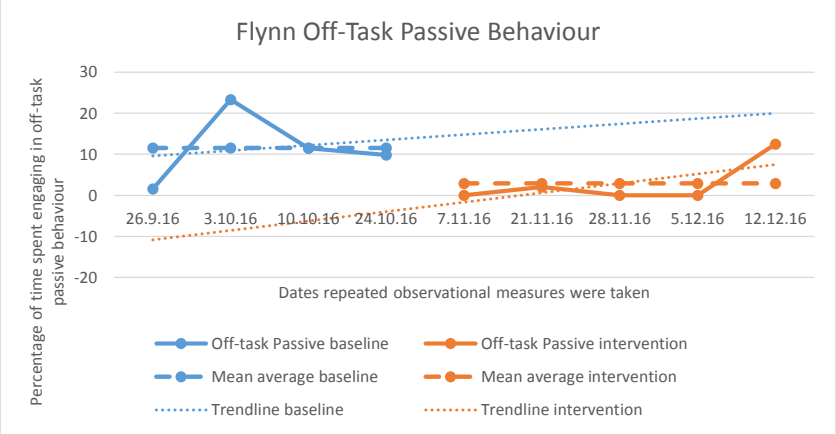


Figure 4. 20 A line graph to show the percentage of off-task passive behaviour across the baseline and intervention phases, with mean lines and trend lines (Flynn).

Feature	Visual Analysis of Flynn's Off-Task Passive Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	11.55%	2.92%	Yes
Changes in trend	Slight acceleration	Steady acceleration	Yes
Changes in variability	Range: 21.77%	Range: 12.5%	No
	Standard deviation: 8.97%	Standard deviation: 5.43%	
Immediacy of effect	There is evidence of an immediate effect, as the first three data points of the intervention phase are all lower than the last three data points of the baseline phase.		Yes
Overlap of data	There are four overlapping data points (44.44%).		Yes

Table 4. 21 A table summarising the visual analysis of the line graph for Flynn's off-task passive behaviour.

4.9.5.1 Summary of Flynn's off-task passive behaviour

The visual analysis suggests that there is an observable decrease in the level of Flynn's off-task passive behaviour, with a decrease of 8.63% decrease between means. The trend line for the baseline phase is slightly accelerating, suggesting that the off-task passive behaviour may have increased further without the introduction of the intervention. The variation in the baseline phase data is large, meaning that a stable baseline was not established prior to the intervention being introduction. This therefore affects the reliability of the data. There appears to be an immediate, positive effect of intervention on Flynn's off-task passive behaviour. There is a moderate amount of overlapping data, thus suggesting that there is some evidence that the intervention appeared to work initially. According to Kratochwill et al.'s (2010) guidance, there are four indications of an observable effect. Therefore, it would suggest that there is evidence of a moderate impact of the intervention upon Flynn's off-task passive behaviour.

4.10 Participant 7: George

4.10.1 George's profile

George, who was White British, was aged 7 years 7 months at the start of the baseline phase. George was in School 2, in a class of 24 pupils, supported by one teacher and one 1:1 teaching assistant. In terms of groupings, George was placed on a table of six pupils, with two girls and three boys.

George's teacher said that his classroom behaviour could be "defiant" when presented with something he didn't want to do. George was said to be very reluctant to write, leading to refusals to engage in writing activities. The school SENCo reported that George had difficulties relating to some pupils and would often call out to them in the classroom. George's school had implemented a quiet area in the classroom for him to use to calm down and had allocated George to work in a small group, supported by the classroom TA or the teacher during teacher-set work activities.

4.10.2 On-task behaviour

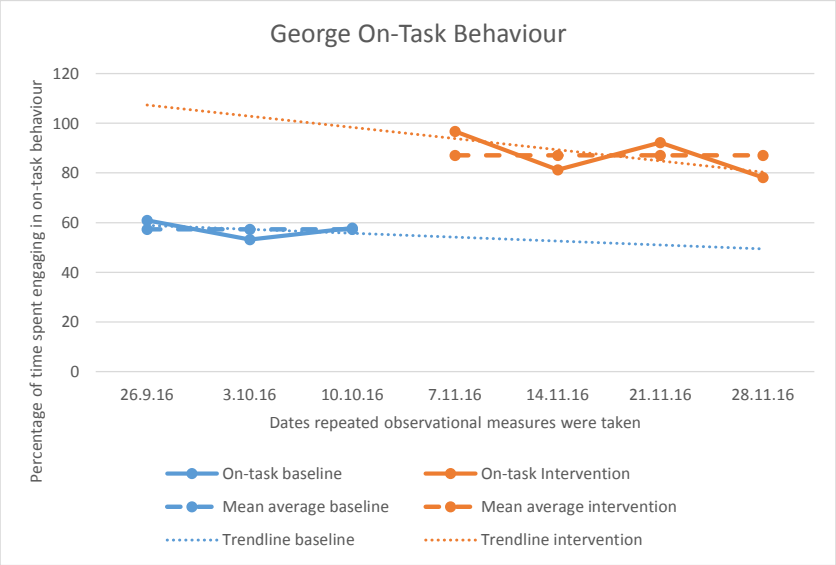


Figure 4. 21 A line graph to show the percentage of on-task behaviour across the baseline and intervention phases, with mean lines and trend lines (George).

Feature	Visual Analysis of George's On-Task Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	57.3%	87.08%	Yes
Changes in trend	Slight deceleration	Steady deceleration	Yes
Changes in variability	Range: 7.84%	Range: 18.65%	No
	Standard deviation: 3.95%	Standard deviation: 8.84%	
Immediacy of effect	There is evidence of an immediate effect, as the first three data points of the intervention phase are all higher than the last three data points of the baseline phase.		Yes
Overlap of data	There are no overlapping data points.		Yes

Table 4. 22 A table summarising the visual analysis of the line graph for George's on-task behaviour.

4.10.2.1 Summary of George's on-task behaviour

The visual analysis indicates that there was an observable increase in the level of George's on-task behaviour between baseline and intervention, with an increase of 29.08% between means. The trend line for the baseline phase is slightly decelerating, suggesting that the level of on-task behaviour may have decreased further without the introduction of the intervention. The variation between the data points is large, yet the figures show a similar pattern across both of the phases. There appears to be an immediate, positive effect of intervention on George's on-task behaviour and there are no overlapping data points. According to Kratochwill et al.'s (2010) guidance, there are four indications of an observable effect and so it would suggest that there is evidence of an impact of the intervention upon George's on-task behaviour.

4.10.3 Off-task motor behaviour

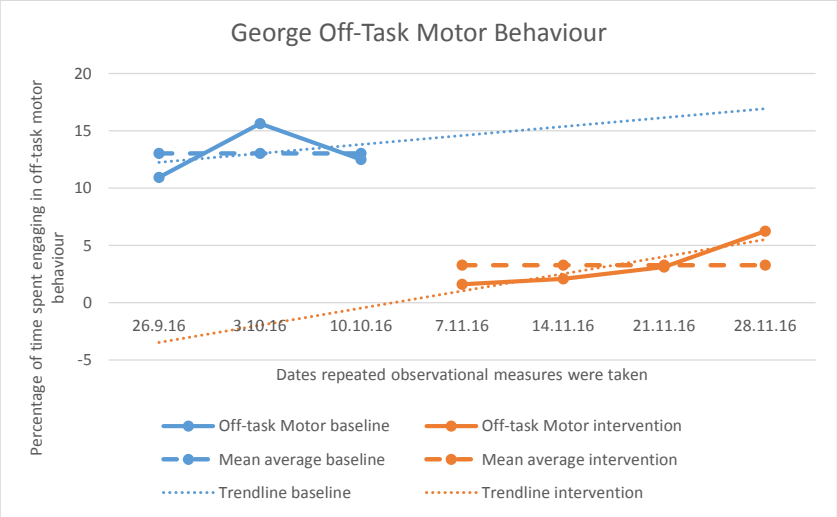


Figure 4. 22 A line graph to show the percentage of off-task motor behaviour across the baseline and intervention phases, with mean lines and trend lines (George).

Feature	Visual Analysis of George's Off-Task Motor Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	13.02%	3.27%	Yes
Changes in trend	Steady acceleration	Steady acceleration	Yes
Changes in variability	Range: 4.68%	Range: 4.64%	Yes
	Standard deviation: 2.38%	Standard deviation: 2.09%	
Immediacy of effect	There is evidence of an immediate effect, as the first three data points of the intervention phase are all lower than the last three data points of the baseline phase.		Yes
Overlap of data	There are no overlapping data points.		Yes

Table 4. 23 A table summarising the visual analysis of the line graph for George's off-task motor behaviour.

4.10.3.1 Summary of George's off-task motor behaviour

The visual analysis suggests that there was an observable decrease in the level of George's off-task motor behaviour between baseline and intervention, with a decrease of 9.75% between means. The accelerating trend line in the baseline phase suggests that this behaviour may have continued to increase without the introduction of the intervention. There is low variability in the data across both phases, which possibly indicates that the intervention had an effect. Furthermore, there appears to be an immediate, positive effect of intervention on George's off-task motor behaviour. There are no overlapping data points. According to Kratochwill et al.'s (2010) guidance, there are five indications of an observable effect and so it would suggest that there is evidence of an impact of the intervention upon George's off-task motor behaviour.

4.10.4 Off-task verbal behaviour

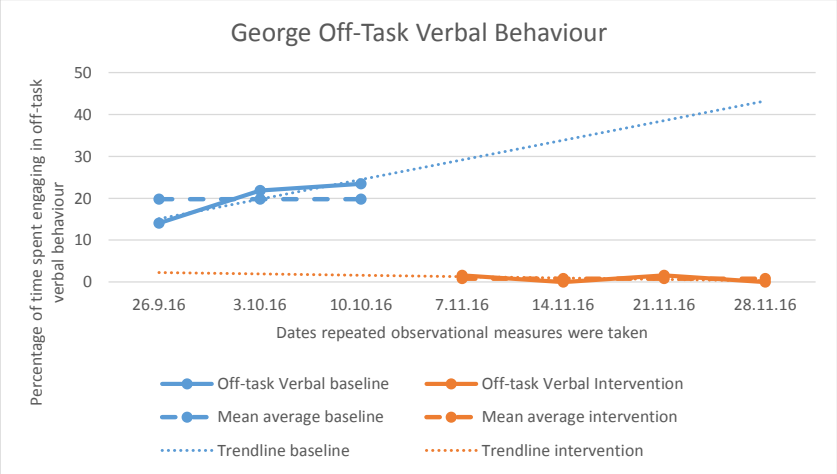


Figure 4. 23 A line graph to show the percentage of off-task verbal behaviour across the baseline and intervention phases, with mean lines and trend lines (George).

Feature	Visual Analysis of George's Off-Task Verbal Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	19.79%	0.79%	Yes
Changes in trend	Steep acceleration	Fairly horizontal, with a slight deceleration	Yes
Changes in variability	Range: 9.38%	Range: 1.61%	Yes
	Standard deviation: 5.03%	Standard deviation: 0.92%	
Immediacy of effect	There is evidence of an immediate effect, as the first three data points of the intervention phase are all lower than the last three data points of the baseline phase.		Yes
Overlap of data	There are no overlapping data points.		Yes

Table 4. 24 A table summarising the visual analysis of the line graph for George's off-task verbal behaviour.

4.10.4.1 Summary of George's off-task verbal behaviour

The visual analysis suggests that there was an observable decrease in the level of George's off-task verbal behaviour between baseline and intervention, with a decrease of 19% between means. The accelerating trend line in the baseline phase suggests that this behaviour may have continued to increase without the introduction of the intervention. Although there is large variability in the data in the baseline phase, the data in the intervention phase appears to be more stable. There appears to be an immediate, positive effect of intervention on George's off-task verbal behaviour. There are no overlapping data points. According to Kratochwill et al.'s (2010) guidance, there are five indications of an observable effect and so it would suggest that there is evidence of an impact of the intervention upon George's off-task verbal behaviour.

4.10.5 Off-task passive behaviour

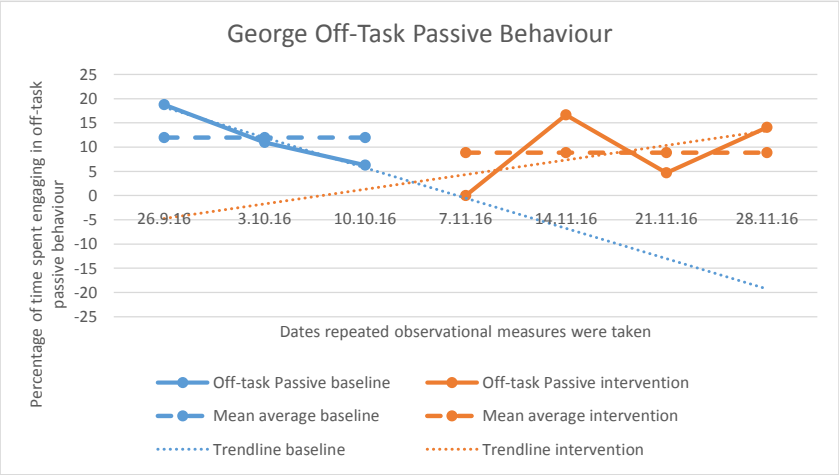


Figure 4. 24 A line graph to show the percentage of off-task passive behaviour across the baseline and intervention phases, with mean lines and trend lines (George).

Feature	Visual Analysis of George's Off-Task Passive Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	11.98%	8.86%	Yes
Changes in trend	Steep deceleration	Steady acceleration	No
Changes in variability	Range: 12.5%	Range: 16.67%	No
	Standard deviation: 6.31%	Standard deviation: 7.83%	
Immediacy of effect	There is some evidence of an immediate effect, as two of the first three intervention data points are lower than the three baseline data points.		Yes
Overlap of data	There are four overlapping data points (57.14%).		No

Table 4. 25 A table summarising the visual analysis of the line graph for George's off-task passive behaviour.

4.10.5.1 Summary of George's off-task passive behaviour

The visual analysis suggests that there was an observable decrease in the level of George's off-task passive behaviour between baseline and intervention, with a decrease of 3.12% between means. However, the decelerating trend line in the baseline phase suggests that this behaviour may have continued to decrease despite the introduction of the intervention. Furthermore, there is a large variation in the data across the intervention phase, which means that it is hard to determine whether there is a reliable effect or not. There appears to be some evidence of an immediate, positive effect of intervention on George's off-task passive behaviour. There is an overlap of 57.14% across the baseline and intervention phases. As the overlap occurs across the intervention phase, it is difficult to accept the hypothesis that the intervention had a positive effect on George's off-task passive behaviour. According to Kratochwill et al.'s (2010) guidance, there are only two indications of an observable effect and so it would suggest that there is no evidence of an impact of the intervention upon George's off-task passive behaviour.

4.10 Participant 8: Harley

4.10.1 Harley's profile

Harley, who was White British, was 7 years 1 month at the start of the baseline phase. Harley was in School 2, in a class of 24 pupils, supported by one teacher and one 1:1 teaching assistant. In terms of groupings, Harley was placed on a table of six pupils, with two girls and three boys.

Harley was identified for the intervention due to his reported frequent refusal to engage in tasks during lessons. He was said to engage in frequent arguments with his peers, both outside on the playground and inside the classroom, during the lessons. Harley was being supported by the Educational Psychology Service prior to the intervention for concerns surrounding learning and classroom behaviour. Harley's behaviour was described by his class teacher as "very immature" and he was said to be "very active" in the classroom. Linked to this, the teacher reported that Harley seemed to find it difficult to focus for more than a few minutes, before becoming distracted and talking to a peer about an off-task topic. In response to Harley's behaviour, his teacher explained that he would often work in a small group with adult support, to ensure that Harley remained focused on the set task.

4.10.2 On-task behaviour

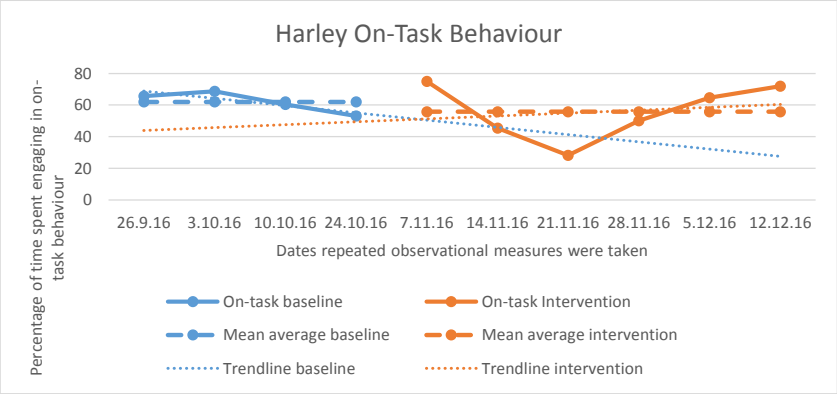


Figure 4. 25 A line graph to show the percentage of on-task behaviour across the baseline and intervention phases, with mean lines and trend lines (Harley).

Feature	Visual Analysis of Harley's On-Task Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	61.96%	55.82%	No
Changes in trend	Steady deceleration	Steady acceleration	Yes
Changes in variability	Range: 15.62%	Range: 46.88%	No
	Standard deviation: 6.84%	Standard deviation: 17.96%	
Immediacy of effect	There is no evidence of an immediate effect, as only one of the first three intervention data points is higher than the last three baseline data points.		No
Overlap of data	There are four overlapping data points (40%).		Yes

Table 4. 26 A table summarising the visual analysis of the line graph for Harley's on-task behaviour.

4.10.2.1 Summary of Harley's on-task behaviour

The visual analysis indicates that there was no observable increase in Harley's on-task behaviour when comparing the mean levels of the baseline phase and the intervention phase (a decline of 6.14%). However, the decelerating trend line in the baseline phase suggests that this behaviour may have continued to decrease without the introduction of the intervention. There is a large variation in the data across the intervention phase, which means that it is hard to determine whether there is a reliable effect or not. There does not seem to be an immediate effect of intervention, despite the first data point of the intervention phase being higher than the last three data points of the baseline phase. There is a moderate amount of overlapping data (40%), suggesting that there is some evidence of an effect of intervention, although this is questionable. According to Kratochwill et al.'s (2010) guidance, there are only two indications of an observable effect and so it would suggest that there is no evidence of an impact of the intervention upon Harley's on-task behaviour.

4.10.3 Off-task motor behaviour

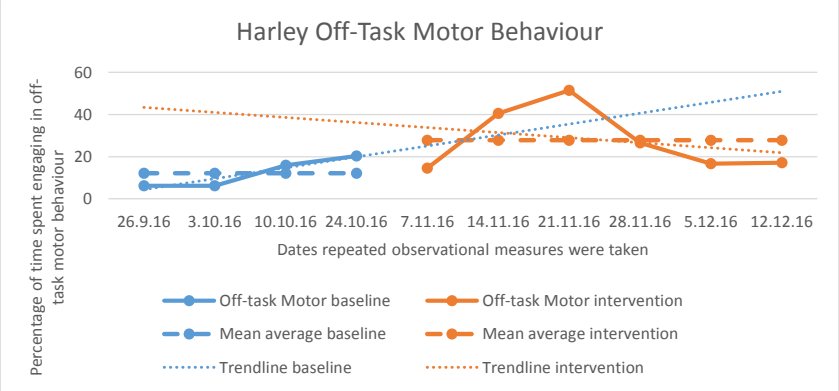


Figure 4. 26 A line graph to show the percentage of off-task motor behaviour across the baseline and intervention phases, with mean lines and trend lines (Harley).

Feature	Visual Analysis of Harley's Off-Task Motor Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	12.17%	27.86%	No
Changes in trend	Steep acceleration	Steady deceleration	Yes
Changes in variability	Range: 14.06%	Range: 36.98%	No
	Standard deviation: 7.07%	Standard deviation: 15.11%	
Immediacy of effect	There is no evidence of an immediate effect, as only one of the first three data points of the intervention phase is lower than the last three data points of the baseline phase.		No
Overlap of data	There are three overlapping data points (30%).		Yes

Table 4. 27 A table summarising the visual analysis of the line graph for Harley's off-task motor behaviour.

4.10.3.1 Summary of Harley's off-task motor behaviour

The visual analysis indicates that there was no observable decrease in Harley's off-task motor behaviour when comparing the mean levels of the baseline phase and the intervention phase (an increase of 15.69%). However, the accelerating trend line in the baseline phase suggests that this behaviour may have continued to increase without the introduction of the intervention. There is a large variation in data points across the intervention phase, which means that it is hard to determine whether there is a reliable effect or not. Furthermore, there does not seem to be an immediate effect of the intervention. There is a fairly low percentage of overlapping data points, indicating that there may have been an effect of intervention. According to Kratochwill et al.'s (2010) guidance, there are only two indications of an observable effect, thus suggesting that there is no evidence of an impact of the intervention upon Harley's off-task motor behaviour.

4.10.4 Off-task verbal behaviour

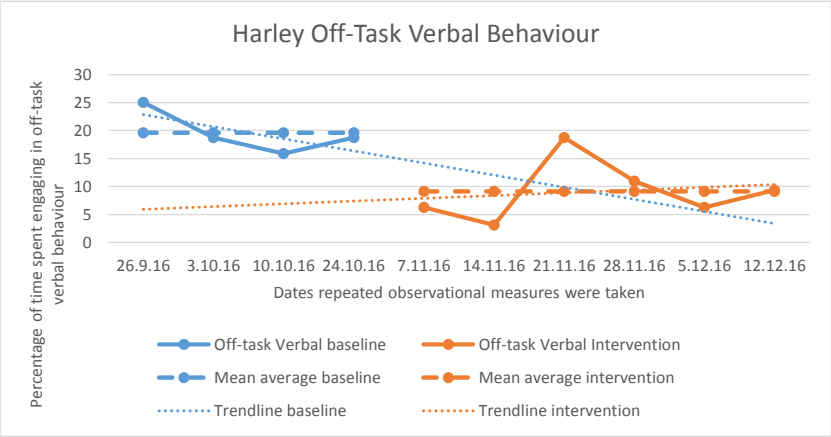


Figure 4. 27 A line graph to show the percentage of off-task verbal behaviour across the baseline and intervention phases, with mean lines and trend lines (Harley).

Feature	Visual Analysis of Harley's Off-Task Verbal Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	19.59%	9.12%	Yes
Changes in trend	Steep deceleration	Fairly horizontal, with a slight acceleration	No
Changes in variability	Range: 9.13%	Range: 15.63%	No
	Standard deviation: 3.85%	Standard deviation: 5.45%	
Immediacy of effect	There is some evidence of an immediate effect, as two of the first three data points of the intervention phase are lower than the last three data points of the baseline phase.		Yes
Overlap of data	There are three overlapping data points (30%).		Yes

Table 4. 28 A table summarising the visual analysis of the line graph for Harley's off-task verbal behaviour.

4.10.4.1 Summary of Harley's off-task verbal behaviour

The visual analysis suggests that there was an observable decrease in the level of Harley's off-task verbal behaviour between baseline and intervention, with a decrease of 10.47% between means. However, the trend line for the baseline phase is steeply decelerating, suggesting that there may have been a decrease in this behaviour despite the introduction of the intervention. There is a large variation in data points across the intervention phase, which means that it is hard to determine whether there is a reliable effect or not. There appears to be some evidence of an immediate, positive effect of intervention on Harley's off-task verbal behaviour. There is a fairly low percentage of overlapping data points, indicating that there may have been an effect of intervention. According to Kratochwill et al.'s (2010) guidance, there are three indications of an observable effect and so it would suggest that there is evidence of a moderate impact of the intervention upon Harley's off-task verbal behaviour.

4.10.5 Off-task passive behaviour

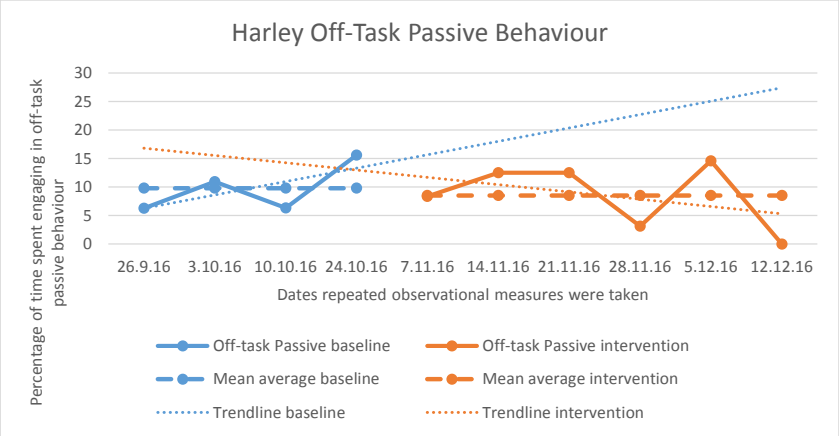


Figure 4. 28 A line graph to show the percentage of off-task passive behaviour across the baseline and intervention phases, with mean lines and trend lines (Harley).

Feature	Visual Analysis of Harley's Off-Task Passive Behaviour		Is there evidence of an effect?
	Baseline	Intervention	
Changes in level	9.79%	8.51%	Yes
Changes in trend	Steep acceleration	Steady deceleration	Yes
Changes in variability	Range: 9.37	Range: 14.58	No
	Standard deviation: 2.68	Standard deviation: 5.83	
Immediacy of effect	There is no evidence of an immediate effect, as the first three data points of the intervention phase are not lower than the last three data points of the baseline phase.		No
Overlap of data	There are eight overlapping data points (80%).		No

Table 4. 29 A table summarising the visual analysis of the line graph for Harley's off-task passive behaviour.

4.10.5.1 Summary of Harley's off-task passive behaviour

The visual analysis of level indicates that there was a slight decrease of 1.28% between the baseline and intervention phases. Furthermore, the accelerating trend line in the baseline phase suggests that this behaviour may have continued to increase without the introduction of the intervention. However, there is a large amount of variation in the data across the intervention phase, which means that it is hard to determine whether there is a reliable effect or not. There does not appear to be an immediate effect of intervention. There is also a high percentage of overlapping data points, indicating that Harley's behaviour largely remained at pre-intervention levels. According to Kratochwill et al.'s (2010) guidance, there are only two indications of an observable effect, thus suggesting that there is no evidence of an impact of the intervention upon Harley's off-task passive behaviour.

4.11 Inter-Observer Agreement for Visual Analysis

Some researchers have argued that a major limitation of visual analysis is that it can be subjective (e.g. Kazdin, 2003). In order to buffer this limitation, inter-observer agreement was conducted between the researcher and a fellow Trainee Educational Psychologist who was also familiar with the processes of visual analysis.

The independent rater was asked to rate each graph according to the following statement:

"There is a significant improvement in on-task behaviour/off-task motor behaviour/off-task verbal behaviour/off-task passive behaviour when the interacting with, and reading to, a dog intervention is introduced"

The rating was from 1 (disagree) to 3 (agree). Table 4.30 displays the inter-observer agreement for each participant.

Participant	Inter-Observer Agreement Score
Alex	100%
Bailey	100%
Charlie	75%
Eric	100%
Flynn	100%
George	100%
Harley	100%

Table 4. 30 A table to show the summary of the inter-observer agreement for each participant.

4.12 The class teachers' perceptions of the impact of the intervention on children's behaviour

Following the collection of observational data regarding the children's behaviour, the researcher had a semi-structured interview with both of the class teachers separately. A full transcript may be found in Appendix 11. An overview of the interviews has been provided here, with comments relating to individual participants presented in the discussion.

4.12.1 School 1 (Alex, Bailey and Charlie)

The class teacher generally felt that the intervention had had little impact on behaviour, over and above what would be expected from maturation over the course of an academic school term. From the interview, it seemed that one benefit not measured through observable changes in behaviour was that the children felt special as they were the ones who had been chosen to read to the dog. However, this is purely speculative as the pupils' views were not measured in this study.

4.12.2 School 2 (Eric, Flynn, George and Harley)

The interview revealed mixed results regarding each pupil. Overall, the teacher felt that there was better engagement with the academic task when the children returned from the intervention and that they displayed a more positive attitude towards learning. Like the class teacher from School 1, the class teacher from School 2 also felt that the intervention had given the children a positive experience which had made them feel special.

4.13 Summary of Results

This chapter concludes with summary of the results found in the present study, as shown in Table 4.31.

Participants' names	On-task behaviour	Off-task motor behaviour	Off-task verbal behaviour	Off-task passive behaviour	Did the intervention have an effect on classroom behaviour?
Alex	No effect	No effect	No effect	No effect	No effect
Bailey	No effect	No effect	Yes	No effect	Yes
Charlie	Yes	No effect	No effect	Yes	Yes
Eric	No effect	No effect	No effect	Yes	Yes
Flynn	Yes	No effect	Yes	Yes	Yes
George	Yes	Yes	Yes	No effect	Yes
Harley	No effect	No effect	Yes	No effect	Yes

Table 4. 31 A table summarising the results for each participant.

Chapter 5: Discussion

5.1 Introduction to Chapter

The present study employed a series of single-case experiments in order to establish what effects interacting with, and reading to, a dog has upon behaviour when the children return to their classroom.

This chapter begins with a summary of the main findings of this study from the seven single cases, with links to the research question detailed in the literature review (Section 2.7). The methodology of single-case experimental designs will be evaluated. This chapter will then turn to a discussion around the possible implications of the findings and how these may fit within the current evidence base for the use of dogs in schools as an intervention for behaviour. This discussion will close with an acknowledgement of the limitations of the current research and topics for future research.

5.2 Summary of results for each participant

This section will reflect the results for each participant in relation to the overarching research question: what effects does interacting with, and reading to, a dog have upon individual children's classroom behaviour?

5.2.1 Alex's classroom behaviour

Visual analysis suggested that there was no observable impact of interacting with, and reading to, a dog across the four areas of Alex's classroom behaviour. There were slight indications that the intervention may have had an impact in time. For example, there was no observable increase in Alex's on-task behaviour following the introduction of the intervention. However, the trend lines indicate that without the introduction of the intervention, the on-task behaviours may have continued to decrease. In contrast, the accelerating trend line for the intervention phase possibly indicates that the levels of on-task behaviour were increasing, and, with time, perhaps the intervention may have had a visually observable effect on Alex's on-task behaviour.

Furthermore, there was no observable decrease in Alex's off-task verbal behaviour following reading to the dog. However, the trend line for the baseline phase indicates that this behaviour was increasing and it is possible that it may have continued to increase without the introduction of the intervention, although

the variability in data points in the intervention phase somewhat limits the conclusions that can be drawn from the trend lines.

With regard to results indicated by the class teacher, it was reported that the intervention “brought Alex out of his shell” and that it improved his confidence with reading.

5.2.2 Bailey’s classroom behaviour

Visual analysis indicated that there was an observable change in only one aspect of Bailey’s classroom behaviour: off-task verbal behaviour. Although the deceleration of the trend line for the baseline phase suggests that this behaviour may have continued to decrease without the introduction of the intervention, the instability of the baseline compared to the relative stability of the intervention phase contradicts that assumption. The stability of the data in the intervention phase indicates that there was an effect of the intervention, as the off-task verbal behaviour consistently remained at a lower level, as further indicated by the fact that there was no overlapping data between the two phases.

No additional results were reported by the class teacher.

5.2.3 Charlie’s classroom behaviour

There appeared to be an observable effect of intervention of interacting with, and reading to, the dog across two aspects of Charlie’s classroom behaviour. Reading to a dog arguably has had an observable increase on Charlie’s on-task behaviour. Despite the accelerating trend line in the baseline phase, there is some evidence of an increase in level and immediacy of effect, alongside a low percentage of overlapping data between the baseline and intervention phase. There is also an observable decrease in Charlie’s off-task passive behaviour. The trend line for the baseline phase indicates that this behaviour may have continued to increase had the intervention not been introduced.

In terms of observable behaviour noted by the class teacher, it was reported that Charlie’s confidence in reading improved.

5.2.4 Eric’s classroom behaviour

Visual analysis suggested that the intervention of interacting with, and reading to, a dog had an impact upon one aspect of Eric’s classroom behaviour. Eric’s

off-task passive behaviour observably decreased during the intervention period. Furthermore, the levels of observed off-task passive behaviour arguably remained consistently low during the intervention phase. However, in light of the other results found in Eric's case, with increases observed in off-task motor and off-task verbal behaviour, it could be that Eric was engaging in these behaviours instead, although this is speculative.

There was no observable increase in Eric's on-task behaviour, nor were there observable decreases in Eric's off-task motor or verbal behaviour.

The class teacher reported that Eric was "ready to sit down and learn" following his return to the classroom having read to the dog. It was also reported that Eric appeared to be happier in his demeanour following reading to the dog: he was smiling more and "he was calm". Interestingly, this "readiness to learn" does not appear to have impacted upon Eric's observable on-task and off-task classroom behaviour.

5.2.5 Flynn's classroom behaviour

Visual analysis of the results indicated that reading to a dog had a positive effect on Flynn's observable on-task, off-task verbal or off-task passive behaviours. However, for both on-task behaviour and off-task verbal behaviour, the trendlines indicated that the behaviour was increasing (on-task) or decreasing (off-task) despite the introduction of the intervention. Consequently, the results cannot be conclusively attributed to the intervention.

There did not appear to be an observable decrease in Flynn's off-task motor behaviour; across both phases, as Flynn's on-task behaviour decreased, the off-task motor behaviour appeared to increase.

There were no specific comments made by the class teacher regarding Flynn's observable behaviour following the intervention.

5.2.6 George's classroom behaviour

There appeared to be an observable effect of intervention of reading to the dog across three aspects of George's classroom behaviour. The baselines were fairly stable for each area, thus giving weight to the interpretation of the results. George's on-task behaviour slightly decreased and his passive off-task behaviour slightly increased when the topic was maths. Interestingly, there was

also a dip in George's on-task behaviour during the baseline stage when the topic was maths. Therefore, as George's on-task behaviour remained higher on the 14.11.16 than it was on the 3.10.16, it could be that the interaction with the dog acted as a buffer to George's off-task behaviour.

The class teacher did not report any specific changes to George's classroom behaviour following the intervention.

5.2.7 Harley's classroom behaviour

Visual analysis of the results indicated that reading to a dog had no overall positive effect on Harley's observable on-task, off-task motor or off-task passive behaviours. Interestingly, during the intervention phase, as Harley's on-task behaviour decreases, the off-task motor behaviour appears to increase.

The results indicate that reading to a dog may have had a positive impact upon Harley's off-task verbal behaviour. However, due to the deceleration in the baseline trend line, the changes observed between phases cannot be conclusively attributed to the intervention. Furthermore, the decrease in verbal behaviour may possibly be linked to increases in other off-task behaviours, such as off-task motor behaviour instead.

The class teacher reported that Harley appeared to be happier following the intervention, as demonstrated through his "excitement when [he] was talking about it" and that he seemed to be smiling more. It was also reported that Harley appeared to be ready to learn following the intervention. Interestingly, this "readiness to learn" does not appear to have impacted upon Harley's observable on-task and off-task classroom behaviour.

5.3 Interpretation of findings

There was some evidence that the intervention of interacting with, and reading to, a dog had some impact on six of the seven participants' classroom behaviour. For three participants, this equated to positive changes in one aspect of classroom behaviour: for Bailey and Harley, off-task verbal behaviour; for Eric, off-task passive behaviour. For one participant (Charlie), the intervention had an observable impact upon two aspects of classroom behaviour: on-task behaviour and off-task passive behaviour. The intervention had an observable impact upon three aspects of class behaviour for George

and Flynn. For both, there were positive differences observed in on-task behaviour and off-task verbal behaviour. For Flynn, there was an impact upon off-task passive behaviour and for George, off-task motor behaviour. Visual analysis highlighted the changes in mean levels for all of these results.

A possible explanation for these findings is that interacting with a dog is purported to be a calm and relaxing activity (Beetz et al., 2012). This could mean that the children felt more ready to learn when they returned to the classroom, compared to the time prior to the intervention. This may be linked to Geist's (2011) theory that interventions involving animals may help to break cycles of behaviour and help to support children in reframing their behaviour.

Alternatively, the reduction in some types of off-task behaviour and increases in on-task behaviour may have occurred due to external factors within the participants' environment. For example, changes may have happened at home, or the participants may have been involved in other interventions targeting their learning (such as Read Write Inc for literacy) which may have had a knock-on effect on their classroom behaviour.

The results indicated that different categories of classroom behaviour were affected for different participants. For example, only George's off-task motor behaviour observably decreased, whereas slight increases were observed for other participants, such as Eric and Harley. Increases for on-task behaviour were observed in the cases of Charlie, Flynn and George, whereas for Alex and Harley, the on-task behaviour appeared to decrease slightly. Decreases in off-task verbal behaviour were observed for Bailey, Flynn, George and Harley. In comparison, the same category of behaviour increased for Alex and Eric. While the data for Charlie, Eric and Flynn showed a decrease in off-task passive behaviour, a slight increase was observed for Alex.

A further explanation for the differences between the results may be the timings of the intervention between pupils. For example, George went straight from the playground into the intervention, returning to the classroom 15 minutes of the lesson starting. At this point, the teacher was able to explain the instructions to him, as the rest of the class were working. In contrast, Harley completed the intervention in the middle of the lesson, meaning that he was abandoning a task

before coming back to it 20 minutes later, when the rest of the group would be further ahead. It may be possible that this interruption to his learning meant that he found it harder to settle back into the classroom routine when he returned.

Another variable that may help to explain the differences in the results is the way in which each child felt about dogs prior to the study. This was a feature not explored within this study, but a variable which previous research has indicated makes a difference to results. For example, results from Friedmann's (2000) study indicated that when reading aloud to a dog, adults with a favourable attitude towards dogs experienced significantly lower blood pressure compared to adults with more negative attitidues towards dogs. Another example of how predisposition towards animals may affect results is a study by Katcher and Wilkins (2000). In their "Companionable Zoo" study, a group of 12 to 15 year old boys with Conduct Disorder completed an intervention which involved interacting with and caring for animals at the zoo. During the intervention, two subsets emerged: those who were highly motivated towards learning about the animals and their care and those who were minimumly engaged. Results indicated that although there was an initial decline in aggression across the group, those who were more highly motivated maintained lower levels of aggression six months after the intervention finished. In comparison, the aggression levels of those who were minimally engaged returned to pre-treatment levels. With regard to the current study, it is possible that there was variability between the participants in terms of their predisposition towards animals and, based upon the evidence of previous research, this may have affected the outcomes of the intervention.

An additional variable is the differences between the pupils in how much time they spent between interacting with or reading to the dog. The researcher did not observe the intervention and therefore no data was collected as to the individual interactions between the participants and the dog. Consequently, there may have been a reciprocal relationship between the activity the participant did with the dog (such as reading or talking to the dog) and their results. This is an avenue for future research to explore.

These findings suggest that interacting with, and reading to, a dog may be successful for improving classroom behaviour in certain aspects. However, the large variability in the data hinders any firm conclusions from being drawn. The variability in the data possibly reflects the influences that external factors may have had. It also demonstrates 'real world' research in that one cannot control for every variable in the setting of an everyday classroom.

Finally, the current research was significant as it was the first to explore the possibility of whether the intervention of interacting with, and reading to, a dog could be used to improve classroom behaviour of pupils identified by their teachers as displaying high levels of off-task behaviour. As the children were working with an experienced dog handler and therapy dog, it is difficult to ascertain how much of an impact was due to the presence of the dog handler, who tailored her feedback to each participant following the completion of reading the book. This was important, as each of the participants had a different confidence level in their own reading ability that was not being measured in the present research. Therefore the dog handler slightly adjusted the feedback to the participant. For example, with errors made reading aloud, the dog handler did not correct these in less confident readers and would ask them to retell the story to Pebbles in their own words. In comparison, with more confident readers, the dog handler would ask them to go back and check that they had read the word correctly. Consequently, it is not known how much difference the effects of the dog handler's soft approach made to the participants' behaviour. This is also a further variable, as it is not known whether a different dog handler may have elicited different results if this study were to be replicated.

5.4 Links to Research

The synthesis from the systematic review revealed that interaction with a dog may facilitate increases in social behaviour (e.g., Kotrschal & Ortbauer, 2003, which examined group behaviour, and Esteves & Stokes, 2008). Interaction through reading to a dog positively impacted upon four of the seven participants' off-task verbal behaviour (i.e., they talked less about off-task topics). It may be possible that this is because the children spent time talking to the dog instead and so did not feel the need to continue to talk about off-task topics when they returned to the classroom. The dog handler commented that

Bailey and Flynn were particularly talkative with the dog (although this was not measured formally); these participants' data showed an observable decrease in off-task verbal behaviour.

The wider literature review revealed that interacting with a dog may have a positive effect upon increased feelings of calm through decreased blood pressure and increases in oxytocin (Beetz et al., 2012). Although this was not measured directly in the present study, the topic arose during the teacher interview with regard to George. The teacher noted that George often had arguments about playground games with other children during the unstructured lunch break. She reflected during the interview (Appendix 11) that, "First thing after lunch [the intervention] was beneficial – if anything had happened at lunch then it [reading to the dog] allowed them [George] to come back in much calmer." It is possible that reading to a dog increased his feelings of calm through reading to the dog. This also links to reports from the children interviewed in Anderson and Olson's (2006) study which highlighted the feelings of calm the children felt when interacting with a dog.

Previous research indicated that reading to a dog could increase on-task reading behaviour (Bassette & Taber-Doughty, 2013). The present research explored whether this result extended to general on-task classroom behaviour. It appears that for three of the participants (Charlie, Flynn and George) reading to a dog did have a positive impact upon on-task classroom behaviour. This relates to an earlier question posed by Gee, Fine and Schuck (2015), who wondered how interaction with animals may impact upon children's readiness for learning. It seems that for these participants that interacting with, and reading to, a dog appeared to have this impact. Further exploration in conversation with the dog handler around treatment fidelity revealed that the intervention ran slightly differently between Charlie and George compared to Flynn. Charlie and George chose a book to read to the dog and followed the story through before returning to class. In comparison, the dog handler noted that Flynn choose a story for the dog, but spent much more time talking around the story, explaining things to the dog, pointing out pictures and 'teaching' the dog, as opposed to simply 'reading' to Pebbles. It seems that two different approaches to the intervention led to similar outcomes for the three children. It

could be that the children bonded with the dog in different ways. The importance of bonding with animals was highlighted in the literature review through Geist's (2011) framework. Perhaps the bonding experience that these participants had with the dog supported the observable changes in their behaviour.

Although attachment behaviours were not explicitly explored in this study, the interviews with the class teachers indicated that there may be links to be made. For example, the teacher from School 2 suggested that the intervention of interacting with and reading to a dog was, "pleasurable and calm". This links to conclusions drawn from Tribenbacher's (1998) study that dogs are viewed as safe and nurturing figures. Furthermore, the teacher described the children's apparent view of the intervention: "from their perspective there was no pressure". Levinson (1970) discussed the possibility that dogs are non-judgemental and the interactions between a child and a dog are non-verbal.

With regard to specific cases, the results indicated that the intervention was possibly more successful for George and Flynn. Interpretation drawing upon Attachment Theory would suggest that these two children felt safe and secure in the dog's presence (Levinson, 1970). The dog may have formed a 'transitional object' from which the children felt calmer and ready to return to the classroom to learn. In light of these exploratory reflections, future research may seek to further understand the impact that interacting with and reading to a dog may have upon attachment behaviours in a classroom setting.

5.5 Evaluation of Research Methodology

5.5.1 The use of a Single-Case Experimental Design (SCED)

The present research utilised an AB single-case experimental design in order to explore the possible effects interacting with, and reading to, a dog may have had on children's on-task and off-task behaviour in the classroom. This study attempted to extend the previous case-study research conducted by Bassette and Taber-Doughty (2013), whose study focused on on-task reading behaviour and who used an ABA design, where the intervention was taken away and effects recorded.

This study's AB design attempted to unpick the natural trends in behaviour prior to the introduction of the intervention (interacting with, and reading to, a dog). However, as highlighted in Section 3.4.1.2.1, the AB design has limitations. For example, Barlow, Nock and Hersen (2009) assert that any changes observed in the intervention ('B') phase cannot be solely attributed to the intervention that was introduced and argue that external factors may also have affected the results. In response to this, future research may explore an ABAB design, where the intervention is 'withdrawn' and it could be posited to the children that it is another group of children's turn to read to the dog, with the expectancy that it will be their turn again. This would help to buffer against potential ethical implications of withdrawing an intervention and it would allow for further exploration of any potential changes in behaviour observed during the first intervention phase. It was not possible to employ this design in the present research due to time constraints.

There are several limitations with the current study which will now be discussed.

5.5.2 Stability of Baseline Phases

In order to draw firm conclusions regarding any changes observed in the intervention phase, a stable baseline must be established (Barlow, Nock & Hersen, 2009). Stable baselines allow researchers to gather information regarding natural behaviour. It also supports researchers in making predictions as to how behaviour may continue without intervention. If a causal relationship is to be inferred, a stable baseline must be established (Barlow et al., 2009). However, within the present research, it was not possible to establish stable baselines across all four categories of behaviour for each of the seven participants. This is demonstrated in the large variability in the data shown in the line graphs in the results chapter. It was not possible to wait for a stable baseline to be achieved across all four categories for each participant, as it would have meant withholding the intervention, an ethical implication. Furthermore, time constraints on the class teachers' time and the dog handler's time meant that the intervention had to be introduced at the point of the half term holiday. Had the researcher waited, the participants would have had fewer weeks doing the intervention.

5.5.3 Limitations of Visual Analysis

Visual analysis was used to analyse data in the current research. The limitations associated with visual analysis were previously explored in Section 3.8.1.3. For example, Brossart et al. (2006) noted that judgements made using visual analysis may be unreliable. It was recognised that statistical analysis can sometimes be used to analyse the results from SCED data. Statistical analysis was deemed inappropriate for use with data from the current research, as it did not meet criteria (such as minimum number of data points per phase). In order to limit the issues around subjectivity and reliability associated with visual analysis, inter-observer checks were carried out alongside a fellow trainee familiar with the processes of visual analysis. The results from these check indicated a high level of agreement, which adds weight to the reliability of the outcomes of the visual analysis.

5.5.4 Limitations involving timings

5.5.4.1 School holidays

The half term holiday, which intersected the baseline phase and the intervention phase, was a week different between School 1 and School 2. Although each participant had the opportunity to have the same number of intervention sessions interacting with, and reading to, the dog, the length of the baseline phases was slightly different. For participants in School 1 (Alex, Bailey and Charlie), it was possible to take measures across five baseline data points. For participants in School 2 (Eric, Flynn, George and Harley), it was possible to take measures at four baseline data points.

The half term holiday itself may also have served as a potential limitation, as the participants' behaviour may have improved after a week off school, despite the introduction of the intervention. It could be argued that a week from school allowed the participants to come back ready to learn. This limitation must be taken into account when considering the results of this study.

5.5.4.2 Classroom timings

The participants were consistently observed on a Monday afternoon (School 2) or a Thursday afternoon (School 1). However, it was not always possible to collect data for certain participants, as the intervention overran in some cases. For example, as Charlie was observed last, if the intervention had overran, it

meant that it was not always possible to observe him following him reading to the dog. The concept of 'real world' research reflects this issue, as the present study took place in a classroom where schedules can change from day to day. As it was not possible to observe Charlie's behaviour on two occasions, data regarding the potential effects of the intervention may have been missed. Therefore, an opportunity to strengthen or refute conclusions regarding Charlie's results may have been affected.

With regard to George, for the final two sessions he expressed that he did not want to read to the dog. The timings for George's intervention meant that he would have had to have left the playground five minutes early and he explained that he wanted to continue playing football with his friends. When it was time for him to come in from the playground, he said that he would prefer to remain in the classroom. This has links to real world research, as well as George's right to withdraw. This was discussed in the debrief with George and he gave verbal permission for the rest of his results to be included.

5.5.5 Researcher Bias

One area which may have been affected by researcher bias is that the repeated observational measures were conducted by the researcher. It may be possible that the researcher coding the behaviour was unconsciously or consciously biasing the codes being recorded.

It was hoped that the use of inter-rater reliability could be used to minimise this bias. On two occasions, the researcher was joined by a second, independent rater, who was given the list of codes and access to the BOSS application. The BOSS application should allow users to access a spreadsheet of how each interval was coded (either as on-task behaviour, off-task motor behaviour, off-task verbal behaviour or off-task passive behaviour). This spreadsheet would then have allowed for the calculation of Cohen's Kappa through the comparison of how each interval was rated by the two coders. However, technical difficulties meant that the application would not allow access to the spreadsheet of data. Consequently, the reliability of the data may be affected.

5.5.6 Threats to Internal Validity Revisited

Table 5.1 revisits the threats to validity highlighted in Section 3.9.1 (Cook and Campbell, 1979). The table relates how each threat related to the present research and how the outcomes may have limitations for this study.

Threat to internal validity	Explanation of threat	How the threat related to the present research
History	External factors which change in the participants' environments other than those directly related to the research.	The children did not begin any new interventions relating to classroom behaviour. There were no staff changes and there were no major changes in the school settings for the duration of the study. Furthermore, the class teachers reported that there were no major life changes for the participants involved that may have affected their behaviour during the study. Therefore, anomalous outlying data points may be attributed to variables outside of the researcher's control, such as the behaviour of the other pupils within the classroom or the participants' views on the lesson content.
Testing	Changes following practice and experience gained on pre-tests by the participants.	The participants' behaviour was not tested or measured other than through the researcher's use of an observable behaviour application which eliminates the likelihood of practice effects.
Instrumentation	Certain features of the way participants were measured differed between pre-test and post-test.	In this study, this may lead to a definition of behaviour being widened or narrowed as the observer becomes familiar with the situation. The researcher made efforts to complete the repeated measures for each participant across the entirety of the baseline and intervention phases,

		with the exception of one week when measures had to be taken on a different day due to the researcher's university commitments (See Section 5.6 Observational Measures). With regard to the definitions of behaviour being widened or narrowed, the researcher completed two joint observations with an independent observer. Unfortunately, due to the way in which the data was collected, it was not possible to compute the Cohen's Kappa to statistically analyse this data. The researcher recognises this to be a threat to the validity of the data collected in the present research.
Regression	If atypical participants are recruited, scores tend to show regression to the mean.	Participant 4 was eliminated as his results showed that his on-task behaviour was above 75% (see Section 3.5.1.1.3). Therefore this participant was not deemed to be demonstrating a level of off-task behaviour consistent with the definitions set out for inclusion for the study.
Mortality	Participants dropping out of the study.	None of the participants dropped out of this study.
Maturation	Growth or change in the participants which is unrelated to the conditions of the study.	The data collected in this study is vulnerable to maturation, as the repeated measures were collected over a period of time in a naturalist classroom setting. In such contexts it is impossible to control for this threat.
Hawthorne effect	The psychological effects which may occur simply from knowing that you are participating in an intervention.	Blinding was not possible in this study and so it is recognised that this is a limitation in the present research. There exists the possibility that the

		participants were aware that they were being observed and so they may have changed their behaviour in the researcher's presence. However, neither of the class teachers reported that there was a change in the participants' behaviour while the researcher was in their classrooms.

Table 5. 1 A table summarising the threats to internal validity relating to the present research.

5.6 Observational Measures

Smith (2012) notes that the use of direct observation is the most common form of repeated measures in studies using a single-case experimental design. However, observational measures need to be valid and reliable and thus free from observer bias and participant error.

In order to limit the effects of participant error, the observations were completed on the same day, at the same time, each week, for each participant. The only exception to this is that the measures for the fifth baseline data point for Alex, Bailey and Charlie were taken on a Tuesday instead of the usual Thursday. However, this change in day does not explain the anomalous outlying data points on some graphs. All other repeated measures for these three participants were taken at the same time every Thursday afternoon. Therefore, this consistency strengthens the validity and reliability of the conclusions drawn regarding the impact that the intervention of reading to a dog upon the participants' classroom behaviour.

Horner et al. (2005) recommend certain actions are carried out in order to increase the validity of observational measures. Table 5.2 demonstrates how these recommendations were met in the present research.

Action to increase validity of observational measures	How this was met in the present study

The observable behaviour is measured repeatedly	Weekly observations were taken across the period of the academic Autumn term
The observable behaviour is assessed for consistency	From the 68 observations, six of these were joint observations by the researcher and either with a fellow Trainee Educational Psychologist, or with a member of school staff (6.97%). Unfortunately it was not possible to calculate Cohen's kappa for the research due to technological issues with the way in which the data was saved. The researcher recognises this to be a limitation of the data.

Table 5. 2 A table to show how the actions to increase validity of observational measures were met in the present study.

5.7 Intervention Integrity

As no official guidance for reading to dogs is provided by the charity, intervention integrity was maintained through provision of a clear definition of the activities with the dog handler (see Section 3.5.3). The procedure was outlined and discussed with the dog handler prior to the introduction of the intervention and so treatment fidelity checks could be carried out by the dog handler. This also ensured continuity between each participant. Furthermore, by each child reading to the same dog and dog handler each week, continuity was ensured for each participant.

However, it must also be noted that the dog handler's self-checks may have created threats to integrity. For example, it may have created bias. Furthermore, as the children were allowed to choose different books to read to the dog, the time spent interacting with the dog afterwards may have affected results. The implications for future research are discussed in Section 5.9.

5.8 Implications for EP Practice

The use of therapy dogs in schools is increasingly being used as an intervention for behaviour (Pidd, 2017). The present study has contributed to the literature focusing on the possible impact that interacting with, and reading to, a dog may have upon children's classroom behaviour. The present research offers some tentative support that this intervention may positively influence on-task and off-task classroom behaviour. In six cases, there was support of positive change,

as evidenced through observational measures. The literature review demonstrated that there is currently no evidence which seeks to explore the effects that interacting with a dog may have once the child returns to the classroom. Therefore this study was important, as it added to the limited amount of research available within the more general area examining the effects of canine-assisted interventions in schools.

The variability in the results has demonstrated that if schools were to employ this type of behavioural intervention for individuals, then it would have to be carefully managed and measured. Although it was not explored in this study, previous research has indicated that individuals engaged in Animal-Assisted Activities and Interventions are more responsive to the outcomes when they have positive predispositions towards animals (Friedmann, 2000; Melson & Fine, 2015). Therefore, this should be measured to find out if there are positive correlations within the context of the present study.

Another point for consideration would be the way in which children are reintegrated back into the classroom after interacting with, and reading to, the dog. The class teacher from School 2 explained that she had noticed a difference between the children who had been reintegrated into the teacher-led group and those who were not (Appendix 11). It was reported by the teacher that when the children were reintegrated, “there was noticeably better engagement and a much better attitude towards the task”. In comparison, the teacher noted that when the children did not reintegrate back into an adult-led group, “It wasn’t particularly seamless for them. They’d had this lovely time with Pebbles [the dog] then it was ‘Bang, bang, bang, now we’re doing this’ – maybe that didn’t help.”

A further consideration for the implications for EP practice is that the research appears to indicate more positive results when the dog is in the classroom all the time. For example, where this study demonstrated some gains for some children in terms of classroom behaviour, the studies exploring group behaviour appear to show more significant results (e.g., Hergovich et al., 2002; Anderson & Olson, 2006; Beetz, 2013).

5.9 Future Research

The present study explores seven case studies and the findings suggest that interacting with, and reading to, a dog can influence positive classroom behaviour of Key Stage 2 children. As the present study employed a SCED methodology, this limits the level which the findings can be generalised to a wider population. It has been proposed that the reliability and validity can be enhanced through the replication of the findings across more settings and with a higher number of cases (Kratochwill et al., 2013). The present research replicated the intervention across seven cases in two different schools. However, further replication would improve the validity and reliability. This study may be extended in several ways, which will now be discussed.

In the literature previously reviewed on the topic of canine-assisted activities and interventions, several of the studies used a quasi-experimental design (e.g., Limond et al., 1997). Therefore this study could have employed a larger group of children and explored pre-test, post-test measures of behaviour. In doing so, the significance of the results could have been further explored.

In the present research, due to timing and practical issues, the observations were completed for approximately 20 minutes weekly. Future research may wish to consider completing this intervention followed by the observations more frequently across the week. This would allow for the prospect for the reading to a dog intervention to demonstrate more of a positive effect in children's on-task classroom behaviour.

In order to have strengthened the validity and reliability of the data, the researcher notes that it may have been beneficial to have asked the dog handler to have kept a log of the books read by the children to the dog and also how much time was spent reading to the dog compared to chatting and petting the dog. As the dog therapy research concentrates on the impact of children interacting with a dog on behaviour, it may have been a useful tool to record the impact of reading (a passive activity) with petting or chatting to the dog (an active activity) for further analysis in examining differences between participant's data. With enough participants, this may have led to a correlational study.

5.10 Contribution of the study

The results from the present research add to the limited evidence base for the use of canine-assisted activities and interventions in schools. Furthermore, this is the first study to use a single-case experimental design to explore classroom behaviour in mainstream primary-school aged children. In addition, it is the researcher's understanding that this is the first study to explore the potential carryover effects from interacting with a dog into the classroom on children's behaviour.

The present study gives tentative evidence that in certain circumstances, interacting with, and reading to, a dog can improve classroom behaviour in some children. The pen portraits alongside results will assist future practitioners in deciding whether this is the right intervention when considering individual interventions for behaviour.

5.11 Researcher Reflections

The aim of the present research was to explore the impact that reading to a dog may have upon children's classroom behaviour. The researcher wished to determine whether the intervention of interacting with, and reading to, a dog could impact upon classroom behaviour through repeated observational measures.

Conducting this research drew the researcher's attention to some of the issues with planning and instigating research within the 'real world' school setting. For example, as outlined previously, there were issues with the intervention over-running from time to time, meaning that data was not collected following a child interacting with, and reading to, a dog. A further issue was the technical difficulties with the BOSS application that could not have been foreseen.

Although the results from the present research indicate that interacting with, and reading to, a dog can be used effectively to improve classroom behaviour in a targeted Year 3 population, more rigourous research is required to increase the generalisability of the results. However, the results of the current study positively contribute to the evidence base encompassing canine-assisted activities and interventions in school settings. The findings have also identified next steps for practice and future research in this field.

Chapter 6: Conclusion

The present research examined the impact of interacting with, and reading to, a dog on seven primary-school aged pupils' classroom behaviour. Results from the SCEDs indicated that the intervention had some effect on classroom behaviour in six cases. The research evaluated the impact across four categories of classroom behaviour: on-task behaviour, off-task motor behaviour, off-task verbal behaviour and off-task passive behaviour. The results suggested that the biggest impact was upon off-task verbal behaviour, with improvements observed in four cases.

It is possible that the current research provides tentative findings that interacting with, and reading to, a dog can be used effectively to improve classroom behaviour, including low-level disruptive behaviour through talking out of turn (i.e., off-task verbal behaviour). The discussion of the results highlighted several limitations of the study. The SCED methodology used limits generalisability of the findings. Consequently, replication is needed across a wider population of pupils before strong conclusions regarding the intervention's impact may be drawn.

References

Ainsworth, M. D. S., & Bell, S. M. (1970). Attachment, exploration, and separation: Illustrated by the behavior of one-year-olds in a strange situation. *Child Development, 41*, 49-67.

Alberto, P. A., & Troutman, A. C. (2006). Applied behavior analysis for teachers. Upper Saddle River, NJ: Merrill/Prentice Hall.

Anderson, K. L., & Olson, M. R. (2006). The value of a dog in a classroom of children with severe emotional disorders. *Anthrozoös*, *19*(1), 35-49.

American Veterinary Medical Association. (2015, January 1). Wellness Guidelines for Animals in Animal-Assisted Activity, Animal-Assisted Therapy and Resident Animal Programs. Retrieved January 20, 2015, from http://www.avma.org/KB/Policies/Pages/Wellness-Guidelines-for-Animals- in-Animal-Assisted-Activity-Animal-Assisted-Therapy-and-Resident-Animal- Programs.aspx

Animal Assisted Intervention International. (2013, January 1). Animal Assisted Intervention International Animal Assisted Intervention. Retrieved January 20, 2015, from http://www.animalassistedintervention.org/AnimalAssistedIntervention.aspx

Arai, S., Ohtani, N., & Ohta, M. (2011). Importance of Bringing Dogs in Contact with Children during Their Socialization Period for Better Behavior. *Journal of Veterinary Medical Science, 73*(6), 747-752.

Archer, C., & Gordon, C. (2006). *New families, old scripts: A guide to the language of trauma and attachment in adoptive families*. Jessica Kingsley Publishers.

Barker, S. B., Knisely, J. S., Schubert, C. M., Green, J. D., & Ameringer, S. (2015). The effect of an animal-assisted intervention on anxiety and pain in hospitalized children. *Anthrozoös*, *28*(1), 101-112.

Barlow, D., Nock, M., & Hersen, M. (2009). *Single Case Experimental Designs: Strategies for Studying Behaviour Change* (3rd ed.). Boston: Pearson.

Bassette, L. A., & Taber-Doughty, T. (2013). The effects of a dog reading visitation program on academic engagement behavior in three elementary students with emotional and behavioral disabilities: A single case design. *Child & Youth Care Forum, 4* (3), 239-256.

Beck, A. T. (1970). Cognitive therapy: Nature and relation to behavior therapy. *Behavior therapy*, *1*(2), 184-200.

Beck, A. T., & Clark, D. A. (1988). Anxiety and depression: An information processing perspective. *Anxiety research*, *1*(1), 23-36.

Beetz, A. (2013). Socio-emotional correlates of a schooldog-teacher-team in the classroom. *Frontiers in Psychology, 4,* 1-7.

Beetz, A., Uvnäs-Moberg, K., Julius, H. & Kotrschal, K. (2012). Psychosocial and Psychophysiological Effects of Human-Animal Interactions: The Possible Role of Oxytocin. *Frontiers of Psychology 3*, 1-15.

Bennathan, M. & Boxall, M. (1998). *The Boxall profile.* London: Nurture Group Network

Bennett, T. (2017). *Creating a culture: How school leaders can optimize behaviour.* Department for Education. https://www.gov.uk/government/publications/behaviour-in-schools

Black, A. F., Chur-Hansen, A., & Winefield, H. R. (2011). Australian psychologists' knowledge of and attitudes towards animal-assisted therapy. *Clinical Psychologist, 15*(2), 69-77

Bombèr, L. M. (2007). *Inside I'm hurting: practical strategies for supporting children with attachment difficulties in schools*. London: Worth.

Berget, B., Ekeberg, Ø., & Braastad, B. O. (2008). Animal-assisted therapy with farm animals for persons with psychiatric disorders: effects on self-efficacy, coping ability and quality of life, a randomized controlled trial. *Clinical practice and epidemiology in mental health*, *4*(1), 9.

Bowlby, J. (1969). *Attachment and loss: Vol. 1. Attachment.* New York, NY: Basic Books

British Psychological Society (2010). *Code of Ethics and Conduct. Guidance published by the ethics committee of the British Psychological Society*. Leicester: BPS.

Brossart, D. F., Parker, R. I., Olson, E. A, & Mahadevan, L. (2006). The relationship between visual analysis and five statistical analyses in a

simple AB single-case research design. *Behavior Modification*, *30*, 531–63.

Bruzek, C. E. (2014). *Socioemotional Benefits of Animal-Assisted Occupational Therapy with Children: A Review of the Literature and Directions for Future Research* (Doctoral dissertation, University of South Florida St. Petersburg).

Carr, J.E & Burkholder, E.O. (1998). Creating single-subject design graphs with Microsoft Excel. *Journal of Applied Behavior Analysis*, 31 (2), 245-251

Cohen, J. (1960) A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20, 37-46.

Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education* (7th ed.). London; New York: Routledge.

Cook, T. D., & Campbell, D. T. (1979). *Quasi-Experimentation: Design and Analysis Issues for Field Settings*. Chicago: Rand McNally.

Dashnaw-Stiles, L. A. (2001). Animal-assisted therapy with children and the elderly: A critical review. Dissertation. UMI No. 3014937.

Davis, T.N., Scalzo, R., Butler, E., Stauffer, M., Farah, Y.N., Perez, S., Mainor, K., Clark, C., Miller, S., Kobylecky, A. and Coviello, L., (2015). Animal Assisted Interventions for Children with Autism Spectrum Disorder: A Systematic Review. *Education and Training in Autism and Developmental Disabilities*, *50*(3), p.316.

Dickson, R., Cherry, M. G., & Boland, A. (2014). Carrying out a systematic review as a Master's thesis. *Doing a Systematic Review: A Student's Guide*.

Dodge, K., & Coie, J. D. (1987). Social-information-processing factors in reactive and proactive aggression in children's peer groups. *Journal of Personality and Social Psychology, 53*, 1146-1158.

Doyle, L., Brady, A. M., & Byrne, G. (2009). An overview of mixed methods research. *Journal of Research in Nursing*, *14*(2), 175-185.

Elton, (1989). Discipline in Schools: Report of the Committee of Enquiry chaired by Lord Elton. Department of Education and Science and the Welsh Office. Accessed 9th May 2017 from http://www.educationengland.org.uk/documents/elton/elton1989.html#01.

Esteves, S. W., & Stokes, T. (2008). Social effects of a dog's presence on children with disabilities. *Anthrozoos, 21*(1), 5-15.

Evans, J., Harden, A., & Thomas, J. (2004). What are effective strategies to support pupils with emotional and behavioural difficulties (EBD) in mainstream primary schools? Findings from a systematic review of research. *Journal of Research in Special Educational Needs*, *4*(1), 2-16.

Eysenck, S. B., & Eysenck, H. J. (1980). Impulsiveness and venturesomeness in children. *Personality and Individual Differences*, *1*(1), 73-78.

Friedmann, E. (2000). The animal–human bond: Health and wellness. In "Handbook on Animal Assisted Therapy: Theoretical Foundations and Guidelines for Practice" (A. Fine, ed.). Academic Press, New York

Friedmann, E., Thomas, S. A., & Eddy, T. J. (2000). Companion animals and human health: physical and cardiovascular influences. In A. L. Podberscek, E. S. Paul, & J. A. Serpell (Eds.), *Companion animals and us* (pp. 125–142). Cambridge: Cambridge University Press.

Friedmann, E., Katcher, A. H., Lynch, J. J., & Thomas, S. A. (1980). Animal companions and one-year survival of patients after discharge from a coronary care unit. *Public Health Reports*, *95*, 307–312.

Friedmann, E., Katcher, A. H., Thomas, S. A., Lynch, J. J., & Messent, P. R. (1983). Social interaction and blood pressure: Influence of animal companions. *The Journal of nervous and mental disease*, *171*(8), 461-465.

Friesen, L. (2010). Exploring animal-assisted programs with children in school and therapeutic contexts. *Early childhood education journal*, *37*(4), 261-267.

Fung, S.-C., & Leung, A. S. (2014). Pilot study investigating the role of therapy dogs in facilitating social interaction among children with autism. *Journal of Contemporary Psychotherapy, .44*(4),

Gee, N. R., Harris, S. L., & Johnson, K. L. (2007). The role of therapy dogs in speed and accuracy to complete motor skills tasks for preschool children. *Anthrozoös*, *20*(4), 375-386.

Gee, N. R., Crist, E. N., & Carr, D. N. (2010). Preschool Children Require Fewer Instructional Prompts to Perform a Memory Task in the Presence of a Dog. *Anthrozoos, 23*(2), 173-184.

Gee, N. R., Fine, A. H., & Schuck, S. (2015). Animals in educational settings: Research and practice. *Handbook on animal-assisted Therapy: Foundations and guidelines for animal-assisted interventions*, 195-210.

Geist, T. S. (2011). Conceptual framework for animal assisted therapy. *Child and Adolescent Social Work Journal*, *28*(3), 243.

Gottman, J. M., & Glass, G. V. (1978). Analysis of interrupted time-series experiments. In T. R. Kratochwill (Ed.), *Single subject research: Strategies for evaluating change* (pp. 197-234). Academic Press New York.

Grob ,A., & Smolenski,C.(2009). *FEEL-KJ.FragebogenzurErhebungder EmotionsregulationbeiKindernundJugendlichen*. Göttingen:Hogrefe.

Handlin, L., Hydbring-Sandberg, E., Nilsson, A., Ejdebäck, M., Jansson, A., & Uvnäs-Moberg, K. (2011). Short-term interaction between dogs and their owners: effects on oxytocin, cortisol, insulin and heart rate—an exploratory study. *Anthrozoös*, *24*(3), 301-315.

Hanson, W. E., Creswell, J. W., Clark, V. L. P., Petska, K. S., & Creswell, J. D. (2005). Mixed methods research designs in counseling psychology. *Journal of counseling psychology*, *52*(2), 224.

Hergovich, A. and Hörndler, H. (1994). *Gestaltwahrnehmungstest. Ein computerbasiertes Verfahren zur Messung der Feldartikulation*. Software und Manual. Frankfurt/Main: Swets Test Services.

Hergovich, A., Monshi, B., Semmler, G., & Zieglmayer, V. (2002). The effects of the presence of a dog in the classroom. *Anthrozoos, 15*(1), 37-50.

Hoagwood, K. E., Acri, M., Morrissey, M., & Peth-Pierce, R. (2017). Animal-assisted therapies for youth with or at risk for mental health problems: A systematic review. *Applied Developmental Science, 21*(1), 1-13.

Holmes, C. M., Goodwin, D., Redhead, E. S., & Goymour, K. L. (2012). The Benefits of Equine-Assisted Activities: An Exploratory Study. *Child & Adolescent Social Work Journal, 29*(2), 111-122.

Horner, R., Carr, E., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005) The use of single-subject research to identify evidence-based practice in special education, *Exceptional Children*, 71, (2), 165-179.

Huesmann, L. R., & Guerra, N. G. (1997). Children's normative beliefs about aggression and aggressive behavior. *Journal of Personality and Social Psychology, 72*, 408-419.

Huesmann, L. R., Guerra, N. G., Miller, L., & Zelli, A. (1989). *The normative beliefs about aggression scale.* Chicago: University of Illinois.

Jalongo, M. R. (2005). What are all these dogs doing at school? Using therapy dogs to promote children's reading practice. *Childhood Education*, 81(3), 152–158.

Janowski, A., Fittkau, B., & Rauer, W. eds. (1981). *Beurteilungshilfen für Lehrer. Skalen zur Beurteilung von Schulerverhalten (BFL)*. Hogrefe, Verlag für Psychologie.

Kamioka, H., Okada, S., Tsutani, K., Park, H., Okuizumi, H., Handa, S., Oshio, T., Park, S.J., Kitayuguchi, J., Abe, T. and Honda, T., 2014. Effectiveness of animal-assisted therapy: A systematic review of randomized controlled trials. *Complementary therapies in medicine*, *22*(2), pp.371-390.

Kastner-Koller, U. and Deimann, P. (1998). Der Wiener Entwicklungstest (WET). Göttingen: Hogrefe.

Katcher, A. H., Friedmann, E., Beck, A. M., & Lynch, J. J. (1983). Looking, talking and blood pressure: the physiological consequences of interaction with the living environment. In A. H. Katcher, & A. M. Beck (Eds.), *New perspectives on our lives with companion animals* (pp. 351–359). Philadelphia: University of Pennsylvania Press.

Katcher, A. H., & Wilkins, G. G. (2000). The centaur's lessons: therapeutic education through care of animals and nature study. In A. Fine (Ed.). *Handbook on animal-assisted therapy* (pp153 – 178). NY: Academic Press.

Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings*. New York: Oxford University Press.

Kazdin, A. E. (2003). *Research Designs in Clinical Psychology* (Fourth.). Boston: Allyn and Bacon.

Kazdin, A. E. (2016). Methodological issues and strategies in clinical research (4th Ed.). APA: Washington, DC.

Kennedy, C. H. (2005). *Single-case designs for educational research*. Boston: Allyn and Bacon

Killian, B. (1994). Das Tierbild des Kindes im Verlauf seiner kognitiven Entwicklung. Unveröffentlichte Diplomarbeit, Universität Wien.

Kirk, R. E. (1995). *Experimental Design: Procedures for the Behavioral Sciences*. New York: Brooks/Cole Publishing.

Kotrschal, K., & Ortbauer, B. (2003). Behavioral effects of the presence of a dog in a classroom. *Anthrozoos, 16*(2), 147-159.

Kratochwill, T. R. (1978). Foundations of time-series research. *Single subject research: Strategies for evaluating change*, 1-100.

Kratochwill, T. R., Hitchcock, J., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M. & Shadish, W. R. (2010). Single-case designs technical documentation. Retrieved from What Works Clearinghouse website: http://ies.ed.gov/ncee/wwc/pdf/wwc_scd.pdf

Kratochwill, T. R., Hitchcock, J. H., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2013). Single-case intervention research design standards. *Remedial and Special Education*, *34*, 26–38.

Kratochwill, T. R., Levin, J. R., Horner, R. H., & Swoboda, C. M. (2014). Visual analysis of single-case intervention research: Conceptual and methodological issues. In Kratochwill, Thomas R. (Ed); Levin, Joel R. (Ed). *Single-case intervention research: Methodological and statistical advances.,* (pp. 91-125). Washington, DC, US: American Psychological Association

Kurdek, L. A. (2009). Pet dogs as attachment figures for adult owners. *Journal of Family Psychology*, 23(4), 439–446.

Lau, J. S., Korman, T. M., Yeung, A., Streitberg, R., Francis, M. J., & Graham, M. (2016). Bacteroides pyogenes causing serious human wound infection from animal bites. *Anaerobe, 42*, 172-175.

Levinson, B. (1969). *Pet-oriented child psychotherapy*. Springfield, IL: Charles C. Thomas.

Levinson, B. (1972). *Pets and human development*. Springfield, IL: Charles C. Thomas.

Levinson, B. M. (1984). Human/companion animal therapy. *Journal of Contemporary Psychotherapy*, *14*(2), 131-144.

Limond, J. A., Bradshaw, J. W. S., & Cormack, K. F. M. (1997). Behavior of children with learning disabilities interacting with a therapy dog. *Anthrozoos, 10*(2-3), 84-89.

Martin, F., & Farnum, J. (2002). Animal-assisted therapy for children with pervasive developmental disorders. *Western Journal of Nursing Research, 24*(6), 657-670

Maujean, A., Pepping, C., & Kendall, E. (2014). A Systematic Review of Randomized Controlled Trials of Animal-Assisted Therapy on Psychosocial Outcomes. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, 1-14.

Melson, G.F., & Fine, A.H., (2015). Animals in the Lives of Children. *Handbook on animal-assisted Therapy: Foundations and guidelines for animal-assisted interventions*, 179-193.

Mertens, D.M. (2010). Research and Evaluation in Education and Psychology: Integrating Diversity with Quantitative, Qualitative and Mixed Methods. 3rd ed. London: Sage Publications Ltd

Messent, P.R. (1983). Social facilitation of contact with other people by pet dogs. In A.H. Katcher & A.M. Beck (Eds.), New perspectives on our lives with companion animals (pp. 37-46). Philadelphia: University of Pennsylvania Press.

McCall, G. J. (1984). Systematic field observation. *Annual review of sociology*, *10*(1), 263-282.

Morrison, M. L. (2007). Health benefits of animal-assisted interventions. *Complementary health practice review*, *12*(1), 51-62.

Nimer, J., & Lundahl, B. (2007). Animal-assisted therapy: A meta-analysis. *Anthrozoos: A Multidisciplinary Journal of the Interactions of People & Animals*, *20*(3), 225-238.

O'Connor, A. (2014, January). Animal-Assisted Therapy With Maltreated Youth: A Systematic Review and Meta-Analysis. In *Society for Social Work and Research 18th Annual Conference: Research for Social Change: Addressing Local and Global Challenges*. Sswr.

Ofsted (2014) *Below the radar: low-level disruption in the country's classrooms*, Ofsted, September 2014 [online]. Available at bit.ly/YGOF2014 (Accessed 12th May 2017)

O'Haire, M. E., McKenzie, S. J., McCune, S., & Slaughter, V. (2013). Effects of Animal-Assisted Activities with Guinea Pigs in the Primary School Classroom. *Anthrozoos, 26*(3), 445-458

O'Haire, M.E. (2014). *Animal-Assisted Intervention for Children with Autism Spectrum Disorder and their Peers* PhD Thesis, School of Psychology, The University of Queensland

Palley, L., O'Rourke, P., & Niemi, S. (2010). Mainstreaming Animal-Assisted Therapy. *Institute for Laboratory Animal Research Journal, 51*(3), 199-207.

Park, H. S., Marascuilo, L., & Gaylord-Ross, R. (1990). Visual inspection and statistical analysis in single-case designs. *The Journal of experimental education*, *58*(4), 311-320.

Pavlides, M. (2008). *Animal-assisted interventions for individuals with autism*. Jessica Kingsley Publishers.

Petermann, F., Jugert, G., Rehder, A., Tänzer, U., & Verbeek, D. (1999). *Sozialtraining in der Schule*. Beltz, Psychologie-Verlag-Union.

Pidd, H. (2017, March 28th). Please, sir – sit! The tale of a learning support dog. Retrieved May 1st, 2017, from https://www.theguardian.com/education/2017/mar/28/teaching-support-dog-school-teach-read

Prothmann, A., Albrecht, K., Dietrich, S., Hornfeck, U., Stieber, S., & Ettrich, C. (2005). Analysis of child-dog play behavior in child psychiatry. *Anthrozoos, 18*(1), 43-58.

Rauer,W., & Schuck,K.-D. (2003). *FEESS 3-4.Fragebogen zurErfassung emotionaler und sozialer Schulerfahrungen von Grundschulkindern dritter und vierter Klassen*. Göttingen:Hogrefe.

Redefer, L. A., & Goodman, J. F. (1989). Pet-facilitated therapy with autistic children. *Journal of Autism and Developmental Disorders, .19*(3),

Richardson, H. (2014, March 14). Children urged to read to dogs, perfect listeners. Retrieved July 20, 2016, from http://www.bbc.co.uk/news/education-26577565

Risley, T.R., & Wolf, M. M. (1972) Strategies for analyzing behavioral change over time. In J. Nesselroade & H. Reese. *Life-span Developmental Psychology. Methodological Issues*. New York: Academic Press.

Robson, C. (1993). *Real world research : a resource for social scientists and practitioner-researchers*. Oxford, UK ; Cambridge, Mass., USA: Blackwell.

Robson, C. (2011). Real world research 3 rd Ed. *UK: Wiley*.

Robson, C., & McCartan, K. (2016). *Real world research* (Fourth Edition ed.). Hoboken: Wiley.

Rossmann, P. (2005). *DTK. DepressionstestfürKinder*. Göttingen:Hogrefe.

Serpell, J. A. (1996). *In the company of animals* (2nd ed.). Cambridge: Cambridge University Press

Serpell, J. A. (2005). Animals and religion: towards a unifying theory. In F.de Jonge & R. van den Bos (Eds.), *The human-animal relationship* (pp. 9–22). Assen: Royal Van Gorcum.

Serpell, J. A.. (2015). Animal-Assisted Interventions in Historical Perspective. *Handbook on animal-assisted Therapy: Foundations and guidelines for animal-assisted interventions*, 11-19.

Shadish, W. R., Rindskopf, D. M., & Hedges, L. V. (2008). The state of the science in the meta-analysis of single-case experimental designs. *Evidence-Based Communication Assessment and Intervention*, *2*(3), 188-196.

Shapiro, E. S. (1996). Academic skills problems workbook. New York: Guilford Press.

Siegel, D. J. (1999). The developing mind: How relationships and the brain interact to shape who we are. New York, NY: The Guilford Press

Smith, J. D. (2012). Single-case experimental designs: a systematic review of published research and current standards. *Psychological Methods*, *17*, 510– 550.

Sprinkle, J. E. (2008). Animals, Empathy, and Violence Can Animals Be Used to Convey Principles of Prosocial Behavior to Children? *Youth Violence and Juvenile Justice, 6*(1), 47-58.

Stadler, C., Schmeck, K., & Janke, W. (2004). *Inventar zur Erfassung von Impulsivität, Risikoverhalten und Empathie bei 9-bis 14-jährigen Kindern: IVE*. Gottingen: Hogrefe.

Steer (2005). Learning Behaviour: The report of the practitioners' group on school behaviour and discipline. Department for Education and Skills. Accessed 9th May 2017 from http://www.educationengland.org.uk/documents/pdfs/2005- steer-report-learning-behaviour.pdf.

Stoiber K.C., & Waas, G.A. (2002) A contextual and methodological perspective on the evidence-based movement within school psychology in the United States, *Educational and Child Psychology, 19,* (3), 7-21.

Stroud, C. (2012, July 3). Dogs in the classroom: Reading with a fluffy friend. Retrieved January 20, 2015, from http://www.telegraph.co.uk/lifestyle/9372554/Dogs-in-the-classroom-reading-with-a-fluffy-friend.html

Stuart-Russell, R. (1997). The human-animal bond in the service of stress management. In J. Gammonley, A. Howie, S. Kirwin, S. Zapf, J. Frye, G. Freeman, et al. (Eds.), *Animal assisted therapy: Therapeutic interventions* (pp. 1–9). Bellevue, WA: Delta Society

Thomas, H. (2003). Quality assessment tool for quantitative studies. *Effective Public Health Practice Project. McMaster University, Toronto*.

Thomas, K. (1983). *Man and the natural world: Changing attitudes in England, 1500–1800*. London: Allen Lane.

Tissen, I., Hergovich, A., & Spiel, C. (2007). School-based social training with and without dogs: Evaluation of their effectiveness. *Anthrozoos, 20*(4), 365-373.

Triebenbacher, S. L. (1998). Pets as transitional objects: Their role in children's emotional development. *Psychological Reports*, *82*, 191-200.

Appendices

Appendix 1: Search terms and results for systematic review

Web of Science Search terms used				Results
Animal	Assisted	Children	Dog$	133
Animal	Assisted	Adolescen*	Dog$	18
Animal	Assisted	Children	Canine$	15
Animal	Assisted	Adolescen*	Canine$	4
Pet$	Therap*	Children	Dog$	111
Pet$	Therap*	Adolescen*	Canine$	1
Pet$	Therap*	Children	Canine$	11
Pet$	Therap*	Adolescen*	Dog$	11
				Total: 304

PsychINFO Search terms used				Results
Animal	Assisted	Children	Dog$	49
Animal	Assisted	Adolescen*	Dog$	12
Animal	Assisted	Children	Canine$	9
Animal	Assisted	Adolescen*	Canine$	3
Pet$	Therap*	Children	Dog$	23
Pet$	Therap*	Adolescen*	Canine$	3
Pet$	Therap*	Children	Canine$	5
Pet$	Therap*	Adolescen*	Dog$	4
				Total: 108

ASSIA Search terms used				Results
Animal	Assisted	Children	Dog$	114
Animal	Assisted	Adolescents or teenagers	Dog$	56
Animal	Assisted	Children	Canine$	28
Animal	Assisted	Adolescents or teenagers	Canine$	9
Pet$	Therap*	Children	Dog$ or Canine$	117
Pet$	Therap*	Adolescents or teenagers	Dog$ or Canine$	62
				Total: 386

ERIC Search terms used				Results
Animal	Assisted	Children	Dog$	5
Animal	Assisted	Adolescents or teenagers	Dog$	1
Animal	Assisted	Children	Canine$	3
Animal	Assisted	Adolescents or teenagers	Canine$	0
Pet$	Therapy or treatment or intervention	Children	Dog$ or Canine$	7
Pet$	Therapy or treatment or intervention	Adolescents or teenagers	Dog$ or Canine$	1
				Total: 17

PubMed Search terms used				Results
Animal	Assisted	Children	Dog$	33
Animal	Assisted	Adolescen*	Dog$	10
Animal	Assisted	Children	Canine$	34
Animal	Assisted	Adolescen*	Canine$	10
Pet$	Therap*	Children	Dog$	8
Pet$	Therap*	Adolescen*	Canine$	0
Pet$	Therap*	Children	Canine$	8
Pet$	Therap*	Adolescen*	Dog$	0
				Total: 103

Appendix 2: Excluded studies from systematic review, with reasons

Author(s)	Title	Reason for exclusion
Bachi, K. and N. Parish-Plass (2017)	Animal-assisted psychotherapy: A unique relational therapy for children and adolescents	Not an empirical study
Balluerka, N., et al. (2014).	Influence of animal-assisted therapy (AAT) on the attachment representations of youth in residential care	Inappropriate setting
Beetz, A. (2013).	Socio-emotional correlates of a schooldog-teacher-team in the classroom	Inappropriate measures (self-report)
Beetz, Julius, Turner & Kotrschal (2012)	Effects of social support by a dog on stress modulation in male children with insecure attachment	Inappropriate measures (measured physiological response)
Beetz, Kotrschal, Turner, Hediger, Uvnas-Moberg & Julius (2011)	The effect of a real dog, toy dog and friendly person on insecurely attached children during a stressful task: An exploratory study	Inappropriate measures (measured physiological response)
Friesen, L. (2010).	Exploring Animal-Assisted Programs with Children in School and Therapeutic Contexts	Not an empirical study
Funahashi, A., et al. (2014).	Brief Report: The Smiles of a Child with Autism Spectrum Disorder During an Animal-assisted Activity May Facilitate Social Positive Behaviors-Quantitative Analysis with Smile-detecting Interface	Inappropriate setting
Fung, S. C. (2015).	Increasing the Social Communication of a Boy With Autism Using	Full-text could not be obtained

	Animal-assisted Play Therapy: A Case Report	
Gee, Beicher, Grabski, DeJesus, & Riley, 2012	The Presence of a Therapy Dog Results in Improved Object Recognition Performance in Preschool Children	Inappropriate setting
Gee, Crist, & Carr, 2010	Preschool Children Require Fewer Instructional Prompts to Perform a Memory Task in the Presence of a Dog	Inappropriate setting
Gee, Gould, Swanson, & Wagner, 2012	Preschoolers Categorize Animate Objects Better in the Presence of a Dog	Inappropriate setting
Gee, Harris, & Johnson, 2007	The role of therapy dogs in speed and accuracy to complete motor skills tasks for preschool children	Inappropriate setting
Grandgeorge, M., et al. (2012).	Children with autism encounter an unfamiliar pet Application of the Strange Animal Situation test	Inappropriate setting
Grigore & Rusu, 2014	Interaction with a therapy dog enhances the effects of social story method in autistic children	Inappropriate setting
Hall, M. L. and K. Ellis (2012).	A Furry Partnership	Not an empirical study
Hamama et al., 2011	A preliminary study of group intervention along with basic canine training among traumatized teenagers: A 3-month longitudinal study	Inappropriate measures (self-report)
Harris, K. I. and S. D. Sholtis (2016).	Companion Angels on a Leash: Welcoming Service Dogs into Classroom Communities for Children with Autism	Not an empirical study
Hoff, T. (2013).	Children and animals: about sense and nonsense of	Full-text could not be obtained in English

	development promoting animal contact and animal assisted interventions]."	
Jalongo, M. R. (2006).	On Behalf of Children	Not an empirical study
Jalongo, M. R. (2008).	Beyond a Pets Theme: Teaching Young Children to Interact Safely with Dogs	Not an empirical study
Jalongo, Astorino, & Bomboy, 2004	Canine Visitors: The Influence of Therapy Dogs on Young Children's Learning and Well-Being in Classrooms and Hospitals	Not an empirical study
Kirnan, J., et al. (2016).	The Impact of a Therapy Dog Program on Children's Reading Skills and Attitudes toward Reading	Inappropriate measures
Lane & Zavada, 2013	When Reading Gets Ruff: Canine-Assisted Reading Programs.	Not an empirical study
Lange, A. M., et al. (2007).	Is Counseling Going to the Dogs? An Exploratory Study Related to the Inclusion of an Animal in Group Counseling with Adolescents	Qualitative study
le Roux, M., et al. (2015).	The effect of an animal-assisted reading programme on word recognition and spelling skills of grade 3 children."	Inappropriate outcomes (outcomes looked at reading)
le Roux, Swartz, & Swart, 2014	The Effect of an Animal-Assisted Reading Program on the Reading Rate, Accuracy and Comprehension of Grade 3 Students: A Randomized Control Study	Inappropriate outcomes (outcomes looked at reading)
Levinson, B. M. (1971).	Household pets in training schools serving delinquent children	Not an empirical study
Lima, M., et al. (2012).	Finding an Ally: Can Dogs Help Therapists	Not an empirical study

	Promote Communication in Individuals with Profound Intellectual and Multiple Disabilities?"	
Martin, E. B. A. M. A. (2004	Therapy Pets – The Healing Animal-Human Partnership	Not an empirical study
Maurer, M., et al. (2011).	Child with autism and animal in a significant bond: possibilities of therapeutic interventions	Not an empirical study
Mengel (2009)	Animal assisted therapy with a dog	Full-text could not be obtained in English
Mockler, 2010	Pet Therapy: A New Way of Reaching Students with Additional Disabilities	Not an empirical study
Obrusnikova, I., et al. (2012).	Integrating Therapy Dog Teams in a Physical Activity Program for Children with Autism Spectrum Disorders	Not an empirical study
O'Haire, M. E., et al. (2014).	Effects of Classroom Animal-Assisted Activities on Social Functioning in Children with Autism Spectrum Disorder	Use an animal other than a dog
Prothmann, A., et al. (2005).	Analysis of child-dog play behavior in child psychiatry	Inappropriate setting
Prothmann, A., et al. (2006).	Dogs in child psychotherapy: Effects on state of mind	Inappropriate setting
Schuck, S. E. B., et al. (2015).	Canine-Assisted Therapy for Children With ADHD: Preliminary Findings From The Positive Assertive Cooperative Kids Study	Inappropriate setting
Siemons-Luhring, D. I. (2011).	Influence of Therapy Dogs on the Learning Abilities in Speech Therapy with Children	Inappropriate setting
Stetina, B. U., et al. (2011).	Learning emotion recognition from canines? Two for the road	Inappropriate population (participants included adults)

Viau, R., et al. (2010).	Effect of service dogs on salivary cortisol secretion in autistic children	Inappropriate measures (physiological)
Wedl, M., et al. (2015).	Children with Avoidant or Disorganized Attachment Relate Differently to a Dog and to Humans During a Socially Stressful Situation	Inappropriate measures
Wohlfarth, Mutschler, Beetz, Kreuser, & Korsten-Reck, 2013	Dogs motivate obese children for physical activity: key elements of a motivational theory of animal-assisted interventions	Inappropriate setting
Zents, C. E., et al. (2017	Paws for Intervention: Perceptions About the Use of Dogs in Schools	Not an empirical study

Appendix 3: Data extraction form

Study information

First author:	Year of study:	Date form completed:
Full title:		

Study Characteristics

Type of study:

Participants	Describe the participants included:		Page
Total number of intervention groups:	Number of participants in group 1:	Age range: Mean: SD:	
	Number of participants in group 2:	Age range: Mean: SD:	
	Number of participants in group 3:	Age range: Mean: SD:	
	Number of participants in group 4:	Age range: Mean: SD:	
	Sample selection:	Factors influencing sample selection:	
	How was consent to participate gained from the children?		
	Inclusion criteria stated:	Exclusion criteria stated:	
	Representativeness of the sample: Are participants in the study likely to be representative of the target population?		
The intervention	Name (if specified):		Page

Aim(s) of the study:		
Setting:	(Who else was in the room while the intervention was being conducted?)	
Start/end date of study:		
Total study duration:		
How much time does the dog with target pop.?		

Types of outcome measures	List primary outcome(s)	Measure used	Page
	List any other outcome measured		
	Outcome measured at population level or individual level?		
	Time points measured		
	Time points reported		

Results

Participants Include if relevant	Include information for each group (i.e. intervention and controls) under study (record 'not reported' if relevant, but missing; record 'not applicable' if not relevant)	Page
What percentage of selected individuals agreed to participate?		
If RCT, total number randomised (or total pop. At start of study for NRCTs)		
Number allocated to each intervention group (no. of individuals)		
Were there any significant baseline imbalances (if more than one group)?	Yes Details: No N/A Unclear	
Number and reason for withdrawals and exclusions for each intervention group		
What percentage of participants completed the study?		
What percentage of participants received the allocated intervention or exposure of interest?		
Is the analysis performed by intervention allocation status (intention to treat) rather than the actual intervention received? Have any attempts been made to impute missing data?		
Any appropriate sociodemographics (e.g., educational level, literacy level, first language, sex, race)		

Subgroups	Enter a description of any participant subgroups from this paper to be analysed in the review	

Intervention group 1

(Copy and paste table for each intervention group)

Group name:	(Control/experimental)	Page
Details of intervention or control condition (include if relevant in sufficient detail for replication)		
Setting (if unfamiliar, what steps were taken to normalise this?)		
Content (list the activities intended and delivered)		
Delivery (e.g., stages, timing, frequency, duration, intensity)		
Providers (teacher? Trained dog handler?)		
Was sustainability discussed by the authors? Was it a consideration in study development?		

Outcomes for intervention group 1

	Outcome 1	Page	Outcome 2	Page
Time points reported				
Unit of measurement (if relevant)				
For scales – upper and lower limits and indicate whether high or low score is good				
How is the outcome reported? Self or study assessor				
Is this outcome/tool validated?				
Has it been used as validated?				
Is it a reliable outcome measure?				
	Outcome 3	Page	Outcome 4	Page
Time points reported				
Unit of measurement (if relevant)				
For scales – upper and lower limits and indicate				

whether high or low score is good				
How is the outcome reported? Self or study assessor				
Is this tool validated?				
Has it been used as validated?				
Is it a reliable outcome measure?				

Results

For two group designs (control and experimental)

Control			Page
Assignment	How were these control and experimental groups selected? Is there likely to an effect if these were the opposite way?		
	Intervention group	Comparison group	
# Participants measured			
# Missing participants and reasons			
Baseline results (pre-intervention)			
Post-intervention results			
Change			
Any other results reported			

Results for one group (internal group)

Comparison				Page
	Pre intervention	Post intervention	Change	
# Participants measured				
# Missing participants and reasons				
Results found				
Any other results reported				

Other relevant information

		Page/ Para/ Figure/Table No.
Key conclusions of the study authors		
References to other relevant studies		

Additional notes by review author		

Appendix 4: Summary of data from included studies

First author	Year	Design	Age	Intervention	Time chn spend with dog	Outcomes measured	Results
Bassette	2013	SCED	7yrs-11yrs	Reading aloud to a dog	30mins/day x5/week for 4 weeks	On-task reading behaviour	High % rate of on-task reading behaviour
Esteves	2008	SCED	5yrs-9yrs	Dog with child and teacher 1:1	8 min sessions x5/week for 4 weeks	Social behaviour	Increased rate of positive interactions with teacher
						Verbal behaviour	
						Non-verbal behaviour	
Fung	2014	Two group matched pairs	7yrs - 10yrs	Dog with child and therapist 1:1	20 min sessions x3/week for 5 weeks	Social behaviour	Exp. group sig higher
						Verbal social behaviour	Exp. group sig higher
						Non-verbal social behaviour	No sig diff between groups
						Non-social behaviour	Exp. Group sig decrease
Hergovich	2002	Two group comparison	6yrs-7yrs	Dog in classroom	All day x5/week for 12 weeks	Field independence	Exp. group sig higher
						Social intelligence	No significant effect
						Empathy with animals	Exp. group sig higher
						Sociability	Both groups sig higher
						Social integration	Exp group sig. higher
						Aggression	Too small a sample
Kotrschal	2003	One group pre/post test	6yrs-7yrs	Dog in classroom	All day x5/week for 4 weeks	Social behaviour	Chn's behav. became more homogenous
						Attention to teacher	
						Attention to task	Sig. less aggressive

Limond	1997	Within-subjects repeated measures	7yrs - 12yrs	Interaction with stuffed dog vs real dog	7min sessions x1/week for 6 weeks	Looking Responses to dog handler Initiations to handler Initiations to dog (real or toy)	Looked at real dog more More responsive to handler in real dog's presence Similar between conditions Real dog received sig. more
Martin	2002	Within-subjects repeated measures	3yrs- 13yrs	Interaction with therapist and dog or stuffed dog or ball	15mins x1/week for 15 weeks	Behavioural interactions Verbal interactions	Higher in dog condition More likely to talk/comply in dog condition
Redefer	1989	Within-subjects repeated measures	5yrs - 10yrs	Interaction with therapist and dog	20mins per session for 18 sessions	Social interaction Isolation	Sharp increase Decrease However, decline between treatment and follow-up
Sprinkle	2008	One group pre/post test	9yrs-12yrs	Healing Species programme	45 mins once a week for 11 weeks	Empathy Violent/aggressive beliefs Aggressive behaviour Violent behaviour	Sig. increase in empathy Sig. decrease of beliefs Sig. decrease of aggressive behaviour
Tissen	2007	3 group exp. Design Randomised	7yrs-10yrs	Social training (ST) with or without a dog Dog - no ST	90 mins once a week for 10 weeks	Social behaviour Empathy Victim of open/relational aggression (VORA)	Improved for all 3 groups Sig. increase from T1 to T2 Sig. decrease of VORA for ST with dog group only

Appendix 5: Letter inviting Headteachers to take part in the study

Ref: *Invitation to participate in a research project*

e: lpxhms@nottingham.ac.uk



Faculty of Science

School of Psychology

The University of Nottingham

University Park

23rd August 2016

Dear Headteacher,

An invitation to take part in a study investigating the effects reading to a dog might have on children's classroom behaviour

I am a Year 3 Trainee Educational Psychologist in the School of Psychology, University of Nottingham and I am currently on placement in [redacted]. I am writing to invite your school to participate in a research project I am conducting. As part of my training programme, I am interested in investigating the effects reading to a dog might have on individual children's behaviour. Previous research indicates that it might increase on-task reading behaviour (i.e., child has eyes on the book, with the pages open, reading aloud and attempting to self-correct) and positive interactions between peers and adults. I am interested in learning more about the effects reading to a dog may have on individual children's behaviour in the classroom.

What would the study involve?

Alongside the charity, [redacted], a trained therapy dog and its handler would spend one afternoon a week in your school. A risk assessment would be completed in conjunction with the dog handler and yourself. I am interested in finding out the effects reading to a dog may have on four children whose behaviour is of some concern. School staff would be asked to identify children who they feel would benefit from the programme and to seek their parent's consent. In the Autumn term, I plan to observe the children's behaviour once a week for five weeks prior to the introduction of the reading to a dog intervention and then once a week for six weeks the lesson after the children had read to the dog. This will help me to find out what difference

reading to a dog had made to the children's behaviour. A flow chart to show potential timescales of the study has been added at the end of this letter.

Asking the staff and pupils for their consent

I would begin by asking the Year 3 teacher to confirm their agreement to participate and to have a general discussion about negative classroom behaviour. School would be asked to send out parent consent letters to those children identified as those who display frequent low-level disruptive behaviour (such as shouting out, being out their seat and so on). Following this, observation will be arranged and pupil's willingness to participate confirmed. The children involved in the study would be informed that the observer would be looking at behaviour for learning within the classroom.

How would the information collected be used?

If you choose to proceed, please understand that your school's participation is entirely voluntary and the school, the children's parent(s)/carer(s) and the children themselves have the right to withdraw at any stage of the study. With regards to confidentiality, the children's names and the names of staff and the school will be retained anonymously throughout the study. Any data collected will be kept in a locked filing cabinet and if it this data is electronic, it will be kept on an encrypted memory stick. Once observations are complete, consent will sought from both participants and parents for the anonymous information collected to be shared confidentially with school staff.

What would happen afterwards?

Following completion of the study, the children and their parents/carers will be debriefed regarding the general findings of the research. I would be happy to meet them in person to explain what the study has found or, with your permission, to send a letter. If you, the staff and the children feel that reading to a dog has been a positive experience, then a request could be made to the charity to find out if they would be willing and able to continue to visit your school.

If you should like to find out more

I understand that you may like to have more information before you decide whether your school would be interested in being involved with this research. Therefore, if you or your staff have any questions about the nature of the study, please contact me or my supervisor, Dr Nick Durbin, using the contact details provided. If you would like to meet me to discuss the school's participation in the research, then I would be more than happy to do so.

Thank you very much for taking the time to read and consider my request; I am very grateful.

Yours faithfully,

Helen Shadbolt

This research has been approved by the University of Nottingham Ethics Committee (reference: 856R). If you have any complaints about the study, please contact: Stephen Jackson (Chair of Ethics Committee) (T: 0115 8467403 or 0115 9514344) (stephen.jackson@nottingham.ac.uk).



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Appendix 6: Parental consent letter



Dear parent/carer,

My name is Helen Shadbolt and I am a Trainee Educational Psychologist. I am currently in my second year at the University of Nottingham and on placement with [redacted].

This is an invitation for your child to take part in a research study on how reading to a dog might affect classroom behaviour. Before you decide if you wish for your child to take part, it is important for you to understand why the research is being done and what it will involve. Previous research has indicated that reading to a dog increases on-task reading behaviour (i.e., child has eyes on the book, with the pages open, reading aloud and attempting to self-correct) and positive interactions between peers and adults in the classroom. I am interested in building on previous research by investigating whether on-task behaviour in the classroom is affected by reading to a dog.

What would the study involve?

If you agree for your child to participate, your child's behaviour in the classroom would be observed twice in September to pilot the observation sheet. In late September and throughout October, your child would be observed once a week before the reading to a dog intervention is introduced. This would be from September until October half term. After October half term, your child would then be introduced and individually read to a dog once a week for six weeks. This would be until December. The dog is a trained therapy dog from the charity [redacted] and would be accompanied by its handler. The dog would remain on its lead at all times and would not approach your child unless your child chose to interact with it. A TA from the school would also be present in the room at all times.

Asking your child for their consent

It will be explained to the class that I am observing their behaviour for learning. Individual, verbal consent would be obtained from your child prior to each session of reading to the dog. Consent would also be obtained from you and your child before sharing anonymous information with school staff. The nature of this information shared with school staff would be an overall, general picture of how the children responded to or viewed reading to the dog. Once the research is complete, if you should wish, I would be in touch with you to share specific information about your child's response to intervention and if you should wish to consent for the specific information to be shared with the school. Your child's name and the name of the school will be kept anonymous throughout the study.

What would happen afterwards?

After the study has finished, I would be happy to talk to you or write to you to tell you about the general findings of the study.

If you agree for your child participate, you need to know that you or your child has the right to withdraw from the research at any time and you do not have to give a reason for this.

If you should like to find out more

I understand that you may like to have more information before you decide whether you would be interested in your child being involved with this research. Therefore, if you have any questions, please contact me on lpxhms@nottingham.ac.uk , or my supervisor (nick.durbin@nottingham.ac.uk). I would be more than happy to speak to you in person at lunchtime or after school.

Yours faithfully,

Helen Shadbolt

(Trainee Educational Psychologist, University of Nottingham)

School of Psychology

Information Sheet

The University of Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

Title of Project … What effects does reading to a dog have upon individual children's behaviour in the classroom?

Insert Ethics Approval Number or Taught Project Archive Number

Researchers: Helen Shadbolt

Supervisors: Dr. Nick Durbin

Contact Details lpxhms@nottingham.ac.uk/nick.durbin@nottingham.ac.uk

This is an invitation for your child to take part in a research study on the effects reading to a dog may have on children's behaviour in the classroom.

Before you decide if you wish to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

If you agree for your child to participate, your child will initially be observed twice, each time for an hour's lesson, in September by a Trainee Educational Psychologist during their normal day-to-day lessons. This is to collect information about the child's everyday behaviour in the classroom. This information will then be used to create an observation tally/frequency chart for the different behaviour, which will then be trialled to assess its effectiveness. In late September and throughout October, your child will be observed once a week for 20 minutes. After October half term, your child will be invited to read to a dog for 20 minutes and then s/he will be observed in the classroom after s/he has read to the dog. The whole procedure will last 12 weeks: once a week for the whole of the Autumn term.

Participation in this study is totally voluntary and you are under no obligation to take part. You are free to withdraw at any point before or during the study. All data collected will be kept confidential and used for research purposes only. It will be stored in compliance with the Data Protection Act.

If you have any questions or concerns please don't hesitate to ask now. We can also be contacted after your participation at the above address.

If you have any complaints about the study, please contact:

Stephen Jackson (Chair of Ethics Committee)

stephen.jackson@nottingham.ac.uk

School of Psychology

Consent Form

The University of Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

Title of Project What effects does reading to a dog have upon individual children's behaviour in the classroom?

Ethics Approval Number:

Researcher(s): Helen Shadbolt lpxhms@nottingham.ac.uk

Supervisor(s): Dr Nick Durbin nick.durbin@nottingham.ac.uk

The participant should answer these questions independently:

- Have you read and understood the Information Sheet? YES/NO
- Have you had the opportunity to ask questions about the study? YES/NO
- Have all your questions been answered satisfactorily? YES/NO

- Do you understand that you and your child are free to withdraw (at any time and without giving a reason) from the study? YES/NO
- I give permission for my child's data from this study to be shared with other researchers provided that my child's anonymity is completely protected. YES/NO
- I give permission for my child's data from this study to be shared with school staff provided that my child's anonymity is completely protected. YES/NO
- Do you agree for your child to take part in the study? YES/NO

"This study has been explained to me to my satisfaction, and I agree for my child to take part. I understand that my child and I are free to withdraw at any time."

Signature of the Participant's parent: Date:

Name (in block capitals)

I have explained the study to the participant's parent and he/she has agreed to take part.

Signature of researcher: Date:

Appendix 7:

Procedure for each participant for School 1

Week	1	2	3	4	5	6	7	8	9	10	11	12
Dates:	22.9.16	29.9.16	6.10.16	13.10.16	18.10.16	27.10.16	3.11.16	10.11.16	17.11.16	24.11.16	1.12.16	8.12.16
1 Alex	Topic Writing	Topic Writing	Topic Writing	Topic Writing	Topic Writing	Half term holiday	Topic Writing	Topic Writing	Topic Writing	Topic Writing	Hand-writing	Topic Writing
2 Bailey	Literacy Reading	Literacy Reading	Literacy Reading	Literacy Reading	Literacy Reading	Half term holiday	Topic Discussion	Literacy Reading	Literacy Reading	Literacy Reading	No measures Illness	Literacy Reading
3 Charlie	Literacy Spellings	Literacy Spellings	Literacy Spellings	Literacy Spellings	Literacy Spellings	Half term holiday	No measures – time constraints	Literacy Spellings	Literacy Spellings	Literacy Spellings	Literacy Spellings	No measures – time constraints

Procedure for each participant for School 2

Week	1	2	3	4	5	6	7	8	9	10	11
Dates:	26.9.16	3.10.16	10.10.16	24.10.16	31.10.16	7.11.16	14.11.16	21.11.16	28.11.16	5.12.16	12.12.16
5 Eric	Maths Number	Science practical	PSHE Discussion	Topic Writing	Half term holiday	Textiles Sewing	Maths Number	Topic Writing	Carol singing	History Writing	Carol singing
6 Flynn	Literacy Reading	Science practical	History Writing	Topic Writing	Half term holiday	PSHE Discussion	No measures - illness	Literacy Story time	Maths games	PSHE Discussion	Carol singing
7 George	Literacy Reading	Maths Number	PSHE Discussion	No measures - illness	Half term holiday	Textiles Sewing	Maths Number	Literacy Reading	Carol singing	Did not wish to participate	Did not wish to participate
8 Harley	Maths Number	Literacy Phonics	History Writing	Topic Writing	Half term holiday	Textiles Sewing	PSHE Discussion	Topic Writing	Carol singing	History Writing	Carol singing

Appendix 8: Coding schedule

On-task behaviour	• Writing • Reading aloud • Raising a hand • Talking to the teacher about the assigned material • Talking to a peer about the assigned material • Looking up a word in a dictionary • Listening to the teacher talking • Looking at an academic worksheet • Silently reading assigned material/book • Looking at the blackboard during teacher instruction • Listening to a peer respond to a question • Passing paper to a student as instructed by the teacher • Colouring on an assigned worksheet as instructed • Swinging feet or fidgeting while working on assigned material • Laughing at a joke told by the teacher • Talking to another student about the assigned academic work during a cooperative learning group • Calling out the answer to a problem when the teacher has permitted such behaviour during instruction • Passively listening to other students talk about the assigned work in a cooperative learning group • Walking to/from seat, as directed by the teacher • Walking to/from carpet area as directed by the teacher • Collecting equipment as directed by the teacher • Playing an educational game on the iPad, as directed by the teacher
Off-task motor behaviour	• Engaging in any out-of-seat behaviour (defined as buttocks not in contact with the seat, unless

	otherwise explicitly directed by the teacher) • Fidgeting in seat (i.e., engaging in repetitive motor movements for at least 3 consecutive seconds) while not on task • Aimlessly flipping the pages of a book • Aimlessly shuffling books • Manipulating objects not related to the academic task (e.g., playing with a paper clip, throwing paper, twirling a pencil, folding paper, banging objects together, tapping objects/fingers on the table) • Physically touching another student when not related to an academic task • Drawing or writing not related to an assigned academic activity • Turning around in seat, oriented away from the classroom instruction • Flapping hands in the air • Swinging on chair • Pretending to eat toy food • Rubbing hands on table • Pointing fingers in the shape of a gun at other pupils • Picking at a scab • Rolling ball bearing across the table
Off-task verbal behaviour	Making any audible sound, such as whistling, humming, singing • Talking to another student about issues unrelated to an assigned academic task • Calling out answers to academic problems when the teacher has not specifically asked for an answer or permitted such behaviour • Laughing at a joke told by another student • Talking while the teacher is talking
Off-task passive behaviour It is important to note that the student must be passively off-task for 3 consecutive seconds within an interval to be scored. Should the	Aimlessly looking around the classroom • Silently reading unassigned material • Sitting quietly in an unassigned activity

interval end before the full 3 second period occurs, OFT-P is not scored for that interval, and a new consecutive 3 second period is required for the next interval. For instance, suppose a student begins to stare out the window during the third interval of observation. The observer counts only 2 seconds before the fourth interval begins. The student continues to stare out the window for over 3 seconds in this interval. In this case, only the fourth interval should be scored for OFT-P. If the student stops staring out the window after 2 seconds of the fourth interval, than OFT-P should not be scored for either interval.	• Looking around the room • Staring out the window • Passively listening to other students talk about issues unrelated to the assigned academic activity • Making faces at another pupil • Putting head down on the desk

Appendix 9: Debrief

EXPERIMENTAL DEBRIEFING INFORMATION

School of Psychology

University of Nottingham

Name of Experimenter: Helen Shadbolt	**Email of Experimenter: lpxhms@nottingham.ac.uk**
Name of Supervisor: Nick Durbin	**Email of Supervisor: nick.durbin@nottingham.ac.uk**

Title of Experiment: What effects does reading to a dog have upon individual children's behaviour in the classroom?

Background/Hypothesis: Previous research has indicated that reading to a dog may have an effect on children's behaviour. For example, it may lead to a high level of on-task behaviour when in the classroom. It may also reduce aggression and increase empathy. Therefore, I was wishing to investigate what effects reading to a dog might have on low-mid level disruptive behaviour in the classroom (this may be behaviours such as shouting out, talking to other children instead of concentrating on individual work, being out of their seat and so on).

Design and Dependent Measures: I completed seven case studies where I observed each child once a week, both before the introduction of reading to a dog and then for six weeks immediately after the child had read to a dog.

Intended Analysis: The numbers of low-mid disruptive behaviours before and after the introduction of reading to a dog are to be compared.

Useful Reading:

Fine, A. (2015). Handbook on Animal-Assisted Therapy: Foundations and Guidelines for Animal-Assisted Interventions. Academic Press.

If you have any further queries about the research, please contact either me (lpxhms@nottingham.ac.uk) or my supervisor (nick.durbin@nottingham.ac.uk).

If you have any complaints about the study, please contact: Stephen Jackson (Chair of Ethics Committee) stephen.jackson@nottingham.ac.uk.

Dear:

Thank you for helping me with my project by reading to Pebbles. I know that Pebbles really enjoyed listening to you read to her and tell her stories.

I have been observing the classroom for behaviour for learning and I have found out that reading to a dog can help some children be more focused on their work. I would like to tell other people, including your parent or carer about what I have found out. I won't be using your name; instead I will be saying "some children who have read to a dog".

What do you think?

If you have any questions, I have given your parent or carer my email address so that you can ask.

Thank you once again,

Helen



Appendix 10: Letter showing ethical approval



UNITED KINGDOM · CHINA · MALAYSIA

School of Psychology

The University of Nottingham

University Park

Nottingham

NG7 2RD

T: +44 (0)115 8467403 or (0)115 9514344

SJ/wb

Ref: 856R

Tuesday, 12 July 2016

Dear Helen Shadbolt & Nick Durbin,

Ethics Committee Review

Thank you for submitting an account of your proposed research 'What effects does reading to a dog have upon individual children's behaviour in the classroom?'.

That proposal has now been reviewed by the Ethics Committee and I am pleased to tell you that your submission has met with the committee's approval.

Final responsibility for ethical conduct of your research rests with you or your supervisor. The Codes of Practice setting out these responsibilities have been published by the British Psychological Society and the University Research Ethics Committee. If you have any concerns whatever during the conduct of your research then you should consult those Codes of Practice. The Committee should be informed immediately should any participant complaints or adverse events arise during the study.

Independently of the Ethics Committee procedures, supervisors also have responsibilities for the risk assessment of projects as detailed in the safety pages of the University web site. Ethics Committee approval does not alter, replace, or remove those responsibilities, nor does it certify that they have been met.

Yours sincerely



Professor Stephen Jackson

Chair, Ethics Committee

Appendix 11: Interviews with class teachers

These notes were taken during the discussion with the class teacher from School 1 (participants Alex, Bailey and Charlie) following the completion of the intervention period. The discussion followed a semi-structured format.

What differences did you notice about the children's behaviour?

"The children really looked forward to it and it built their confidence in reading – especially with Alex and Charlie. I don't know if it improved concentration, other than what would be observed with maturity – I didn't see anything other than natural progression."

"It helped vulnerable children to feel special – if they feel like that they'll make more effort. I think that effect was unique to reading to the dog – they do other interventions all the time, but only **they** read to the dog. It was special attention for them because the dog got so much attention so they were top of the pile."

"It brought Alex out of his shell."

Did you observe any changes in behaviour once the intervention had finished?

"I didn't notice a difference after it [the intervention] had finished."

What practical issues did you experience?

"The children are in and out of the classroom all the time and so that's part of their normal classroom routine. They…could come in and out smoothly. There was no fuss – they wanted to read to the dog and so they went out immediately."

Notes from discussion with class teacher from School 2

These notes were taken during the discussion with the class teacher from School 2 (participants Eric, Flynn, George and Harley) following the completion of the intervention period. The discussion followed a semi-structured format.

What differences did you notice about the children's behaviour?

"Ones like Flynn and Eric were full of it when they came back. George was interesting because he was keen and then he went off it – this is like other strategies – it followed the same pattern – things are put in place for his behaviour which work for two weeks, but then stop working."

"None of them viewed it as an academic activity – there was no pressure. They talked about the book they read to Pebbles [the dog]. It was pleasurable and calm compared to other interventions which whip them up or there's pressure to

achieve. From their perspective, there was no pressure [in this intervention] as they knew the dog can't read! Harley is not a confident reader, but it was all about the dog – reading was secondary."

"There was a sense of it being really special – which was really good for their self-esteem. The dog would roll up after lunch, **but** it [the dog] was just for them."

"For Eric and Harley, the excitement when they were talking about it [reading to the dog] – they're quite often sad – it was them smiling and being happy – there was no negative to the experience."

"With Eric…he was ready to sit down and learn – it got him in the right frame of mind – he was calm and ready and wanted to talk about Pebbles [the dog]. He wanted to tell a grownup about what book he'd chosen and why. He was willing to do the work [in the classroom] and chat to the teacher."

"Eric and Harley were ready to learn."

[After the children returned from the intervention] "They would be integrated into the guided task – straight into the teacher-led group – there was noticeably better engagement and a much better attitude towards the task – I'm sure some of it must have been her [Berny, the dog handler] – she must have been really low-key – the dog was dominant."

Did you observe any changes in behaviour once the intervention had finished?

"They didn't realise that they were doing a learning session or developing their reading."

"I thought it was brilliant – a really positive experience for those kids."

What practical issues did you experience?

"Some of them had missed the input – if I had TA support then I would have allocated the TA to reintegrate them – they found that difficult. It wasn't particularly seamless for them. They'd had this lovely time with Pebbles [the dog] then it was 'Bang, bang, bang, now we're doing this' – maybe that didn't help."

"Timings – with the run up to Christmas, but then it [the intervention] came into its own – breaking it up – they were calmer compared to other interventions."

"First thing after lunch was beneficial – if anything had happened at lunch then it [reading to the dog] allowed them to come back in much calmer. This was noticeable for the two earlier ones."