

# Can a dog be used as a motivator to develop social interaction and engagement with teachers for students with autism?

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Research into children with autism indicates that therapeutic sessions with dogs might provide a way of encouraging social interaction and reducing solitary or repetitive behaviours. With recent educational ASD interventions aimed at providing ways of encouraging intrinsic motivation to socially engage, it is possible that sessions with dogs could be used in a similar way. The present study involved three students with ASD who were given five sessions with a dog and their teacher. Sessions followed a semi-standardised approach and were recorded and coded on social behaviours, with qualitative observations made. Pre and post measures entailed ADOS-2 assessments and teacher questionnaires. Results suggest that students' responses in sessions were highly individual; all showed an increase in meaningful social interactions with dog and teacher, reduction in solitary or repetitive behaviours within the sessions and reported generalisation effects in some areas. The study lends support to the research base on the beneficial impact of dogs for children with autism and suggests that sessions with dogs in school could act as a way to strengthen interactions and engagement with teachers.

**Key words:** School, animals, children with autism, therapy, engagement.

The following research was conceived as a result of the introduction of therapy dogs into a post-16 special needs classroom environment. Observations of these sessions suggested a reduction in challenging behaviour, reduction in phobias and anxiety and an increase in independence. As a result of these observations, and the continued need to refine and develop new interventions and techniques, the offspring of one of these therapy dogs was introduced into a special school for pupils with autism.

The puppy began work at 12 weeks of age and anecdotal evidence suggested that the school dog often had a significant and positive impact. It seemed important to try to find a way to explore and understand more rigorously what these benefits might be to children with autism.

## Literature review and justification for research

Autistic spectrum disorder (ASD) affects approximately 1% of children in the United Kingdom (Baird, 2006). It is characterised by core deficits in social communication and reciprocal social interaction, and an increase of restricted, repetitive and stereotyped patterns of behaviour, interests and activities (WHO, 1992). More recently, the impact of sensory sensitivities has also been well documented (Dunn, 1997). Finding ways to motivate and encourage children with autism into social interactions and away from preferred sensory or solitary activities is a key element to successful and rewarding educational provision.

Recently, there has been development in ASD interventions that conceptualise children's motivation and attention as the primary focus and starting point from which to develop interaction and social skills and use naturalistic and engaging methods to work on this, rather than a 'top down' approach of highlighting a student's social deficits and teaching specific skills to counteract this. These may be classed as 'constructive applications' (Attwood, 1998), using the child's natural interest to motivate learning and behaviour change and promote the development of social communication and play skills. This mirrors Koegel *et al.*'s (2005) work on 'pivotal response' interventions – those that enhance the children's intrinsic motivation to participate and learn, by arranging environments to capitalise on what is motivating for that child and involving the children as 'active participants', thereby increasing engagement and learning opportunities. This definition might be applied for instance to Lego therapy (Legoff *et al.*, 2014)

which uses the child's strong interest in Lego play to work in group and develop social skills, or the Attention Autism approach developed by Gina Davies (Davies, 2014), which focuses on giving children an 'irresistible invitation' to learn and creating 'experiences worth communicating about' for children with autism, who might not be naturally motivated to engage in social experiences.

Children with autism are highly individual, and what motivates one child to engage may not be intrinsically interesting to others. Therefore, finding further naturalistic means to engage students with autism in interactions and their education environment seems important.

Interaction with animals has been clearly documented in the general population to enhance psychological well-being (O'Haire, 2010). Dogs have also increasingly attended schools to support children with a range of difficulties, including the use of dogs to reduce stress and hence motivate children who struggle with motor skills (Gee *et al.*, 2007) and reading (Jalongo, 2005), and to contribute to emotional stability and more positive attitudes to school for those with severe emotional and behavioural disorders (Anderson and Olson, 2006). Generally, research indicates that therapy dogs may offer physiological, emotional, social and physical support for children, perhaps by shifting the power balance with their 'non-judgemental' quality and having a calming effect (Friesen, 2010). A study by Walters *et al.* (2008) explored, with three children with developmental disabilities, the impact of sessions with a dog and teacher. Observational interval recordings of sessions showed an increase in overall positive initiated behaviours toward teacher and dog, and a decrease in negative initiated behaviours; observational ratings made by the teacher also suggested generalisation of improved social responsiveness in the classroom 30 minutes after completing the experimental sessions. They suggest the positive use of dogs in the classroom, for specific skills or as part of the general curriculum, to aid participation in activities for some children.

Specifically, Levinson (1969) was the first to document the potential therapeutic impact of dogs to enhance interactions with children with autism, suggesting that the dog acted as a 'social lubricant' and describing how

'when the child plays with the dog, he establishes his own world . . . the therapist, therefore, participates in a common adventure by entering into a corner of the child's world where he feels secure. This is where the therapist

and the child find an equal footing; this is where the doors of communication are likely to open between child and therapist.’ (1969, pp. 67–68)

The idea of ‘social lubricant’ links also to Winnicott’s (1953) concept of ‘transitional objects,’ with children perhaps establishing bonds with dogs which can then be extended to humans (Katcher, 2000). Many anecdotal reports, and several research studies, have since indicated the potential of assistance dogs within families to motivate children with autism into enhanced, albeit circumscribed, more social behaviours, as well as potentially increasing calmness and parental feelings of competence, and providing an element of safety and security (Burrows *et al.*, 2008, Solomon, 2010; Grandgeorge *et al.*, 2012; Burgoyne *et al.*, 2014). However, research findings are mixed and anecdotal reports often subjectively positive.

In terms of research specifically designed to address experimentally whether social interaction and engagement is enhanced for children with autism in the presence of a dog, there are only a handful of studies, and even fewer based within a school environment. Redeker and Goodman’s (1989) observational study indicated that introducing a dog into therapy sessions at a centre for children with autism caused a sharp increase in frequency of verbal and nonverbal social behaviour for highly withdrawn children with autism, with the increase directed to dog and therapist, and with a parallel decrease in withdrawal. Follow-up one month later indicated a decline in social interaction levels, but still at a higher rate than before the study began. The authors reflect on the need to consider how to generalise impact outside of therapeutic confines. Martin and Farnum (2002) compared behaviour of children with autism in school-based sessions with a live dog, a stuffed dog or a ball. They found that children were less distracted, showed more playful mood, were more aware of social environment and had increased meaningful verbal interactions in sessions with the live dog. However, hand flapping also increased, which the authors describe as due to excitement, but which is in itself a repetitive behaviour – suggesting dogs may elicit an increase in mannerisms, linked perhaps to higher states of arousal. They also suggest future research could be focused on how to generalise the positive effects seen. Sam *et al.* (2006) similarly found that incorporating animals into occupational therapy sessions for children with autism resulted in increased social interaction, communication and motivation to participate. A laboratory-based study by Prothmann *et al.* (2009) further analysed the preference and responsiveness of children with autism towards dogs, people and inanimate toys, and found that children interacted most frequently and longest with the dog, then with people,

and then with objects, with a reduction in self-stimulated behaviour in sessions with the dog. They observed children's interest in socially contacting (rather than physically) with the dog to increase significantly as sessions continued and suggest dogs communicate intentions in a way more readily understandable to children with autism. Finally, a single case study by Silva *et al.* (2011) comparing therapeutic sessions with a dog and therapist to those with therapist alone further adds support that dog presence might increase engagement (smiles, visual contacts and affectionate behaviours) while decreasing negative behavioural patterns, such as physical and verbal aggression and self-absorption. Again, they suggest the need to explore in future research whether these effects might be generalisable and maintained outside of the therapeutic context.

Two recent articles (Berry *et al.*, 2013, O'Haire, 2012) have critically reviewed the research base specific to scientific enquiry into the impact of dogs on children with autism. Both articles describe the same research (described above); in total, only seven articles met their inclusion criteria, which were publication in an English peer-reviewed journal and collection of original, empirical data of any intervention using a live animal and participants with a diagnosis of autism. Berry *et al.* also excluded qualitative research. Articles dated from the late 1980s, but most had been published since 2000. The reviews also hypothesise about the merits of dogs for children with autism. Berry *et al.* (2013) suggest that intervention strategies based on 'exploiting the emotional aspects of the relationship with a dog might represent an effective tool to dampen withdrawal' of children with autism through the 'structurally simple social actions that do not require interpretation of verbal cues and are highly repeatable and predictable' (p. 74). They also refer to the 'powerful multisensory stimulus' that a dog provides, which might meet the specific sensory needs of children with autism. They further hypothesise that the dog, in absorbing attention in a non-threatening way, might exert a calming influence, in turn increasing the child's responsiveness and willingness to communicate. O'Haire's review (2012) reflects also on the potential importance of the non-judgmental quality of dogs, offering the potential for a unique outlet for positive social engagement. All studies involved sessions with an animal and interventionist (e.g. trained animal handler or therapist) and participants, or those placed within a family context. Only one study (involving guinea pigs, not dogs) considered the impact of social interactions with peers (Křskova *et al.*, 2010); none considered the direct relationship between a teacher and students, despite three of the studies taking place in the school environment.

The most common outcome of these reviews was increased social interactions, language and communication, with significantly greater interaction in the pres-

ence of an animal; some also saw an increase in human-directed social interaction. Two studies also demonstrated decreases in ASD symptom severity, and three a decrease in problem behaviours. The reviews highlight the lack of standardised methodology, interventions being unclearly described and a lack of control groups. They highlight the need for further, more detailed studies of behaviour and, due to the infancy of research in the area, the need for further carefully designed single-subject experiments in order to establish manualisable techniques before progressing to large, randomly controlled studies.

Due to the initial promising evidence that dogs might enhance social interactions and engagement for children with autism, and considering recent educational intervention advances into more 'naturalistic' therapy aimed at increasing motivation to engage with others as a priority, it would seem a logical next step to explore the impact of a dog upon the interactions with a teacher who works with the child every day. Such classroom or teacher-based practice research has begun with children with other needs and dogs, with positive effects (such as for reading or motor difficulties, or those with emotional and behavioural difficulties). This would potentially have greater impact in terms of generalisability, and could also lend support for a more widespread use of dogs with children with autism in a school-based environment. It would also add to the body of research of single-subject experiments of children with autism and dogs, in focusing upon what techniques and approaches seem most beneficial in such interactions. To the author's knowledge, no research has specifically and empirically explored this area.

In conclusion, the core impairments of children with autism in social interaction and communication and a potential preference for repetitive, restricted behaviours and interests can make it difficult to engage them, socially and academically. Recently, interventions have begun to respond to this by building on students' interests and motivation to engage as key to educational and social skills training, and to do this in a naturalistic fashion. At the same time, research and anecdotal evidence has increasingly shown the positive impact that dogs can have for children with autism, in terms of prosocial behaviour and a decrease in social withdrawal. It seems possible that sessions with a dog and school staff could therefore create a 'way in' for increased social interaction and engagement, which might generalise to other situations in which this relationship occurs in the school setting.

## Research hypothesis

Can sessions with a dog be used to motivate students with autism and who are hard to engage to increase their social interaction and engagement with their teacher? If so, can this effect be generalised outside of the sessions and into the classroom?

## Research questions

1. Can sessions between a student with autism, a dog and a teacher be the catalyst to elicit and expand social interaction and engagement, and reduce isolated, sensory stimulated, repetitive and negative behaviours?
2. If social interaction and engagement behaviours are elicited, are these behaviours also increased in other settings (without the dog's presence) with the teacher who supports the intervention? Are isolated, repetitive and stereotyped behaviours decreased in these settings?
3. Is there a change in the child's underlying skills in engagement and social interaction as assessed by a standardised measure?

## Methodology

### *Design*

This study entailed three single case studies, with five repeated observations of the subjects (quantitative and qualitative) in semi-standardised sessions with their teacher and school dog, and pre and post outcome measures. Observations and measures focused on social behaviours, negative or repetitive behaviours and autistic symptomatology.

### *Participants*

Three male students with a diagnosis of autism took part in the study. All students attended a special school for children with autism and learning difficulties. Participant details are described in Table 1.

Diagnosis was confirmed with ADOS-2 (Lord, 2000) assessment by independent administrator at the beginning of the intervention. The students were

**Table 1.** Participant details

<i>Student</i>	<i>Age</i>	<i>Other interventions</i>	<i>ASD Profile from ADOS-2 assessment</i>
A	7 years	School based occupational therapy, speech and language therapy and music therapy. ASD specialist teaching.	ADOS-2 classification: Autism. Marked impairments in communication, social reciprocity and pervasive nature of repetitive and stereotyped behaviours. Early indicators of potential for communicative intent in vocalisations and approach to adults.
B	13 years	School based occupational therapy, speech and language therapy and music therapy. ASD specialist teaching. External individual dramatherapy sessions.	ADOS-2 classification: Autism. Marked impairments in communication, social reciprocity and pervasive nature of repetitive and stereotyped behaviours.
C	12 years	School based occupational therapy, speech and language therapy and music therapy. ASD specialist teaching.	ADOS-2 classification: Autism. Relative strengths in receptive language, attachment to teacher and ability to follow simple instructions. Anxiety and repetitive behaviours pervasive and impact on daily functioning.

chosen specifically for their reported difficulty in engaging in the curriculum, characterised by limited social interactions, low social responsiveness and motivation to interact with others and a significant portion of time spent engaged in repetitive, sensory or solitary behaviours. The study took place in a school specifically for children with autism. The students were accompanied in sessions by a teacher or therapeutic assistant (from now on described as ‘teacher’) who spent a significant amount of time with the student.

### ***Procedure***

Each participant took part in five intervention sessions, spread across a ten-week period. Each session lasted for 20 minutes, the first two minutes just with the teacher, then with the dog as well. Where possible, each session was held in the



same room (the school dinner hall), cleared of distractions. The same dog resources were used each week (e.g. rope, balls, brushes, blankets, toys, biscuits, leads and harness). In time alone with the student, the teacher was instructed to use the aids available as a way to encourage interaction with the student. In the initial session with the dog, the teacher followed a structured plan, so as to introduce all objects to the student. In the following weeks, the child was allowed to choose how to structure and use the sessions, so as to maximise their control over and engagement in the sessions. The teacher's role was made clear – to encourage interactions (through verbal, gestural or physical prompts) between dog and child if this was not forthcoming and, when the dog and child were engaged, to use this interaction as a 'way in' for them to also engage with the child – for example, commenting upon and praising interactions, showing interest, remaining close by, looking and smiling, getting involved in play and suggesting turn-taking games. They were also instructed to intervene if the child became distressed or over-aroused within sessions. The child was free to leave the sessions at any point. One of the researchers (and dog owner/handler) was present to video the sessions, and also to advise on interactions to ensure a level of consistency across sessions and ensure the dog did not become distressed.

### ***Ethical considerations***

Therapeutic work with dogs entails certain issues that must be addressed, around sanitation, the risk of dog biting or injury to the animal, allergies, dog phobia and cultural differences (Jalongo *et al.*, 2004). Two of the authors attended a PAWS research project conference which raised a number of additional ethical considerations that were addressed and discussed as part of this project. The PAWS project highlighted the risks raised of using an untrained dog in a school environment and with children with autism, such as noise and unexpected behaviours.

The dog that was used within this project was not specifically trained as a therapy dog and had not undergone any specialist training other than obedience classes and an early introduction to a specialist school environment. The authors of this research are not animal behaviourists, but had worked with the dog, staff, students and parents in order to create a safe and conscientious environment for this research to take place. They also had long-standing experience of working with children with autism. The school had previously undertaken a

comprehensive risk assessment process for all students who worked with the dog, and all parents in the school were asked to consent to their children accessing any sessions with the school dog. All students also had a preliminary ten-minute session with the dog to ensure they were not unduly anxious, and heightened anxieties demonstrated by one student led to his being excluded from the study. Informed consent was gained from the parents and carers of all participants for them to take part in this research.

The school dog's welfare was also considered within the research plan in relation to the dog becoming scared, unusual and unexpected noises, touching, roughness and providing the dog with quiet time and space between sessions with students. However, on all occasions the dog was keen to take part and join in with the sessions.

## ***Analysis***

All 20 minutes of each session were coded (frequency and duration) by the first author (not involved in sessions directly), using the computer-based package ODlog, Version 2 (Macropod Software), in the areas described in Table 2.

A further researcher coded 20% of videos to establish inter-rater reliability; coding reliability for all categories on all three students ranged from 45% to 93% (Pearson's correlation). In addition, the first author watched the videos again, making qualitative observations on the interactions and engagement from a psychological perspective.

The behaviours in Table 2 which focused on the teacher (e.g. interactive play, visual interest, meaningful vocalisations, expressing pleasure and joint attention behaviours) and negative and stereotyped behaviours also formed the basis of a pre and post questionnaire presented to the teacher involved in the research, one week before the sessions and one month after sessions had ended. This asked how frequently the child engaged in these behaviours, on a Likert scale of 0 (never) to 5 (all the time), in unstructured times within the classroom environment.

Finally, an independent assessor performed ADOS-2 assessments of all three students a week prior to session onset, and again one month following the

**Table 2.** Observation and questionnaire schedule

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**Levels of social interaction/engagement with dog:**

Interactive play and engagement	Imitating and copying, taking part in simple games (throw and fetch, peekaboo, tug of war), physical touch and play, chasing
Visual interest	Looking at dog (when not actively involved in play)
Directed vocalisation, sounds and verbal engagement	Calling, talking, sounds for communicative purpose (rather than e.g. echolalia), clapping, tapping floor to get attention

**Levels of social interaction/engagement with teacher:**

Interactive play and engagement	Imitating and copying, taking part in simple games (throw and fetch, peekaboo, tug of war), physical touch and play, chasing.
Visual interest	Looking at teacher (when not actively involved in play)
Directed vocalisation, sounds and verbal engagement	Calling, talking, sounds for communicative purpose (rather than e.g. echolalia), clapping, tapping floor to get attention

**Expressing appropriate pleasure and shared enjoyment**

Smiling and laughing in sync with teacher/dog.

**Initiates joint attention**

Showing objects to teacher with eye contact, use of protodeclarative pointing (points to attain joint attention to object out of reach) or co-ordinated gaze between child & dog / child & teacher to jointly reference object

**Responds to joint attention**

Follows teacher's point or gaze to reference object out of reach

**Isolated play/Mannerisms and stereotypical behaviour**

Mannerisms, stereotyped behaviour/sensory interest or compulsions

Playing alone with toys, oblivious to people/dog

Negative/disruptive/distressed behaviour

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sessions' completion, in order to explore whether there were any objective differences in autistic symptomatology.

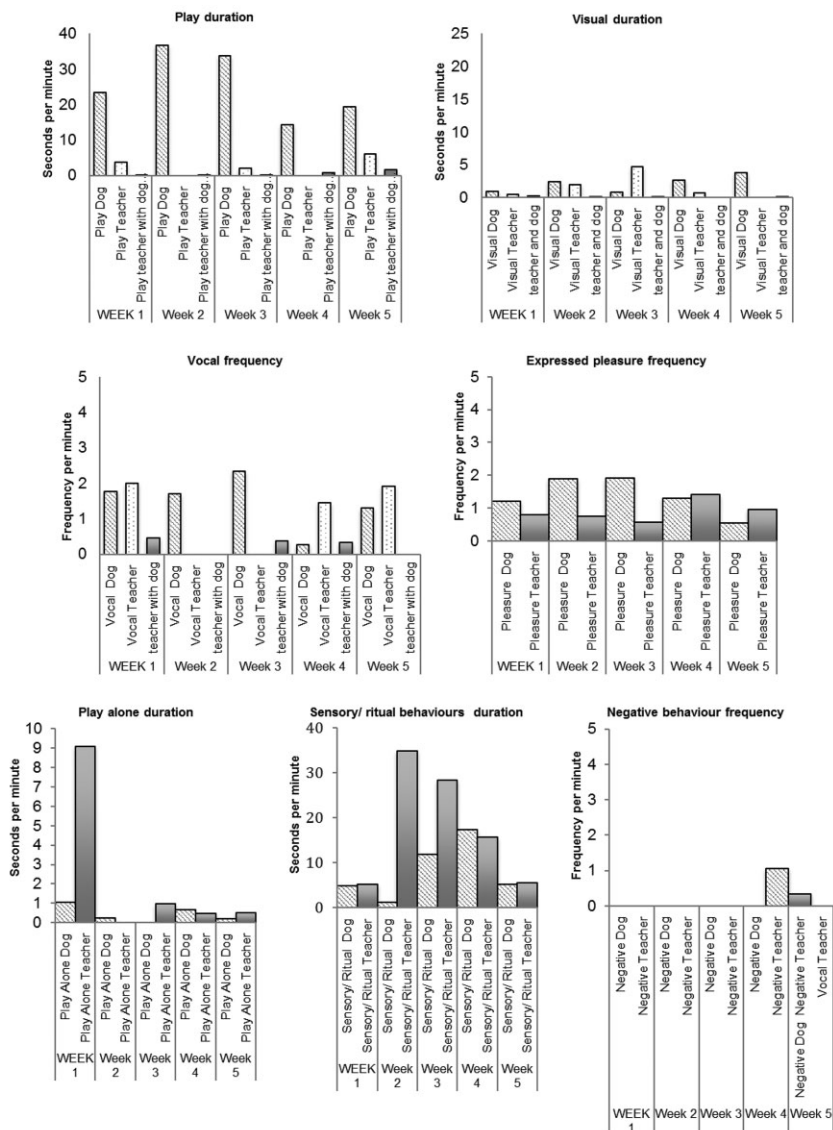
## Results

### *Student A*

#### *Session observations*

As can be seen from Table 3, student A engaged in far higher levels of interactive play, visual interest and expressions of pleasure when the dog was present. In general, playing alone and sensory/ritualistic behaviours were also decreased. Interactive play with the teacher also increased from the first to last session, as did expressions of pleasure toward them.

**Table 3.** Student A results



Qualitative observations highlighted the immediate impact on the child's engagement when the dog entered the room – from sensory interests to full attention on the dog. Play in initial weeks was focused on physical exploration of the dog, beginning with mouth and tongue (which sometimes needed preventing by the teacher), then extending to the whole body (almost as if the dog was conceptualised initially as a 'part-object' rather than a whole, living being). Clearly, the dog at this stage provided a highly exciting, multi-sensory experience. Initially there was little effective communication between the dog and student, despite attempts by the student to get the dog's attention. After initial weeks, play took on a 'rough and tumble' quality. In the third session, when the student threw a ball that the dog brought back, he seemed to realise that his actions could lead to a particular response by the dog – a sequence he kept repeating in the following sessions, as if realising the dog was a sentient, intentional being that he could influence. In the third session, the student also began to share joint attention with his teacher – looking to make eye contact and check she was watching his interactions, and sharing pleasure with her. More meaningful vocalisations occurred from this point on, and the student appeared more focused and calmer. At the end of the last two sessions, the student seemed to suddenly switch off from his interactions with the dog and return to sensory behaviours, almost as if he had 'had enough.' The teacher approach that seemed most effective was a gentle, fun, facilitative one, rather than being too directive or involved (e.g. commenting on what was happening and laughing, rather than direct questions or instructions).

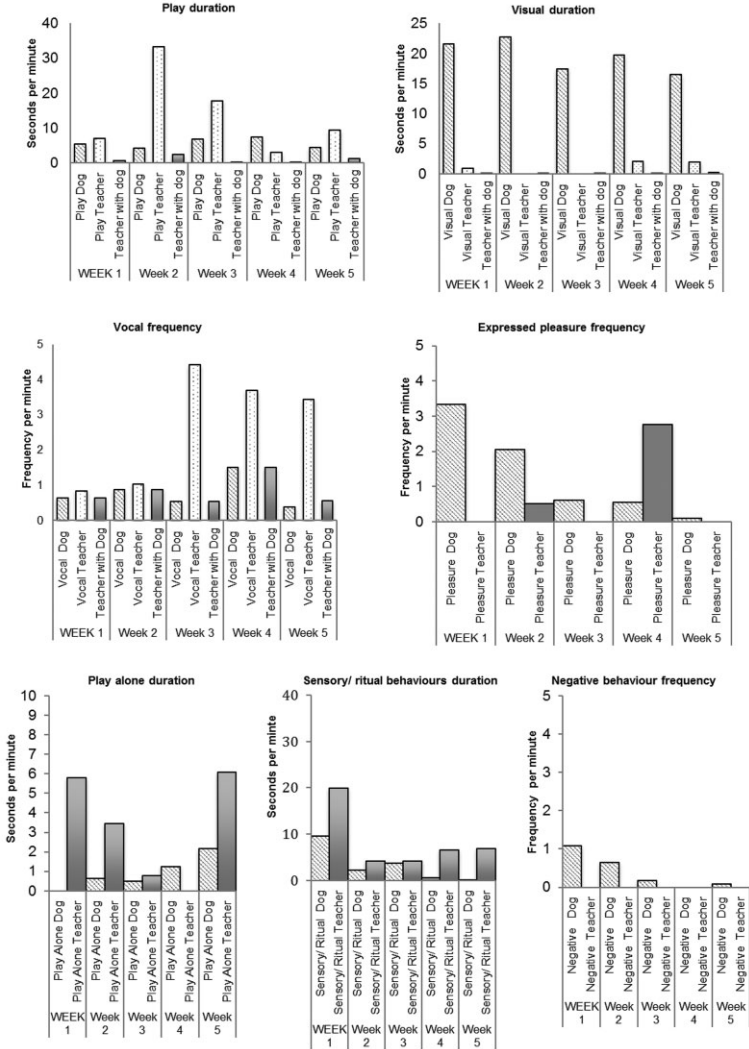
### *Pre and post measures*

The ADOS-2 assessments suggested the same level of ASD symptomatology at the beginning and end of sessions. Qualitatively, the assessor observed the student to be more aware of others in the room, and to spend more time engaging functionally with materials in the room following sessions and less engaged in sensory and repetitive behaviours. The teacher questionnaire suggested that in the classroom environment, the student's interactive play levels, visual interest in others and expressions of pleasure and shared enjoyment remained the same before and after sessions. However, the child's verbal interaction, showing objects to others, co-ordinated looking and pointing to direct attention were felt to have increased from 'never' or 'rarely' to 'sometimes'. Stereotyped and repetitive behaviours remained the same.

# Student B

## Observational data

**Table 4.** Student B results



From coded observations (summarised in Table 4), across most sessions the student's levels of visual interest, meaningful vocalisations and interactions were much greater when the dog was present, and levels of playing alone or sensory/ritualistic behaviour reduced. Levels of interaction and vocalisation decreased with the dog slightly as sessions continued, but increased with his teacher. Initially, the student was a little anxious of the dog, and withdrew from interactions, but this reduced as sessions continued.

Qualitative observations revealed that in time alone with the teacher, there was generally little attention or engagement with the teacher, unless clearly directed by the teacher. Most sessions were characterised by a gradual increase in interest and engagement with the dog, beginning with looking and smiling at the dog and talking about him, to touching the dog and playing games with him (such as tug of war, and throw and catch), to excitedly running around together. As sessions continued, language seemed to become more relevant. For instance, the student began calling the dog by his name, whereas initially he referred to him as a 'bear'; speech in initial sessions also comprised mainly talk about favourite cartoons, whereas in later sessions he would name parts of the animal or ask relevant questions, such as 'does he sit?' The dog seemed often to mirror the mood of the student – sitting calmly and watching him when the student was not focused, and running around when the student was engaged and excited. Teacher style seemed important, with the student being more responsive to a supportive and facilitative approach, rather than directive and questioning.

### *Pre and post measures*

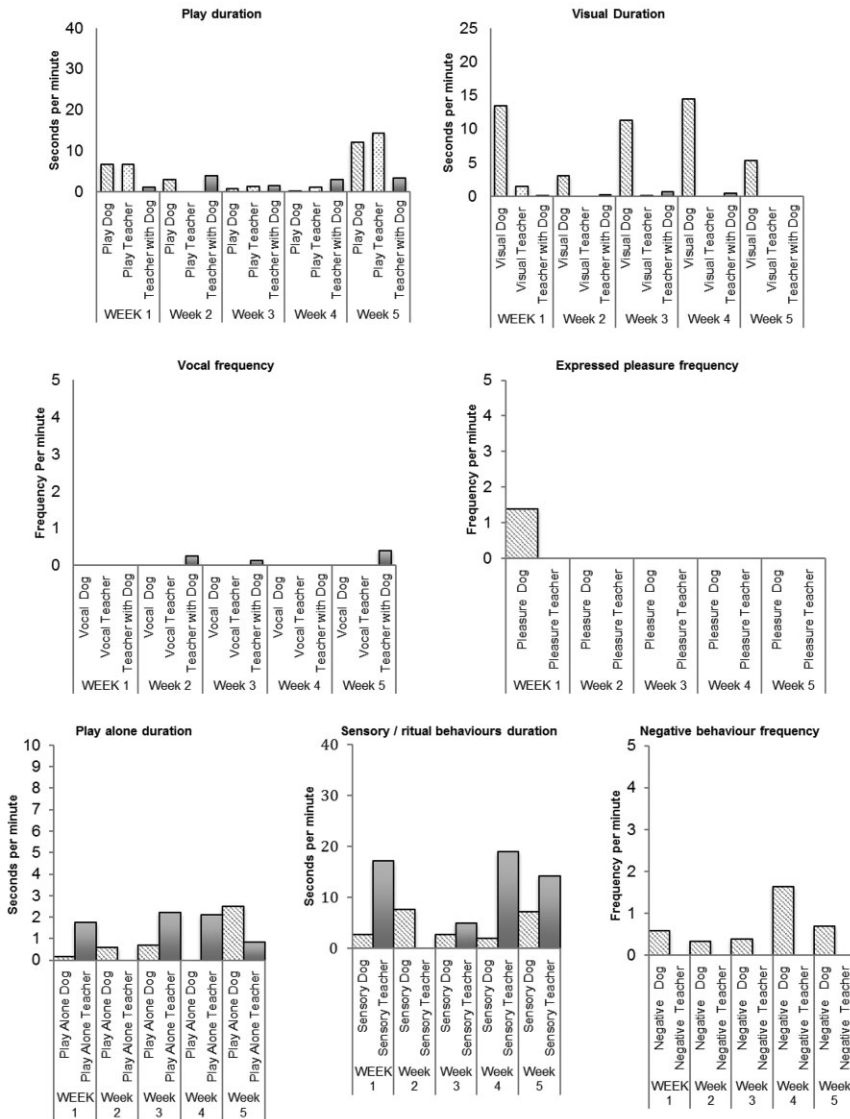
Student B had the same levels of ASD symptomatology as assessed by the ADOS-2 at the beginning and end of sessions. Qualitatively, the assessor observed the student to have more relevance and functionality in his language (i.e. a more 'in tune' response, specific to actual objects in the room, rather than just delayed echolalia). Level of engagement was felt to be the same, but there seemed to be a little more interest, eye contact and smiles in certain activities than previously.

The teacher questionnaire gave a mixed picture – visual interest in others and co-ordinated gaze were felt to have decreased post sessions, while pointing and shared enjoyment remained the same. However, interactive play, showing objects to others and meaningful vocalisations were all felt to have increased, and stereotyped behaviour to have reduced a little.

# Student C

## Observational data

Table 5. Student C results





Coded observations (see Table 5) revealed that there was much higher visual interest when the dog was present in sessions, rather than the teacher alone. Generally, levels of playing alone and repetitive/sensory interests were also higher with teacher alone than when the dog was present. For instance, the student was very preoccupied with touching surfaces in the room, or following markings on the floor in a repetitive manner. Directed and meaningful vocalisations also occurred only when the dog was present in sessions. There was no clear pattern in terms of interactive play, although the first and last sessions were marked by higher levels of play, with both dog and teacher. The first session was the only one in which the student expressed pleasure – throughout the sessions the student showed some anxious withdrawals from the dog.

Qualitative observation suggested that the student's interest and focus across all except the last session were characterised by an over-riding interest in and motivation for things in the environment other than the dog – for instance, sensory qualities of the room or dog aids, camera equipment or performing mannerisms. However, the student did seem very quickly aware of the dog's presence in each session. Until the last session, awareness and visual interest in the dog was accompanied by wariness, watching the dog in order to move away if it got too close. This did, however, seem to temporarily interrupt the student's engagement in sensory/ritualistic behaviours. The student's play with the dog or teacher generally took the form of simple throw/catch games – in the last session, the student initiated this play with the dog for the first time and seemed less anxious, even approaching the dog to take a ball off him and touching the dog to explore the feel of his fur. Generally, the student's interaction with the teacher was more comfortable, sitting close to the teacher, holding hands and looking to the teacher for reassurance. The student would also generally respond briefly to the teacher's requests to play simple games with them, and the teacher's response of providing reassurance, physical presence and gentle directions to join in seemed most helpful. In the last two sessions the student chose to leave before the end.

### *Pre and post measures*

For this student, ASD symptomatology increased slightly as measured on the ADOS-2 in the follow-up assessment. This linked specifically to the student being slightly more passive in the second assessment, and initiating fewer interactions (in showing objects or initiating joint attention). In both assessments, sensory interests and ritualistic behaviour and mannerisms impacted greatly on the student's capacity to engage.

The teacher questionnaire reported that the student was engaged in higher levels of interactive play, visual interest, expressions of pleasure, showing objects, co-ordinated looking and pointing following the sessions. This suggests that, outside of the sessions, the student was now more engaged and interactive with their teacher. This was despite a perceived increase also in stereotyped and repetitive behaviours.

## Discussion

The results of the case studies give tentative support to the research hypothesis made: for all three students, levels of interaction, visual interest and meaningful vocalisations were shown to increase in the sessions with the dog and teacher present, and teacher questionnaires suggested that, on at least some measures, this effect generalised to the classroom setting. There was also within the sessions a parallel reduction in playing alone and sensory/repetitive behaviours, but this was not conclusively reported to generalise outside of the sessions. An independent objective assessment of underlying ASD symptomatology (using the ADOS-2) suggested either no improvement or, for one student, a slight decline in terms of levels of passivity in initiating interactions. However, the assessor's qualitative observations suggested two students were more focused and meaningfully engaged following sessions. It is possible the ADOS-2 was not a sensitive enough instrument to capture these subtle differences.

This research therefore adds to the growing body of empirical literature that suggests that dogs can have a positive impact upon children with autism in terms of interaction and communication, and can, within sessions, decrease social withdrawal and repetitive behaviours. It is the first published study to explore these benefits for children with autism in relation to their class teachers, and to assess whether the effects generalise beyond the sessions. While the results for generalisation were mixed, the evidence from the teachers' qualitative questionnaires suggested that this did occur – even for the student whose ADOS-2 assessment showed increased passivity and whose stereotypical behaviours had increased.

In reporting the results as three separate case studies, it is clear that the response to the dog, engagement with both dog and teacher, and impact of the sessions for each student was highly individual. Similarly, the best supporting approach from

the teacher also varied from student to student, suggesting that with a basic selection of dog-appropriate aids, the teacher's knowledge of the student underpins how best to utilise the sessions and what approach to take. A gentle, not overly directive approach seemed key in all sessions, with an emphasis on commenting rather than questioning, and suggesting rather than instructing. It was clear that the dog itself also altered its behaviour and response dependent upon each students' presentation. Furthermore, it became clear after the initial session that allowing the child as much control over the content of the session as possible maximised their motivation to take part, rather than imposing a prescheduled framework of activities.

Within these sessions the dog clearly impacted positively upon the students' levels of meaningful interaction, seemingly interesting the students and making them motivated to attend to the dog (and/or teacher) and move away from sensory, circumscribed interests. This suggests that using a dog at school could indeed be an additional 'pivotal response' intervention or 'constructive application' to build upon social engagement and interactions. The consequent increases in interactions with the teachers in sessions, and reported generalisability of effects, also correspond to theories of dogs as 'social lubricants' or 'transitional objects' into human relationships, and suggests a possible importance of dogs to strengthen the working relationship between students with autism and their teachers.

For one (and possibly two) of the students, the powerful multi-sensory experience that the dog provided seemed the initial key motivator away from their usual solitary interests and behaviours. Through the repeated exploration that the dog allowed on this physical and sensory level, the child seemed increasingly able to understand the dog as a whole being rather than just a mouth or tongue. For all students, the simple, nonverbal, repeated and reliable responses that the dog gave (e.g. throw a ball and it would fetch it, pick up a rope and it will tug the end) helped them as the sessions continued to understand the intentions of the dog, appreciate that they could impact upon the dog and comfortably engage in a two-way interaction. Interestingly, for Student A, this was also mirrored in and outside of sessions with the first development of joint attention behaviours with his teacher, suggesting a more fundamental understanding of others as separate and intentional beings. Furthermore, the unconditionally positive and ever-willing responses that the dog gave encouraged all students to engage socially. For one student, motivation to engage with the dog was much less evident, however, and interest was generally more about wariness of the dog rather than a genuine desire to interact (until the last session). This suggests that using a dog as social

motivator may not be appropriate for all children with autism, although the changes this student showed within the last session and in the classroom might indicate that allowing children several sessions (unless highly anxious) might be warranted.

The study does however have limitations. There was a lack of control group; therefore it is not possible to state with certainty that the results (especially outside of the classroom) are attributable to the dog sessions or to other educational or therapeutic input they had received, or perhaps just to having spent a longer time with their teachers in very purposeful, interactive one-to-one sessions (as well as in the classroom generally). The research also aimed at detailed observations, and was as such necessarily small in its sample size. It is therefore not possible to generalise findings to all other children with autism; in fact, the individual responses of all three students would argue against this. Furthermore, comparing only the initial two minutes of time alone with the teacher in each session compared to eighteen minutes with the dog might unfairly bias results for the time with the dog, as the students may need this time to 'warm up' to the sessions. However, the different responses of two of the three students as soon as the dog entered the room would argue against this. Due to the students' engagement clearly being encouraged by allowing them to choose how to use the time on a very individual basis, it was also not possible to construct a clear, manualised approach to the sessions to allow for direct replication. The sessions were also intended to be run weekly for ten sessions, but, due to constraints of research in a school-based setting (sickness, hall being used for other purposes some weeks), this was not possible, and may have limited the findings possible. Similarly, school holidays meant that follow-up data was collected after one month rather than immediately after sessions, which may make confidence about generalisability less secure (although it does conversely suggest longer term effects of the sessions).

There are also ethical considerations. The sessions entailed some level of anxiety and risk (e.g. trying to lick the dog's tongue), and this needed to be carefully managed by the teacher at times. Whilst most studies use a registered pet therapist to conduct sessions, this study used a dog (albeit licensed) which was owned by a school teacher with no formalised training in pet therapy. The dog also had not undergone specialised training in working with children with autism (although it did have long experience in the presence of pupils with autism and being encouraged to work with them in two schools). While this might be seen to bias results or make them less valid, it could also be argued that this makes the study and

results more applicable to a much wider audience practically, and the similar results to previous studies suggest that a specialised level of training for the type of naturalistic sessions engaged in might not always be necessary. Indeed, the freedom of both dog, child and teacher to respond in the most natural and spontaneous way possible may have been key.

The benefits of dogs for children with autism suggest that finding ways to incorporate the use of adequately trained and licensed dogs into school settings could be advantageous both for goals of increasing social motivation and interaction with key staff in itself, but also to encourage the child's participation in other activities. Future larger-scale research could usefully expand this study to incorporate further students, perhaps including a comparison group (such as Lego therapy or Attention Autism) to more clearly examine the unique impact that dogs might bring. Involving the dogs with groups of students, rather than just teacher/student dyads, may also have implications for peer relationships and interactions.

## Conclusion

Some recent educational interventions for children with autism have focused upon how to motivate children to take part in activities and interactions when they lack the intrinsic social motivation to do so due to their condition. Research into children with autism, dogs and therapists suggests that dogs can provide a way of encouraging social interaction and communication, and reducing solitary or repetitive behaviours. This study explored the impact of sessions with three students with autism, a dog and their teacher to establish if similar benefits would be found, and whether this might generalise to the classroom context. Results suggest that students' response in sessions was highly individual, but for all there was an increase in meaningful social behaviour with dog and teacher within the sessions, and reported generalisation effects in some areas. This suggests that dogs in school could act as a motivational tool for children's participation in school activities, and also a way to strengthen their interactions generally within their social relationships at school. Future research could examine similar sessions with a comparison group of alternative therapy sessions to be clearer about the particular benefits of sessions with a dog, and also the impact of a dog in a group of children.

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