Human-Animal Interaction Bulletin
2016, Vol. 4, No. 2, Pages 38-58

Effects of Pet Dogs for Children with Autism Spectrum Disorders (ASD) and their Families: Expectations versus reality

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Previous studies have examined the specific benefits of therapy and assistance dogs on children with autism, but until recently only anecdotes existed concerning the benefits of pet dogs. We conducted structured interviews with 40 parents of children with an autism spectrum disorder (ASD) to investigate the perceived impact of pet dogs. Half the sample (20) owned a pet dog and half the sample was looking to acquire one. Restrictions associated with dog ownership were underestimated, whilst enjoyment, fun and improvements in communication and social interaction were overestimated by the non-owners, indicating important areas where expectations are unlikely to be met. These areas represent important factors to consider when deciding whether to acquire a pet dog in families living with ASD, and as such is of interest to a broad audience including clinicians, veterinarians and parents.

Keywords: Autism; children; families; dogs; animal-assisted intervention

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Acknowledgements:
The study was part of a larger project funded by the Big Lottery; collaboration between the University of Lincoln (UK), National Autistic Society (London, UK) and Dogs for Good, Banbury, UK (previously Dogs for the Disabled). Dogs for Good contributors: Peter Grobing, Helen McCain, Dr Corri Waitt, PAWS project team (Katie Bristow-Wade, Amy Davies, Kate Thomas). The study was guided by a formal advisory group: Dr Lorna Wing, Jo Stevens. Dr Lorna Wing, Dr Bob Michell, Denis Lane, Dr Jane Fossey, Professor Shaun Lawson, Peter Gorbing, Helen McCain, Susan Aston and Sarah Milne. We thank the parents who gave up their time to participate in this study.

Autism spectrum disorder (ASD) is a heterogeneous condition defined by the DSM-5 as a person experiencing persistent difficulties in social interaction in a range of contexts and as showing restricted, repetitive behaviors. These problems must have been evident in early childhood, cause significant impairment in functioning, and not be explainable by intellectual disorders or developmental delays (DSM-5, American Psychiatric Association, 2013). From the time of diagnosis of autism spectrum disorder (ASD), parents are advised on a range of treatment programs (see Autism Speaks, 2010), including early behavioral interventions (e.g., the Early Start Denver Model and Lovaas Model), through to family based approaches and biomedical interventions (e.g., medications, diets, supplements, alternative and complementary therapies). The role of dogs in animal assisted intervention (AAI) and its subcategories of animal assisted therapy (AAT) and animal assisted activities (AAA) in the remediation of ASD behavior are of increasing interest. Many studies report positive effects when using dogs as therapy for children with ASD (e.g., Burrows & Adams, 2005; Prothmann, Ettrich, & Prothmann, 2009; Soloman, 2010). However, there has been limited exploration of the impact of un-trained pet dogs (i.e., dog companions), as opposed to therapy dogs, who have received specific and extensive training, in the homes of those living with a child with ASD. Pet dogs may prove an important avenue to investigate in order to meet the needs of many families living with ASD in a timelier and cost effective manner than that possible with trained assistance dogs. Given the increasing interest of the value of dogs in ASD treatments, and the surmounting concern for the need to develop effective treatments which have a strong scientific evidence base (e.g., Hamburg & Collins, 2010; Simpson, de Boer-Ott, Griswold et al., 2005), this paper reports parental perceptions (their expectations and the reality) on the value of pet dogs as an effective therapy for ASD. We first provide a brief review of the literature on structured AAI (e.g., using trained animals) and then explain how these benefits may be achieved through companion pet dogs.

There is increasing awareness that animals might benefit children with ASD, with a variety of animal species having received attention including dogs, dolphins, horses and guinea pigs (e.g., see reviews by Endenburg & van Lith, 2011; Melson, 2003). A review of the use of AAI recently concluded that there is preliminary support for the value of AAI in ASD treatment programmes (resulting in increased interaction and communication, and decreased problem behavior, autistic severity and stress; O'Haire, 2013). However, it should be noted that the application of these studies into practice are constrained by the lack of high quality studies, which are plagued with methodological weaknesses and limited replications (O'Haire, 2013).

Nonetheless, despite criticisms of AAI research there is surmounting interest and evidence to suggest that dogs in particular may be valuable in therapy sessions (for a review see Berry, Borgi, Francia, Alleva, & Cirulli, 2012). Although the theoretical basis behind the effects of dogs in treatment programmes is unclear (e.g., see review by Mills & Hall, 2014), possible explanations could be extrapolated from separate evidence bases which suggest that dogs have the potential to improve communication (Lima, Silva, Amaral, de Sousa, 2012; Wells, 2004), reduce stress (Barker Knisely, McCain, & Best, 2005; Odendaal & Meintjes, 2003), reduce depression (Souter &

Miller, 2007) and improve health (Nimer & Lundahl, 2007; Wells, 2009). It is possible that a combination of some, or all (and indeed additional) factors, may benefit those living with a disability and potentially prime the individual for therapy (Silva, Correia, Lima, Magalhães, & de Sousa, 2011). More specifically, there are reported benefits of therapy and assistance dogs to children with ASD. These advantages include increased child safety, increased outdoor access, heightened communication and social interaction with other people, and improved family behavior (Burgoyne, Dowling, Fitzgerald et al. 2014; Burrows, Adams, & Spiers, 2008; Redefer & Goodman, 1989; Silva et al., 2011). It is noteworthy that many of these benefits might also be accrued from pet dogs without specialist training, and this beginning to be reflected in recent literatures.

A paper by Grandgeorge, Tordjman, Lazartigues et al. (2012) reported that children with ASD who acquired a pet (cat, dog or small furry animal) improved on the prosocial behavior of 'offering to share' and 'offering comfort', as measured by parental responses to the Autism Diagnostic Interview-Revised. Another recent paper also reported an increase in social behavior, as well as a reduction in restrictive behavior patterns, when children with ASD interacted with a companion animal, (Byström & Lundqvist Persson 2015). These conclusions were drawn from qualitative interviews with the parents. However, both of these papers simply specified 'pet', as opposed to a 'pet dog'. If we are to define the circumstances under which animal companionship is most effective to children with ASD it is important that we specifically identify the animal used in the study and document the extent of the effectiveness of the intervention. One recent paper highlights the benefits of pet *dog* acquisition to parents of children with ASD (Wright, Hall, Hames et al., 2015). Parents who acquired a pet dog showed significant reductions in parenting stress after acquiring the dog in comparison to a control group of parents who did not acquire a pet dog. This paper highlights the potential of exploring the role of dogs, specifically, on improving quality of life for children with ASD, as well as their parents.

Combined, these papers (Byström &Lundqvist Persson, 2015; Grandgeorge et al., 2012; Wright et al., 2015) begin to show some evidence that the benefits associated with acquiring a trained assistance dog can be evidenced from acquiring a pet. However, to date only one (known) study has considered potential drawbacks with pet dogs as an effective ASD intervention. When evaluating the feasibility of a new intervention it is important that we document both potential positive and negative effects. Through conducting interviews with parents with children with ASD Carlisle (2014) identified that parents believed that pet dog ownership improved child interactions and bonding experiences, but identified time and costs constraints as the negative aspects of dog ownership (Carlisle, 2014).

It is clear that further scientific reports are required to establish whether, and how, pet dogs may benefit those living with ASD. Additionally, it is important to establish whether parents considering acquiring a dog have realistic expectations of what benefits this may bring. Not only will this aid parents in the decision making process of acquiring a dog, but it will also help healthy relationships develop between the dog and family members, so that frustrations are minimised with regard to the benefits of dog ownership living up to the expectations. By

qualitatively exploring perceptions of dog ownership in parents of a child with ASD, who do and who do not own a pet dog, this project addresses a number of concerns, including; the predominance of case-study reports in human-animal interaction studies (O'Haire, 2013); the lack of a control comparison group (O'Haire, 2013) and the application of laboratory based results to treatment in the home environment (Mandell, Stahmer, Shin, Xie et al., 2013). Additionally, by adopting qualitative techniques we respect the importance of the individual nature of ASD (e.g., Kohane, McMurry, Weber, McFadden et al., 2012; Mukaddes & Fateh, 2010) and appreciate that what helps in one case might not be helpful in another.

The study aimed to provide an initial exploration into the perceptions of dog ownership in parents with children with ASD. To achieve this aim we first identified the perceived impacts of dog ownership in dog-owning families with a child with ASD. Secondly, we compared the perceptions of dog owners with the expectations of other families with a child with ASD, who were looking to get a pet dog but had not yet obtained one. The research objectives were: (1) To undertake structured interviews with families with a child with ASD, half with a dog and half looking to get a dog. (2) To identify the themes that reflected the breadth of perceived and expected impacts of dog ownership. (3) To assess differences in emphasis between the two populations.

Methods

The research process was approved by the University of Lincoln's ethics committee. Fully informed, written consent was obtained from all participants prior to the interviews.

Sample. Forty parents of children diagnosed with ASD were recruited; 20 were pet dog owners and 20 non dog owners, who were considering getting a pet dog. This convenience sample from the UK population was recruited on a voluntary basis, via Dogs for the Disabled's PAWS (Parents Autism Workshops and Support) network (Dogs for the Disabled, 2013). The PAWS program involves a series of three workshops that educate parents about dog behavior, welfare, and training, whist advising on the suitability of, and integration of pet dogs into families with children with ASD. In addition postings on websites and social networks related to Dogs for the Disabled and the National Autistic Society (NAS), and word of mouth were used to increase the number of participants.

Demographic data relating to the child, dog and family were collected. In families where more than one child was diagnosed with ASD (n=4 dog owners) parents were asked to select the child whose ASD symptoms were considered to be more severe. Where more than one dog was owned (n=4), parents were asked to respond with regards to the dog that they believed had the closest relationship with the child with ASD.

Interviews

Item Generation. The interview questions were initially compiled following a review of the existing literature and then circulated to the project advisory group for additional input and discussion. The project advisory group was made up of twelve members, including autism professionals, psychology professionals, veterinary professionals, assistance dog professionals, academics and parents of children with ASD who own a family pet dog. Feedback from the group resulted in an interview schedule addressing specific areas associated with dog ownership in families with children with autism. The

areas included potential benefits and difficulties for both the child and the family with respect to owning a pet dog. Twenty four areas (hereafter 'items', Figure 1) were targeted as a result: covering child behavior, impact on the family, child-parent issues, child-sibling issues. In addition, four general items were added to gather views on overall perceptions (Figure 1).

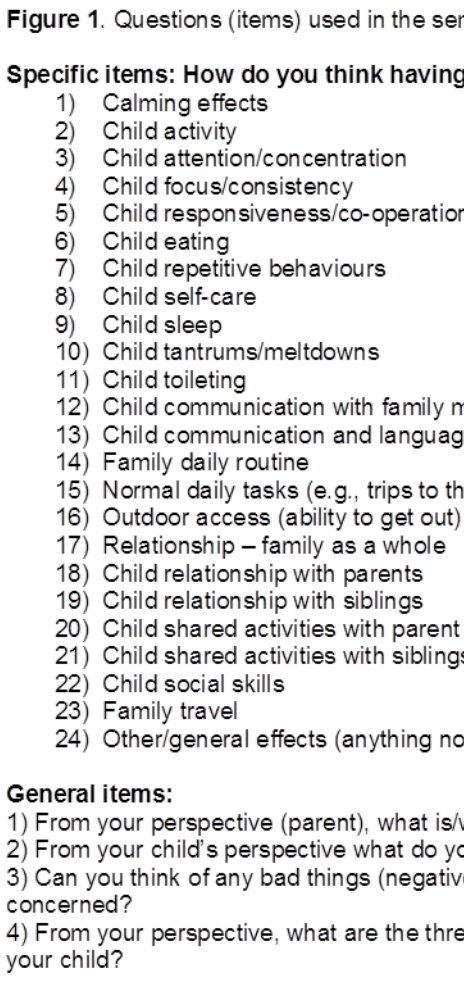

Figure 1. Questions (items) used in the ser

Specific items: How do you think having

1) Calming effects
2) Child activity
3) Child attention/concentration
4) Child focus/consistency
5) Child responsiveness/co-operatior
6) Child eating
7) Child repetitive behaviours
8) Child self-care
9) Child sleep
10) Child tantrums/meltdowns
11) Child toileting
12) Child communication with family m
13) Child communication and languag
14) Family daily routine
15) Normal daily tasks (e.g., trips to th
16) Outdoor access (ability to get out)
17) Relationship – family as a whole
18) Child relationship with parents
19) Child relationship with siblings
20) Child shared activities with parent
21) Child shared activities with siblings
22) Child social skills
23) Family travel
24) Other/general effects (anything no

General items:

1) From your perspective (parent), what is/
2) From your child's perspective what do yc
3) Can you think of any bad things (negativ
concerned?
4) From your perspective, what are the thre
your child?

Interview Process. Participants undertook structured interviews via the telephone with the primary researcher (HW). All interviews with the dog-owning and non-dog owning group followed the same format. Questions were open-ended and parents were allowed to elaborate on their answers so as to encourage greater qualitative information. An interview-to-redundancy technique (Sandelowski, 1995) was used to determine the final sample size (recruitment continued until no additional qualitatively different responses could be identified from the ongoing interviews, to ensure redundancy). Interviews were audio taped and transcribed by a professional audio typist.

Data Analysis. Data were extracted from the transcriptions and entered into a spreadsheet as follows: Each discussion element from the parent (when they were reporting a perceived impact of the dog) was entered onto a separate line as a single data point from the transcription using an interpretative approach (e.g., when a parent was asked if the dog had a calming effect, and the parent replied: "he (child) strokes the dog which calms him down,", this was recorded as a single data point: child stroking dog calms child). Only responses reporting effects (either positive or negative) were included as data points (i.e., if parents did not respond to an item, or reported 'no-effect', or similar, then no data point was recorded for that response). Data was analysed using a mixed method approach combining qualitative and quantitative techniques. Data points were qualitatively analysed for common themes in responses across the two groups. To quantitatively assess for differences in expectations versus reality of dog ownership we conducted statistical tests on the number of respondents reporting items within themes. Specific items (n=24) and general items (n=4) were analysed separately as detailed below:

Specific items. Following familiarisation of the data set, two researchers (HW & AH) independently developed mutually exclusive themes that represented the entire data set. This was followed by an iterative process of

categorising the data into proposed themes, discussing discrepancies and amending themes, until there was a consensus between the researchers. For a small number of items where agreement could not be achieved, (e.g., items were difficult to interpret), data points were removed from additional analysis. The development of the response themes was conducted independently of the original items (i.e., the final themes did not consider the structure or content of the original questions asked of the parents). For each theme, the total number of data points, number of participants responding (and number from dog owning and non-dog owning group) were counted. A participant was counted as responding if they reported positive effects or negative effects in relation to the item. A descriptive account of responses for each item was also compiled by the two researchers.

General items. Within each general item (n=4), data points were coded independently by the two researchers, according to the specific response themes identified previously. Within the proposed themes, each participant's response was coded as either 'yes' or 'no' (i.e., yes if they thought the dog has/would have an impact on that theme, or no if they did not or did not mention it). After initial coding, inter-rater reliability for each theme was calculated using Cohen's Kappa. Discrepancies were discussed and an agreement was reached on descriptive titles for the themes and numbers of yes/ no responses within them. The number of participants responding to each theme was compared between the dog-owning and non-dog owning groups. Chi squared tests were used to identify significant differences ($p < .05$) in number of participants responding between the dog-owning and non-dog owning groups. Fisher's Exact tests replaced Chi squares tests where the assumption related to expected values (i.e. <5) was not met.

Results

Sample. The final number of participants, as determined by interview to redundancy technique, was n=20 dog owners. No new information was gathered after participant number 15 in the dog owning group. No new information was gained after participant number 14 in the non-dog owning group but recruitment continued to n=20 to match numbers in the dog owning group. Interview length ranged from 9.88-45.00 minutes (21.75±7.83; Mean±SD). There was no significant difference in length of interview between groups $t(38) = -0.457$, $p = .638$).

Thirty participants (75%) were recruited through the PAWS network (n=12 dog owners, n=18 non-dog owners). The remaining ten participants (25%) (8= dog owners, 2= non-dog owners) were recruited via other sources (four through Dogs for the Disabled advertisements, three through National Autistic Society advertisements, and three through other sources). There were significantly more recruits from PAWS in the non-dog owner group ($\chi^2 = 4.800$, df = 1, $p = .028$). Of those recruited through the PAWS network 23 were on the waiting list, so had not attended any of the program at the time of interview (n=7 dog owners, n=16 non-dog owners). Over both groups (dog owners and non-dog owners) seven participants had taken part in PAWS workshops. Five of these participants had only attended one workshop, which forms a basic introduction to PAWS (n=3 dog owners, n=1 non-dog owner). Two participants had attended three workshops, where they would have gained more detailed information on the potential benefits of acquiring a dog.

However, the ratio of participants who attended three workshops was split evenly between the dog owner and non-dog owner groups (n=1 dog owner, n=1 non-dog owner).

Demographics. Thirty-eight (95%) interview participants (parent and main carer for the child) were women, two (5%) were men. Thirty-three (82.5%) were a two parent family, five (12.5%) were a one parent family, and two (5%) were from a family with three adults living in the home.

Children's ages ranged from 3-15 years (8.75±3.47). There was no significant difference in child age between groups $t(38) = 0.452$, $p = .654$). Participants were recruited to take part in the study if their child had a confirmed diagnosis of autism spectrum disorder. Because of the heterogeneous nature of ASD we did not include a strict exclusion criterion for participation, in order to obtain a sample that reflected the disparity of characteristics of families in the general population. The stipulations for participation was that the child had had received a clinical diagnosis of ASD through Children and Adolescent Mental Health Services (CAMHS), ASD diagnosis was confirmed verbally by the parents. Eighteen (45%) were described as having a diagnosis of autism, 15 (37.5%) Asperger's/High Functioning Autism, and seven (17.5%) were on the spectrum (ASD). There was no significant difference in diagnoses between groups (Likelihood ratio $\chi^2 = 2.291$, df = 2, $p = .318$). Thirty (75%) were boys (16= dog owners, 14= non-dog owners), ten (25%) were girls (4= dog owners , 6= non-dog owners). There was no significant difference in child gender between groups ($\chi^2 = 0.533$, df = 1, p = 0.465). Five children (12.5%) were an only child (3= dog owners , 2 = non-dog owners), 27 (65.5%) had one sibling (12= dog owners, 15= non-dog owners), six (15%) had two siblings (5= dog owners , 2= non-dog owners), and one (2.5%) had three siblings (non-dog owner). There was no significant difference in number of siblings between groups (Likelihood ratio $\chi^2 = 3.250$, df = 3, $p = .355$).

Among the dog owners, dog ages ranged from 10-60 months (15.16±18.15 months). Eleven dogs were male and nine were female. Four were crossbreeds and 16 were purebred from nine different breeds (five Labrador Retrievers, two German Shepherd Dogs, two Golden Retrievers, one Cairn Terrier, one Cocker Spaniel, one Bullmastiff, one English Bull Terrier, one Bichon Frise and one Tibetan Terrier). Seventeen (85%) were acquired from breeders, and three (15%) from rescue homes. The length of time the dog had been with the family at the time of interview ranged from 5-58 months (4.8 years), (24.80±16.43).

Results of the Thematic Analysis

Results from analysis of responses to specific items. The total number of data points was 968, of which 893 were coded into themes following agreement by the two researchers. The remaining 75 (7.7%) data points were removed because they were either difficult to interpret or irrelevant, (e.g., "he (child) has learnt to growl when he (child) is angry," difficult to interpret "dog needs to go out of the house," difficult to interpret; #600 "we have always had a dog," irrelevant); "he (child) has been on horse camp and loved the horses," irrelevant).

Eleven themes were identified from the twenty-four specific items: Quantitative summaries of the themes and the number of parents that reported effects from each group (non-dog owners & dog owners) are contained in Table 1. Qualitative (content

descriptions) for the 11 themes are reported below:

1. Family Effects. This was the largest theme, accounting for 30% of all references made by parents. A high proportion of non-dog owners and dog owners made a similar number of specific references to positive and negative family effects (Table 1).

Non-dog owners: Non-dog owners expected the dog to *enhance and unite the family*, taking the focus off the child with ASD (e.g., "the dog may be a new focus for the family") and that the dog would improve communication within the family, providing something to talk about (e.g., "the dog would be a common interest for the family to talk about"). Increases in positive interaction between the child with ASD and their siblings (e.g: "a dog may take the pressure off her (child with ASD) brother as she (child with ASD) has something else to interact with"). Responses also described how the dog would *allow better inclusion of the child in the family*, providing a connection between the child and other family members, increasing interaction and time spent with the child (e.g., "having the dog will make him (child) participate in more family activities"). It was anticipated that this inclusion would allow an *increase in amount or range of family activities* either directly involving the dog, such as playing with the dog, walking the dog, or activities involving family members when the dog was just present but not directly taking part (e.g., "I would expect there will be more outdoor activities for us as a family focused around the dog"). Parents expecting *a range of benefits for other family members* besides the child with ASD, such as: outdoor access for the family and a healthier lifestyle; social benefits for all family members as they got out and about with the dog; and stress relief for other family members, either through increased exercise, or through companionship with the dog (e.g., "I (parent) would stroke dog to relieve stress if I felt stressed about him (child)").

Negative expectations included that the dog was anticipated to be a potential source of conflict between siblings (e.g., "he (child with ASD) may get possessive and not let sister near the pet") and between family members in relation to responsibility for general care of the dog (e.g., "there may be potential disagreements between the family and her (child with ASD), for example over kennelling dog while going away"). Additionally, there were concerns over work time and cost involved in dog ownership because of cleaning, feeding, walking (e.g., "it will be more work for the family, feeding and walking the dog etc.") as well as restrictions to outings, travel and holidays and extra consideration when the family go away (e.g., "there may be restrictions on travelling as we will need to consider the dog").

Dog Owners: Responses from dog owners suggested that the expectations of dog ownership on family effects are likely to be met in the sample population. For instance, dog owners indicated that the dog did help *enhance and unite the family* ("he (dog) unites the family, everyone is on the same level"), serve as a talking point (, "all the family will talk about him (dog), which they are interested in talking about") and improve sibling interaction ("he [dog] has helped our older son have a better relationship and to communicate with his brother [child with ASD]). Statements suggested that dog ownership did *allow better inclusion of the child in the family*, as expected (e.g., : "the dog has given a reason for him (child) to want to spend time with me [parent]") and this did

increase in the amount or range of family activities (e.g., "we are doing more things together as a family"). Expectations on *a range of benefits for other family members* were evidenced in dog owner group (e.g., "there is a social aspect for me [parent], I get to know more people by having the dog").

Negative expectations appear to be justified, in terms of: (a) conflict (e.g., "she (child with ASD) can be competitive with her sibling over the dog"; "there can be tension between parents, we argue over the dog"), (b) work / time costs (e.g., "it is quite stressful having a dog, consideration of walking, payment for feeding and training. We have enough on our plate without that worry") and (c) travel ("there is the extra consideration of someone to look after dog if we are going away").

2. Child social and emotional skills / sense of self. The second largest theme accounted for 23% of references made by parents, with a similar number of specific references from non-dog owners and dog owners.

Non-Dog Owners: Parents anticipated that the *dog would be a companion or friend for the child*, providing a non-judgemental companion that the child could rely on or relate to (e.g., "a dog would provide companionship for him (child) who feels isolated at the moment"). It was hoped that the dog would aid the child to become more independent from family members (e.g., "a dog may help him (child) to become more independent as he is currently very dependent on me (parent)").

Parents expected the *dog would give confidence to the child* (e.g., "having a dog may help develop my son's self-esteem and confidence") and the child would show *affection and empathy* for the dog ("she [child)]is affectionate with dogs where she may not be with us [parents]"). It was further expected that the *child would benefit from enjoyment, fun and increased happiness* in areas of daily life involving the dog (e.g., "he [child] will enjoy the dog") and *give the child a reason or way to socially engage with others*, (e.g., "the dog is a safe thing to engage with people about"). Parents were anticipating that the dog would help their child to *learn about responsibility;* through considering the needs of the dog (e.g., "something that is her [child's] responsibility that she has to consider the needs of")

Reference to *negative effects* on child social and emotion skills were rare, but one non-dog owner parent was concerned that the child would not accept the dog.

Dog Owners: Parental opinions highlight that the *dog provides a companion or friend for the child*, (e.g., "he (child) shows affection for the dog, fussing, playing, feeding her (dog)" as well as promoting independence (e.g., participant #19, "he (child) has become more independent during morning routines, he does more for himself"), as hoped by the non-dog owning group. Comments indicated that the *dog does give confidence to the child* (e.g., "he [child] seems to be more confident with the dog around"), indeed, three parents reported their child's fear of dogs had improved since having a dog. Evidence suggests that the expectation that dog ownership may improve the child's empathy may be met (e.g., "he [child] has developed some empathy for the dog which he does not have with people"). Other expectations are also met, including; that the *child would benefit from enjoyment, fun and increased happiness* (e.g., "he seems happier now we have a dog"); that the dog *gives the child a reason or way to socially engage with others* (e.g., "he [child] likes the dog to be there at school so he can talk about dog to other children"); and that the dog helps their

child *learn about responsibility* ("he [child] thinks about dog's needs").

Negative effects of dog ownership on their child's social and emotions skills were reported by five dog owners (parents reported that the child did not like the dog or aspects of the dog's behavior, such as barking or being boisterous).

In summary, the expectations of the positive effects of dog ownership on children with ASD social and emotional skills appear to be met. However, non-dog owners should consider the potential impacts of the negative effects of barking and excitable behavior from the dog.

3. Child calmness & effects on child's anxiety based behavior. The third largest theme accounted for 14% of references made by parents. All non-dog owners made reference to effects included in this theme, and 80% of dog owners did (Table 1). A greater number of specific references were made by non-dog owners than dog owners.

Non-Dog Owners: Parents anticipated a *general calming/anxiety reducing effect* when the child was close to the dog or stroking the dog (e.g., "there is a general calming effect when he is with the dog") and this would be evident in different contexts, such as sleeping, eating, travelling, going to school, and arriving home from school (e.g., "dog may calm him [child] when on public transport"). Such calming effects were expected to reduce *tantrums/meltdowns or repetitive behavior* (e.g., "dog may be a distraction, in that it will be more fun to play with the dog so prevent repetitive behavior [in the child]"). The dog was also viewed as a potential distraction technique to prevent such problematic behavior (e.g., "we may be able to use the dog as distraction when he [child] is at low level escalation"), as well as a means to *actively interrupt and stop tantrums/meltdowns/repetitive behavior* once they started (e.g., "we could interrupt repetitive behavior? by introducing a game with dog") and *speed up recovery following tantrums* (e.g., "a dog may help calm the child following tantrums").

Dog Owners: Reports indicate that the expectation of dog ownership on child calmness and anxiety and not unreasonable, with evidence for: *general calming/anxiety reducing effects* (e.g., "calming effect on him [child] if the dog is calm"; "calms her [child] when out walking"); a reduction in *tantrums/meltdowns or repetitive behavior* (e.g., "she [child] is less likely to have a tantrum when dog is around"); a viable technique for *actively stopping tantrums/meltdowns/repetitive behavior* (e.g., "if he [child] is about to have a tantrum, sitting with him [dog] prevents it"; "we can interrupt bad moods by suggesting he goes to play with the dog"); and for *speeding up recovery following tantrums* (e.g., "her [child] tantrum will finish much quicker if the dog is around").

4. Child activity (physical activity/exercise/motor skills). The fourth largest theme accounted for 11% of references made by parents, with similar number of specific references from non-dog owners and dog owners.

Non-dog owners: Parents expected the dog would *increase children's activities* inside and outside the home by providing purpose and motivation to engage in activities (e.g., "the dog may be a reason to exercise, she [child] will walk for miles if she has a dog"). An increased range of physical activity was expected to lead to *general improvement in the child's motor skills and stamina* (e.g., "she [child] may improve her motor skills through interactions with a dog") and increase their *child's level of exercise* (e.g., "he [child] will do more exercise because of the dog, he will be healthier").

Dog Owners: the expectations of dog ownership on child activity were reflected in observed benefits made by dog owners, with evidence for an *increase in children's activities* (e.g., "the dog provides a reason to do activity"), *general improvements in the child's motor skills and stamina* (e.g., "playing fetch games appears to have improved his [child's] motor skills") and increases in the *child's level of exercise* (e.g., "the dogs are reason why he [child] gets a high amount of exercise").

5. Child co-operation with others. This theme accounted for 8% of references made by parents. Proportionately more references were made by non-dog owners than dog owners.

Non-Dog Owners: Parents were expecting that the *dog would be used as a role model* for the child. For instance, the parent could show, how through grooming the dog that self-care routines are important for the child, or the dog 'behaving itself' was used as a comparison for the child behaving (e.g., "the dog could be used as a role model for self-care, such as grooming the dog to improve his [child's] dislike of this"; "may help him [child] accept being strapped in car; seeing dog strapped in too"). Parents expected that *dog would be used as a reward for the child* in various situations, for example, in co-operating with parent requests, compliance with daily routines and activities (e.g., "the reward for her [child] focusing on a task could be taking the dog out for a walk"). Additionally, it was hoped that the child would be *more co-operative just because the child was around the dog* (e.g. "we hope it would help him (child) be more responsive to people").

Dog Owners: In general dog owning parents made no specific reference to the *use of the dog as a role model*. However, this may just be differences in the way they described the use of the dog in this context, since dog owning parents did describe the *dog as a reason for the child to co-operate* and did report how they would *use the dog as a reward* (e.g., "we use the dog as a reward for him [child] doing things such as bath time, it helps him concentrate on that activity") and indicated that their child is *more co-operative just because the dog was around* (e.g., "he [child] is more compliant with requests from parent if dog is there"). One parent reported that the dog had a negative effect on child co-operation, but did not expand on this point.

In summary, dog ownership appears to improve child co-operation in most the areas expected, however, the use of the dog as a role model and potential negative effects on co-operation should be considered in greater detail before acquiring a dog.

6. Child attention, concentration & focus (on activities and on dog). This theme accounted for 5% of references made by parents. More references were made by non-dog owners than dog owners.

Non-Dog Owners: Parents expected that children would *concentrate better on activities (not involving the dog) just because the dog was around* (e.g., "dog would help him [child] to focus better in activities"); that the dog would focus the child (e.g., "he [child] will concentrate on what dog is doing rather than negative thoughts of what he has experienced that day") as well as sustain attention if the activity directly involved the dog (e.g., "a dog might help increase his [child's] attention as he will have to be watching the dog"). Two parents were concerned that the dog would be a distraction for the child, and therefore reduce concentration.

Dog Owners: The positive effects of dog ownership on child

attention, concentration and focus expected by the non-dog owners were observed in the dog owners group (e.g., "she [dog] helps her [child] focus just by being there and calming her" and "she [child] will concentrate better on any tasks that involve the dog"; "she [child] focuses on the dog as she walks"). No observed negative effects of dog ownership on child attention were specifically made, indicating that the non-dog owners may overly-concerned with the likelihood of this.

7. Language skills (expression of verbal and non-verbal skills). This theme accounted for 3% of references made by parents in the interviews. Proportionately more references were made by non-dog owners than dog owners.

Non-Dog Owners: Parents were anticipating that through interacting with the dog, children would show an *improvement in verbal and/or non-verbal skills as the* dog would be a reason or motivation to practice these skills (e.g., "a dog may encourage him [child] to use speech more").

Dog Owners: Improvement in languages skills were observed in the dog owning group (e.g., "his [child's] communication has improved through talking to the dog a lot"), indicating that expectations of dog ownership on language skills may be realistic. No negative effects were reported.

8. Interaction with local community (bringing community to family). This theme accounted for 2% of references made by parents, with most referencing positive effects.

Non-Dog Owners: Parents anticipated that the presence of a dog would allow them to engage more with the community (e.g., "the dogs would help break down barriers with people in the community"). Negative effects were forecast in terms of conflict with neighbours (e.g., "I would expect a potential conflict with friends who own dogs but have very different views").

Dog Owners: Parents reported that dog ownership did improve community engagement (e.g., "he [child] is better known in local community because of having the dog"). Concerns over neighbour conflict appear to be justifiably recognised (e.g., "our next door neighbour said "your dog must leave our cat alone").

9. Child safety: This theme accounted for 1% of references made by parents, with more references made by non-dog owners than dog owners. All referenced positive effects.

Non-Dog Owners: Parents hoped that the dog would improve safety for their child when engaging in activities, particularly outside of the home (e.g., walking), as the child would remain close to the dog (e.g., "the dog may provide safety on walks, as she [child] is a runner").

Dog Owners: Improvements in child safety can be evidenced through dog-ownership (e.g., "the dog remains physically very close to him (child) when out; safety aspect as he [child] will speak to and go off with any strangers").

10. Dog specific issues. This theme accounted for <1% of references made by parents in the dog owners group only. The items directly related to training and behavior problems with the dog, including the dog showing aggression towards people or dogs, repetitive behavior, and nervous or boisterous behavior (e.g., "our dog is quite aggressive to other dogs so he [child] cannot take him [dog] out alone"). These problems were not anticipated by the non-dog owners group highlighting a key area for non-dog owners to be educated in before considering dog ownership.

11. Sensory elements for child. This theme accounted for <1% of

references made by parents, all comments concerned positive effects.

Non-Dog Owners: A few parents expected the child to benefit from the sensory aspect of having a dog, (e.g., "the dog may help her [child] explore her senses a little more").

Dog Owners: Evidence that a dog may help overcome sensory difficulties was observed (e.g., "my son has become a little more tolerant of sensory things, for example, licking from dog").

Table 1. Thematic Analysis from Specific Items Recorded in Figure 1

	All responses		**Positive effects**		**Negative effects**	
	n (%)	**n(%)**	**n (%)**	**n(%)**	**n (%)**	**n(%)**
	Non-Dog Owners[a]	**Dog Owners[b]**	**Non-Dog Owners[a]**	**Dog Owners**	**Non-Dog Owners**	**Dog Owners[b]**
1. Family effects	20(100)	19(95)	20(100)	18(90)	14(70)	15(75)
2. Child social skills	20(100)	20(100)	20(100)	20(100)	1(5)	3(15)
3. Child calming	20(100)	16(80)	20(100)	15(75)	1(5)	1(5)
4. Child Activity	19(95)	18(90)	19(95)	18(90)	0(0)	0(0)
5. Child co-operation	20(100)	13(65)	20(100)	12(60)	0(0)	1(5)
6. Child attention	17(85)	13(65)	17(85)	13(65)	2(10)	0(0)
7. Child language	13(65)	9(45)	13(65)	9(45)	0(0)	0(0)
8 .Local community	11(55)	6(30)	9(45)	4(20)	2(10)	2(10)
9. Child safety	6(30)	3(15)	6(30)	3(15)	0(0)	0(0)
10. Dog specific	0(0)	3(15)	0(0)	0(0)	0(0)	3(15)
11. Child sensory	3(15)	3(15)	3(15)	3(15)	0(0)	0(0)

[a] Number of Non Dog Owners making reference to themes
[b] Number of Dog Owners making reference to themes

Results from analysis of responses to general items

Inter-rater reliability for responses to themes within the general items was good (Kappa > 0.89, $p < 0.001$). The number of responses in each theme from dog owners and non-dog owners are summarised in Tables 2-5. Qualitative summaries of the themes within items are described below:

Best thing about having a dog, from parent's perspective. There was no significant difference (chi-square or Fisher's exact test $p > 0.05$) between dog owners and non-dog owners in their opinion of what they believed to be (or would be) the best thing about having a dog (from their perspective). Within both groups unconditional love,

companionship and affection for family members (RELATIONSHIPS) was most commonly reported.

Other themes reported by both groups included increased enjoyment and fun for the child members (ENJOYMENT & FUN); increased in parent and/ or child physical activity and outdoor access (ACTIVITY); the dog as a focus for enhanced family cohesion (FAMILY FOCUS); and improved quality of life for the child, enhances the family and effects on the child (OTHER).

Themes reported by the non-dog owners group only included increased behavior and other skills in their child (BEHAVIOR/SKILLS) and increased calm for the family (CALMING). Themes reported by the dog owners group only included seeing their child communicate with the dog and allowing the parent to meet people (COMMUNICATION/SOCIAL INTERACTION) and the security of having a dog in the house (SECURITY).

Best thing about having a dog, from child's perspective. When parents were asked what they believed to be (or would be) the best thing about having a dog, (from their child's perspective) companionship for the child was the most commonly mentioned best thing from the child's perspective, by both the dog owners and non-dog owners. Common themes between groups were: someone to love unconditionally, a friend, playmate, companion (COMPANIONSHIP); motivate child, increased physical activity and exercise (ACTIVITY); someone to laugh with, enjoy, have fun with (ENJOYMENT & FUN); boost child's immune system, safety, continuity (always had a dog), a focus, sensory feedback and responsibility (OTHER). In the non-dog owners group only 'opening the child's world' (COMMUNICATION/SI) was included. Enjoyment and fun was reported significantly more by non-dog owners than dog owners ($\chi^2 = 4.80$, df = 1, $p = .028$). No other differences were statically significantly different.

Table 2. Number (n) and Percentage (%) of Non-Dog-Owners (NDO) and Dog-Owners (DO) Reporting to Themes on: Best Things on Owning a Dog from a Parent's Perspective

Theme	n (%)Non-Dog Owner	n (%) Dog Owners
Activity	4 (20%)	4 (20%)
Behavior/Skills (of child)	2 (10%)	2 (10%)
Calming	2 (10%)	2 (10%)
Communication/social Interaction	0 (0%)	2 (10%)
Enjoyment & Fun	6 (30%)	4 (20%)
Family Focus	2 (10%)	2 (10%)
Parent emotional gain	1 (5%)	2 (10%)
Security	0 (0%)	3 (15%)
Relationships	7 (35%)	11 (55%)
Other	2 (10%)	1 (5%)

Table 3. Number (n) and percentage (%) of Non-Dog-Owners and Dog-Owners Reporting to Themes on Best Things on Owning a Dog from a Child's Perspective

Theme	n (%) Non-dog owners	n (%) Dog owners
Companionship	15 (75%)	14 (70%)
Activity	2 (10%)	2 (10%)
Enjoyment & Fun	8 (40%)*	2 (10%)
Communication/Social interaction	2 (10%)	0 (0%)
Other	2 (10%)	2 (10%)

*indicates significant difference between non-dog owners and dog owners (Chi-squared, $p<0.05$).

Negative factors about having a dog. When parents were asked what they believed to be (or would be) the 'bad things' (negative factors) about having a dog the themes were: Time, commitment and work involved in owning a dog (MORE TO DO); managing dog BEHAVIOR, training, cleaning up after them (DOG SPECIFIC); restrictions with travelling, visiting people and days out (RESTRICTIONS); concerns about the dog-child relationship including child not accepting the dog and risk of the dog biting (DOG-CHILD DIFFICULTIES); cost associated with dog ownership (COST); concerns about how the child would cope with the death of the dog (DEATH OF DOG); dog a source of conflict between family members (NEGATIVE FAMILY RELATIONSHIPS). Restrictions and 'more to do' were the most commonly reported theme by the dog owners, with restrictions being reported significantly more by dog owners than non-dog owners ($\chi^2 = 6.14$, df = 1, $p = .013$). The non-dog owners most commonly reported 'dog specific' factors, although not significantly more than the dog owners. Dog-child difficulties and negative family relationships were more frequently reported by non-dog owners. No other differences were statically significantly different.

Table 4. Number (n) and Percentage (%) of Non-Dog-Owners and Dog-Owners Reporting to Themes on Perceived Bad Things (Negative Factors) About Owning a Dog

Theme	n (%) Non-dog owners	n (%) Dog owners
More to do	9 (45%)	9 (45%)
Dog specific (e.g., dirt, noise)	11 (55%)	8 (40%)
Restrictions	2 (10%)	9 (45%)*
Dog/child difficulties	8 (40%)	3 (15%)
Cost	4 (20%)	3 (15%)
Death of dog	1 (5%)	1 (5%)
Negative family relationships	3 (15%)	0 (0%)

*indicates significant difference between non-dog owners and dog owners (Chi-squared, $p<0.05$).

Most important effects of having a dog on the child. When parents were asked what they believed to be (or would be) the three most important effects on their child the responses were: increased activity, outdoor activity and motivation to do things (ACTIVITY); improvement in behavior, independence and self-care skills (BEHAVIOR/SKILLS); calming effect, decreased anxiety and increased confidence (CALMING); improved communication, social skills and interaction with people (COMMUNICATION/SI); a common focus for the family (FOCUS); fun and enjoyment for the child (ENJOYMENT & FUN); companionship, unconditional love and friend for the child (COMPANIONSHIP); teaching child about responsibility (RESPONSIBILITY); aids routine (ROUTINE); increased child safety (SAFETY). The effect mentioned most by dog owners was companionship, whereas for non-dog owners it was calming. Non-dog owners expected significantly more positive effects on child communication and social interaction than were reported by dog owners ($\chi 2 = 4.64$, df = 1, $p = 0.003$). No other differences were statically significantly different.

Table 5. Number (n) and Percentage (%) of Non-Dog-Owners and Dog-Owners Reporting to Themes on the Three Most Important Effects of Dog Ownership on the Child

Theme	n (%) Non-dog owners	n (%) Dog owners
Activity	5 (25%)	7 (35%)
Behavior/skills	5 (25%)	3 (15%)
Calming	12 (60%)	9 (45%)
Communication/social interaction	12 (60%)*	3 (15%)
Focus	3 (15%)	3 (15%)
Enjoyment & fun	3 (15%)	3 (15%)
Companionship	8 (40%)	12 (60%)
Responsibility	3 (15%)	5 (25%)
Routine	0 (0%)	1 (5%)
Safety	2 (10%)	2 (10%)

*indicates significant difference between non-dog owners and dog owners (Chi-squared, $p<0.05$)

Discussion

This exploratory, qualitative study provides an insight into the perceptions of dog ownership in the homes of children with ASD. The evidence suggests that pet dogs can improve the lives of children with ASD, their parents and wider family. In general, the expectations of non-dog owners were matched by the perceived benefits reported by dog owners. Discrepancies in expectations (from non-dog owners) versus reality (from dog owners) are highlighted in this discussion to indicate possible effects to consider when informing parents about acquiring a pet dog. We recognise that it is not possible to match our dog owner and non-dog owner groups on every potential individual variable that may affect their responses to the interview questions. However, we highlight that both groups showed no significant difference in the severity of child diagnoses of ASD, and that an equal number of parents in both groups

had attended more than one PAWS workshop (one in each group).

A predominant focus in responses across both groups of parents related to the positive effects of dog ownership on the family. Non-dog owners anticipated that a dog would enhance the family unit by improving cohesion, family activities and socialising. Such improvements were identified by dog owners, indicating that these expectations are potentially realistic. The benefits of dogs on the child's emotional and social skills were similar between the two groups. Reports from dog owners indicated that the dog improved the child's confidence and enjoyment of activities, as well as promoting engagement, and these were comparable with the effects expected from dog ownership by the non-dog owners group. However, potential negative effects of the dogs behavior (e.g., barking and over-activity) on the child's behavior were overlooked by the non-dog owning group. Effects of a dog on child calmness were observed in both groups responses, but were predominant in the non-dog owning group. Nonetheless, comments from the dog owners group indicate that pet dogs can calm the child. Parents reported both anticipated (non-dog owners) and observed (dog owners) improvements in child activity with the acquisition of a dog. This is compatible with observations from a neuro-typical population which suggest that dog owners are more likely to take regular exercise (Levine, Allen, Braun et al., 2013).

Parental reports indicate that dog ownership may benefit child co-operation, attention /concentration and languages skills; however such improvements appear to be anticipated more frequently by non-dog owners than dog owners. Both positive and negative effects of dog ownership on the local community were observed in both groups. This supports suggestions that dogs can improve social interactions (McNicholas & Collis, 2000) but also indicates an important potential negative to consider. Although negative comments from the wider community were rarely made by our participant sample, neighbour concerns over the dog chasing their cats were documented. Therefore, when acquiring a pet dog parents may wish to consider attending obedience training classes with their dogs to minimise the risk of these frustrations developing. A small number of parents indicated that dog ownership can improve child safety; comments made on this topic were slightly more predominant in the non-dog owning group.

An important area that appeared to be overlooked by non-dog owners was dog specific issues, such as behavioral problems, including aggression. Those providing advice (e.g., clinicians, veterinarians, family friends) to families thinking of acquiring a dog should encourage potential owners to consider such issues as well as suggest appropriate sources of support to enable the prevention of problem development (i.e., suitably qualified animal training and behavior providers). Should behavior problems develop it is important that parents acknowledge these early and seek appropriate professional support to treat and manage these for the welfare of the family and dog. The impact of dog behavior problems on the family and child should not be underestimated. Furthermore, there are potential welfare implications for the dog, and it should be recognised that if animal welfare is compromised as a result of unsuitable placement, of or lack of understanding about dogs and their needs, then this might lead to difficulties and safety concerns. .

Generally a greater number of references were made within the themes

by the non-dog owners. This might be because of extended speculation in this group. It is also possible that the non-dog owners population had a greater representation of parents seeking ASD interventions (as opposed to simply having a family pet dog by coincidence). This speculation is consistent with the significantly higher number of parents recruited via the PAWS network in this group. It is worth noting that most had not attended any of the PAWS workshops, which suggests their expectations might not have not been discussed with professionals. Further instances of over estimation of effects of dog ownership are seen in the response to the general item on 'most important effects on child'; whereas 60% of non-dog owners referenced effects on the child's communication and social interaction (compared to 15% of dog owners). These opinions may be derived from the small evidence base, which suggests that dogs provide a mechanism for children with autism to interact socially (Berry et al., 2012), and that the acquisition of family pets (dogs, cats or small furry animals) between the ages of 4-5 years has greater potential to increase some pro-social behavior in children with ASD, when compared to pets having always been present (Grandgeorge et al., 2012).

Responses to the general items concerning the best thing about getting a dog from the parent and child perspective were similar between groups. The greatest number of parents responded with references to family relationships and companionship for the child, although non-dog owners seemed to place more emphasis on enjoyment and fun than dog owners. Responses to the item about negative aspects of dog ownership indicate that non-dog owners anticipate the same impacts as dog owners report. However, non-dog owners seem to under estimate the extent to which dog ownership can impact upon restrictions on travel and visiting other people, as well as issues surrounding greater time commitments. Non-dog owners anticipate more negative child-dog interactions and negative family interactions, than are reported by the parents who have a dog. Whilst this could reflect genuine concerns that do not materialise, the study population would likely be biased toward families with successful dog relationships.

To date only one (known) study has reported parent's qualitative perceptions on the effects of pet dogs on the lives of those living with ASD. Carlisle (2014) focused on the decision making process involved in getting a dog, and provided descriptive information of how children interact with and benefit from the dogs. However, the study did not consider whether the reality of dog ownership lives up to the expectations, and fails to consider the wider impacts of pet dog ownership on the family and child, which is important because much of the information available (e.g., on the internet), advocates the benefits of dogs for children with ASD without proper evaluation of the impact on the whole family system. There is a risk that families searching for ways to improve their child's ASD symptoms or overall quality of life might only view positive case examples and acquire dogs without careful consideration or receiving appropriate professional advice. Given the individual nature of ASD, what might be beneficial for some children / families might not be for others, indeed, there is the risk that getting a pet dog could result in additional problems. This paper serves an important reference point for both families considering dog ownership and mental health practitioners.

To evaluate the potential of pet dogs (as opposed to animal therapy / assistance dogs) we compared

perceptions on pet dog ownership with published results found with assistance dogs. The biggest area of discussion for parents in both groups focussed around effects on the whole family. Parents described improvement in family relationships, better inclusion of the ASD child, increased family activities and outdoor access, as well as individual benefits for family members other than the child with ASD. All of these effects have also been described by parents who have an autism assistance dog for their child (Burrows et al., 2008). Both non-dog owners and dog owner's recognised important negative effects of pet dogs (see also Carlisle, 2014). These negative effects have not been raised by parents who have an autism assistance dog for their child; in fact they have described how travel and vacations became easier because of being able to take the dog (Burrows et al., 2008). It is important to consider that under current regulations pet dogs will not have the same public access rights of dogs trained with registered assistance animal charities. Positive effects on child social and emotional skills were also referenced frequently by parents in both groups. These effects are consistent with those reported when dogs are used in a therapy setting (Martin & Farnum, 2002; Silva et al, 2011) which describe how dogs provide opportunities for the child to socially engage, develop relationships, and express affection toward others. A much stronger emphasis on improved child safety inside and outside of the home, increased social integration into the community of the family and the opportunity for community education is described by parents with assistance dogs (Burrows et al., 2008). Although these were mentioned by pet dog owners, they were infrequent.

Future studies should consider the effects of the dog-owner relationship (e.g., strength of attachment, levels of and commitment to dog training) on parental perceptions. Additionally, where negative effects or risks have been identified in this study, particularly by the non-dog owners, they relate to reports from a population that were carefully considering getting a pet dog. Additional risks, particularly those related to child and dog safety, might exist when the acquisition of pet dogs is less considered. Furthermore, the results of this small scale qualitative study focus on identifying perceived impacts of dog ownership in families with children with ASD, rather than considering potential covariates that may impact upon the quality of the experience of dog ownership. Having identified key areas which may be of importance to investigations in this area, future research should consider the role of individual differences. One important factor which should be considered in future studies, and which was not recorded here, was previous experience with dog ownership in both the dog-owning and non-dog owning group. It is possible that previous experiences play an important role in shaping parental perceptions on the value of dog ownership.

In conclusion, this study provides a solid foundation for future systematic and targeted analyses of the benefits of pet dogs for children with ASD and their families, and highlights potential areas where expectations appear unrealistic. The study provides essential information for practising professionals who can offer advice on acquiring a pet dog to parents with a child with ASD. Overall, the perceived benefits reported by parents looking to get a dog were similar to those that already owned a dog, suggesting that their expectations were met. However, parents without a dog seem to anticipate more positive changes in child behavior and fewer restrictions on the family,

suggesting that expectations in these specific areas might not be met. Parents should be carefully counselled about their expectation in these areas by professionals working in this field in order to promote dog welfare and positive human-dog relationships.

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