PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Parents' perspectives on the value of assistance dogs for children with autism spectrum disorder: a cross sectional study
AUTHORS	Burgoyne, Louise; Dowling, Lisa; Fitzgerald, Anthony; Connolly, Micaela; Browne, John; Perry, Ivan

VERSION 1 - REVIEW

REVIEWER	Rebecca Giallo Healthy Mothers Healthy Families Research Group Murdoch Childrens Research Institute Australia
REVIEW RETURNED	27-Feb-2014

GENERAL COMMENTS	This paper presents on an interesting area of enquiry – parent perceptions on the value of assistance dogs for their children with ASD. The paper is generally well written, however there are several areas in which the paper could be strengthened in preparation for publication. Abstract • The primary and secondary outcome measures section is not necessary. • Reference to 'waiting list control group' is confusing here. Perhaps state '87 parents of children waiting to receive an assistance dog' • Reference to 'controls' in the results needs to be changed. • 'There was an intensity of positive feeling toward…' is a little vague here. • Be careful not to overstate the conclusions – The findings indicate that parents' perceive that assistance dog programmes can be value. Introduction • The introduction is brief. More detail could be provided in some parts. • Provide an example of what animal assisted therapies are. • More detail about the studies cited could be provided – samples, research designs – particularly for references 8-10. • Given that this is not a RCT, a stronger rationale for this study design is needed. Perhaps focus on the social validity of the study– why obtaining parents' views of the perceived benefits is important. Method • More information on the measures is required. Example items would be helpful here. • Data analysis – the sentence on t-tests needs to be a clearer –

	differences between parents of children with an assistance dog and those waiting to receive one. • More detail on the process of qualitative analysis is needed (e.g. How data was coded, process of deriving themes, the cross-coding. Results • Provide an alternative phrase to 'waiting list controls' • More detail on the thematic approach is needed – either here or in the method section. • Illustrate quotes would bring the themes to life. • There were issues viewing some parts of the tables as well as the last table due to formatting issues. Discussion • Caution to not overstate the results. For example page 14 – 'They also suggest that the presence of an assistance dog can make parents/guardians feel more competent…' Avoid suggesting that the presence of an assistance dog can make….

REVIEWER	Alan M. Beck Purdue University College of Veterinary Medicine United States
REVIEW RETURNED	27-Feb-2014

GENERAL COMMENTS	Well written studies addressing an important issue but the methods do not make a convincing argument. Some basic specific comments follow. Pg 2 #12 "family unit" a novel and good approach Pg #30 How can you explain an "expedited" approval since animals and protected subjects where employed? Pg #26 a pilot of only 4 subjects is quite small. Pg 7 #38 how was bias managed since the "questionnaire from the contact person at the assistance dog's centre."? There is much literature on how people try to please the people who are presenting the questionnaire. Pg 8 #17 how was adjustments for age, gender and location performed? Pg #31 the presentation of the data is a bit awkward but it appears that the response rates between dog group and wait list group are significantly different (Z = 2.40, $p > 0.02$) which is not fully addressed. Pg 8 #38 how did you correct for the significant differences between the waiting list control and experimental group regarding gender, age, and schooling? Pg 11 #12 no significant difference was found between the groups but even the waiting list group had full expectation of a dog. Perhaps a control for a dog would be good, perhaps a robotic dog or cat or planned activity would have been a better control.

	Pg 12 #5 presents selected qualitative data, how representative? Was there any concerns expressed? Pg 13 #50 what was the training of the dog versus just being a pet? Pg 14 #38 authors note that “not assess the views of parents/guardians who do not want an assistance dog for their child.” but why? This questions the validity of the waiting list control since there was already a pre-selection for a positive outcome. Pg 15 #8 give one general 2007 review article, which does not specifically address ASD so a better citation would be a more recent and specific review; O’Haire, M. E. (2013). Animal-assisted intervention for autism spectrum disorder: A systematic literature review. Journal of Autism and Developmental Disorders 43(7): 1606-1622. Pg 18 #34 the author’s comment that “Our quantitative findings authenticate the role of assistance dogs in providing this service.” Is a bit of an exaggeration. Pg 16 #24 does not seem to cite none of the extensive literature that exists for assessing caregivers, much in the nursing literature. Pg 17 #22 notes the importance of appreciating the difference between a therapy dog and a service dog but does not fully explain the issue.

REVIEWER	Marguerite O'Haire The University of Queensland, Australia
REVIEW RETURNED	05-Mar-2014

GENERAL COMMENTS	This manuscript evaluates parent/guardian perceptions of the effects of service dogs for children with ASD. The comparison of families with a service dog to those on a waitlist is an effective design. Although the study is limited by its use of only parent perception (rather than more informative and less biased behavioral outcome measures), it presents novel and useful information from individuals uniquely affected by life with a child with ASD. The authors are to be commended for their use of a large sample and their study in an area of growing interest. Major areas that need to be addressed include: 1) Include statistical test information (not just p-values). 2) Present analyses for the full sample (rather than just under 10s). 3) Emphasize in abstract and conclusions that results are about parent perceptions, not actual behavioral change. Additional specific comments are provided below.

ABSTRACT

Page 2, Line 50: How is “intensity of positive feeling” operationalized?

Page 3, Lines 3-8: The Conclusions should be tempered by the fact that the results are parent perceptions, rather than an un-biased behavioral outcome. This should be noted as a limitation and/or as a qualifier of the conclusion.

Page 3, Line 17: In some instances, “assistance dogs program” is used, whereas others state “assistance dog’s intervention.” This should be consistent. It is recommended that “dog” be singular in all instances.

Page 3, Lines 20-22: Again, it should be emphasized that these are parental perceptions rather than actual measures of safety (e.g. reduced instances of danger) or public perception (e.g. actual perceptions of the public rather than parent perceptions of public perception).

Page 3, Line 24: “waiting list” should be “waitlist”

Page 3, Line 27: The acronym “RCT” should be defined in the first instance of its use.

I would argue that the strongest limitation of this study is not the lack of randomization, but instead the sole use of biased informants (i.e. parents) for opinions rather than actual outcomes (e.g. actual safety or instances of unsafe occurrences, security, and public reception). It is important and interesting that parents felt more safe, secure, and that the public perceived them more positively. However, it would be more informative to know if children actually were safer (e.g. fewer instances of dangerous activities such as elopement) or if the public actually perceived them more positively (e.g. perceptions of the public rather than just parents). These limitations should be highlighted.

INTRODUCTION

Page 4, Line 48: The acronym “ASD” should be defined in the first instance of its use.

Page 5, Line 55: How many of the service animal programmes include specialization for ASD or clients with ASD? Justify why ADI is selected as the reported governing body in this instance.

The introduction provides a clear overview of the purpose of service animals for ASD, but fails to include some of the most relevant literature, including the following two papers:

O'Haire, M. E. (2013). Animal-assisted intervention for autism spectrum disorder: A systematic literature review. *Journal of Autism and Developmental Disorders, 43*(7), 1606-1622.

Berry, A., Borgi, M., Francia, N., Alleva, E., & Cirulli, F. (2012). Use of assistance and therapy dogs for children with autism spectrum disorders: A critical review of the current evidence. *The Journal of Alternative and Complementary Medicine, 19*(2), 73-80.

Data Analysis

It is unclear when linear regression was used, given that the prior sentence states that t-tests were used on all outcome variables. Please clarify.

RESULTS

What are the demographic characteristics of the parents who completed the survey? Were there any differences based on parent demographics (e.g. gender, SES)?

What are the exact diagnoses of the children with ASD? Who made these diagnoses? Was there any independent confirmation of

	participant diagnosis and/or severity? How long had the assistance dogs been with the families? There is a larger proportion of non-responders among those with a dog (35%) compared to those without a dog (19%). Were there any differences between responders and non-responders to the questionnaire with respect to demographics? Given that the linear regression model controls for age, it seems unnecessary to exclude almost half of the sample based on age (40% over age 10). Were there any differences in responses between those over 10 and those under 10? Was the analysis different when these participants were included/excluded? I would recommend including these participants and controlling for age in the model and reporting or discussing any age-based differences. What other medical conditions (in addition to ASD) do the children have? To remove age differences from the school type variable, you could reduce the categories to just two: special school/class compared to mainstream school/class. The core variable of interest is whether the children are in a specialized program, rather than the age-grade level of the program. Age differences should then be reported separately. Were there any differences in outcomes based on verbal ability? The full results of statistical tests should be reported rather than just the percents (which are also reported in Table 2). It is not sufficient to say there are “significant differences” without reporting the full details of the tests. Also, given that the descriptive statistics (means) are reported in the tables, they should not be repeated in the text. Given that there are different group sizes (between dog and waitlist group) it would be useful to show percentages rather than sample size in the qualitative outcomes (including in the figures).

More detail the definitions of some categories is needed. For example, under “physical factors,” what are “management” and “physiological”?

It would be useful at the end to summarize the key areas where the dog/no dog groups were the same or different. This will form a clear picture leading into the discussion.

DISCUSSION

The second sentence should say “promoting parent perceptions of safety…” to emphasize that outcomes were perceptions rather than behavioral outcomes.

The summary of results should also state where no differences were found (e.g. parent stress/strain). On the note of parent stress, were parent outcomes relatively high/low? In other words, how do their stress levels compare to standardized scores on the instruments or reported levels in other studies using the measure? Could there be a ceiling effect on these measures?

The authors highlight several important limitations. As per my comment above, I do not believe that randomization was the “main” limitation. I think the self-report nature of the findings and the lack of a group who does not want an assistance dog are the main limitations of the study. I think the second limitation could be fixed in the current dataset, as per my above recommendations.

I suggest discussing the results prior to listing the limitations.

Page 15, Line 8: Clarify or justify why this is “particularly the case” for assistance dog programs. Based on the current literature, there does not seem to be more evidence for assistance dog programs compared to other forms of animal-assisted intervention for ASD.

Page 16, CGSQ findings: With regards to the first explanation, does this mean that the stress of caring for the child with ASD is replaced by the stress of caring for the dog? With regards to the second explanation, it still does not explain the lack of a difference between the dog and no dog groups. It seems that a third explanation would be that the service dogs do not ameliorate caregiver stress/strain. This explanation needs to be considered and if not valid, a rationale for why this is not true should be discussed. At present, discussion of the CGSQ findings seems incomplete. It is important to try to disentangle why there were no differences on parental strain, even though parents felt their child was more safe and secure and that they were more competent.

Page 16, Line 53: The section on promoting calm should start a new paragraph.

Page 17, Line 8: Reference #34 appears to be related to hearing dogs rather than social development in individuals with ASD.

Lines 20-24: Another explanation for this difference may be that although parents anticipate changes in social interaction, this does not emerge as the most important benefit of the assistance dogs. Indeed parents do not say that social interaction is not a benefit, but it is not commonly listed in the top 2 benefits which were analyzed. There seem to be more benefits listed among the “no dog” group than the “dog” group. Did the no dog group actually list more benefits?

The Discussion seems to end somewhat abruptly with a reiteration of results rather than a discussion of the findings. Why do you think there were differences in expectations of constraints between the dog/no dog groups? Some discussion of why certain expectancies in the no dog group did not match actualities in the dog group would be useful.

In general, the fact that the dog and waitlist group both give relatively similar responses to the qualitative items indicates that there may be some expectancy biases, whereby parents expect certain outcomes and therefore believe they have experienced these outcomes. Areas where this is not the case are of particular interest and should be more fully explored in the discussion.

Another finding that does not appear to be sufficiently discussed is that there were differences in caregiver competence. Why would a parent with a service animal feel more competent?

	CONCLUSIONS The conclusions should be reframed to highlight that all outcomes are parent perceptions. The final sentence implies that the findings were predominantly related to social and emotional development, which was not the case. TABLES & FIGURES Table 1 Indicate which measures are validated (give their names). It is recommended that exact items on the investigator-designed measures be published so that they can be replicated. Table 2 Why is the p-value not reported for each category? Figures 1 & 2 Use percents (%) rather than sample sizes (n).

VERSION 1 – AUTHOR RESPONSE

Reviewer Name: Rebecca Giallo

General Comments
This paper presents on an interesting area of enquiry – parent perceptions on the value of assistance dogs for their children with ASD. The paper is generally well written, however there are several areas in which the paper could be strengthened in preparation for publication.

The authors would like to thank Rebecca Giallo for her insight and very useful comments. We hope that we have addressed the comments sufficiently in our revised submission.

Abstract
Comment: The primary and secondary outcome measures section is not necessary.
Response: We are happy to remove this from the abstract. However it is noted by BM Open author instructions as a point for inclusion. We are happy to take advice on whether to include or exclude it from editor and reviewer.

Comment: Reference to ‘waiting list control group’ is confusing here. Perhaps state ’87 parents of children waiting to receive an assistance dog’

Response: We have made the required changes to lines 13 and 14 of the abstract. The sentence now reads: “A total of 134 parents/guardians with an assistance dog, and 87 parents of children waiting to receive an assistance dog were surveyed”

Comment: Reference to ‘controls’ in the results needs to be changed.
Response: We have taken out the term ‘controls’ and put in the phrase ‘parents on the wait list for a dog’ (Abstract: line 18).

Comment: ‘There was an intensity of positive feeling toward…’ is a little vague here.
Response: We have addressed this point by linking the phrase to the following sentence. It now reads as follows: There was an intensity of positive feeling towards assistance dogs programmes with particular focus on safety and comfort for children, and a sense of freedom from family restrictions associated with ASD (Abstract lines 19-20).

Comment: Be careful not to overstate the conclusions – The findings indicate that parents’ perceive that assistance dog programmes can be value.
Response: We have changed the conclusions (Abstract lines 23-24) to read: Findings suggest that parents perceive a high value in dogs for promoting safety, security and positive public reception for children with ASD.

Introduction
Comment: The introduction is brief. More detail could be provided in some parts.
Response: We acknowledge that the Introduction is brief. We have expanded upon this section in addressing the specific points below.

Comment: Provide an example of what animal assisted therapies are.
Response: We have given an example of what animal assisted therapies are. Sentence 5 paragraph 2 now reads ‘The emphasis is on improvements in physical, social and cognitive functioning e.g., an occupational therapist working to facilitate fine motor skills development in a child via a series of structured tasks such as grooming and feeding a cat’

Comment: More detail about the studies cited could be provided – samples, research designs – particularly for references 8-10.
Response: This section (Introduction – paragraph 3, lines 4-11) now reads: ‘Qualitative inquiry on the integration of assistance dogs into ten families with a child who has ASD, showed that the presence of a dog can improve quality of life for children and parents. 8 A study examining risks and benefits of assistance dogs using a series of structured interviews with 17 families, reported social and cognitive benefits in addition to physical and medical benefits. 9 An experimental study which assessed the effects of assistance dogs on basal salivary cortisol secretion of 42 children with ASD demonstrated a reduction in the cortisol awakening response and the number of disruptive behavioural incidents post introduction of the dog’.10

Comment: Given that this is not a RCT; a stronger rationale for this study design is needed. Perhaps focus on the social validity of the study– why obtaining parents’ views of the perceived benefits is important.
Response: We have mentioned the challenges that parents/guardians of children with ASD face in daily life. We have added a further sentence to Paragraph 5 in the Introduction to strengthen the rationale for the study. The sentence (line 7) reads ‘Outings to public places can become less stressful and families can enjoy greater freedom and mobility. Given the resource implications of assistance dog interventions for ASD there is a need to assess the value of acceptability and likely uptake of services’

Method

Comment: More information on the measures is required. Example items would be helpful here.

Response: We have extended the measures section to include example items from the questionnaire. The additions to paragraph 2 in the methods read: A sample item from the PCS is 'I am able to do my own routine caring for my child with autism' (lines 4-5) and 'The CGSQ asked participants to consider the past 6 months in terms of the problems presented by items such as: 'interruption of personal time resulting from your child's emotional or behavioural problem (Objective Strain)', 'how embarrassed did you feel about your child's emotional or behavioural problem (Subjective Externalised Strain)' and 'How worried did you feel about your child's future (Subjective Internalised Strain)' (lines 7-12).

The additions to paragraph 3 in the methods read: 'Participants were asked to rate how strongly they agreed or disagreed with respect to their child's safety and security over the past 3 months e.g., I am confident that my child with autism is secure from environmental hazards when we go on walks in our neighbourhood.' (lines 3-6) and 'In this case participants were asked to rate the public's perception of their child over the past three months on items such as 'I am sure that people make allowances for my child with autism when we are in a restaurant'(lines 7-10).

Comment: Data analysis – the sentence on t-tests needs to be a clearer – differences between parents of children with an assistance dog and those waiting to receive one.

Response: We have made this sentence more clear by adding the suggested phrase. The sentence now reads: 'T-tests were used to examine differences in mean scores between parents of children with an assistance dog and those waiting to receive one on the following scales: competence, caregiver strain (CGSQ), environmental hazards and public awareness'.

Comment: More detail on the process of qualitative analysis is needed (e.g. How data was coded, process of deriving themes, the cross-coding.

Response: We have added the following information to the data analysis section of the paper: Qualitative data were analysed via open coding, followed by a process of categorisation which facilitated the emergence of themes. Author LB analysed the data initially and author LD completed a second analysis and cross check (6-8).

Results

Comment: Provide an alternative phrase to 'waiting list controls'

Response: We have changed this phrase throughout the results section.

Paragraph 1 line two 'from the wait list'
Paragraph 3 line two 'those on the wait list for a dog'
Paragraph 4 line two 'children wait for a dog'
Paragraph 6 line nine 'those on the wait list'
Paragraph 7 line four 'those on the wait list'

Comment: More detail on the thematic approach is needed – either here or in the method section.

Response: We have added the following three sentences to the Benefits and Constraints section (paragraph 8 lines 2-5) Each participant response was reviewed and codes were assigned to each 'segment of meaning'. Open codes were assigned to representative categories. The process of coding and categorisation facilitated the emergence of themes from within the data.

Comment: Illustrate quotes would bring the themes to life.

Response: We have included two quotes for each theme in the original paper (n=14 quotes). Please let us know if you would additional quotes in a supporting supplementary table. We are happy to provide these to the editors.

Comment: There were issues viewing some parts of the tables as well as the last table due to

formatting issues.
Response: We have ‘hopefully’ addressed the formatting issues in the tables. Please let us know if there are any further issues with formatting.

Discussion
Comment: Caution to not overstate the results. For example page 14 – ‘They also suggest that the presence of an assistance dog can make parents/guardians feel more competent…’ Avoid suggesting that the presence of an assistance dog can make…
Response: We have changed the wording of the sentence to read: ‘They also suggest that the presence of an assistance dog may make parents/guardians feel more competent (paragraph 1 line 4).

Reviewer Name: Alan M. Beck

Well written studies addressing an important issue but the methods do not make a convincing argument.

The authors would like to thank Alan M Beck for his insight and very useful comments. We hope that we have addressed the comments sufficiently in our revised submission.

Comment: Pg 2 #12 “family unit” a novel and good approach
Response: The authors thank the reviewer for this comment.

Comment: Pg #30 How can you explain an “expedited” approval since animals and protected subjects where employed?
Response: We obtained ethical approval from the Clinical Research Ethics Committee of the Cork Teaching Hospitals (CREC), Ireland. We understand that we obtained an expedited approval, on the basis that our study was cross sectional, and confined to parents and guardians of children with ASD. The children and the dogs were not directly involved, and there were no invasive procedures followed. We are happy to provide further clarification from CREC if required.

Comment: Pg #26 a pilot of only 4 subjects is quite small.
Response: We acknowledge that our pilot with parents is small. However, the first drafts of the questionnaire were examined by author three (child psychologist specialising in ASD) and colleagues at the Brothers of Charity Southern Services Cork, and by the research team at University College Cork. Our final draft was piloted with 4 parents from each of the two groups (4 wait list, 4 with a dog) giving a total of 8 parents in the pilot. We made minor changes to the wording of some of questions post pilot, and were satisfied that it was survey ready at this point.

Comment: Pg 7 #38 how was bias managed since the “questionnaire from the contact person at the assistance dog’s centre.”? There is much literature on how people try to please the people who are presenting the questionnaire.
Response: We agree with the reviewer that this type of self-report questionnaire is subject to a type of social desirability bias where the respondent may try to please the investigator. We endeavoured to control for this via the study design. We report in the Procedures sub-section (Methods paragraph 5) that the researchers did not have access to names and addresses of participants. The assistance dog’s centre did not have access to the completed questionnaires. Each questionnaire pack contained a consent form with study details, a questionnaire, a stamped addressed envelope, and an envelope marked ‘Research’. Participants were requested to place completed questionnaires in the envelope marked ‘Research’ and to seal it. They were asked to place the sealed envelope together with the signed consent form in the stamped addressed envelope, and to post back to the assistance dog’s centre. Participants were assured in the consent form that participation in the study would have

no impact on their status with the centre. The following statement was included in the participant consent form: The Irish Guide Dogs for the Blind will not have access to the completed survey. Please be aware that your participation in this study has no relationship, and will have no relationship to your current status with the Irish Guide Dogs for the Blind. Completed surveys will be placed in a sealed envelope within the main envelope you return to the Irish Guide Dogs for the Blind. Only the researchers at University College Cork will have access to the sealed envelope with your completed questionnaires. The researchers will not have access to your name or address or your consent form. These are retained by the Irish Guide Dogs for the Blind.

In order to clarify the attempt we made to minimise bias, we have added another line in the Procedures sub section which reads: Participants were assured that participation in the study would have no impact on their status with the centre and that staff at the centre would have no access to the survey data (lines 11-12).

Comment: Pg 8 #17 how was adjustments for age, gender and location performed?
Response: We have added this sentence to the Data Analysis subsection (Methods) to clarify. We fitted a linear regression that included having a dog or being on the wait list as a dichotomous variable and each of gender, age, home location and education as factors (lines 4-6).

Comment: Pg #31 the presentation of the data is a bit awkward but it appears that the response rates between dog group and wait list group are significantly different ($Z = 2.40$, $p > 0.02$) which is not fully addressed.
Response: Thank you for pointing this out. Unfortunately we do not have access to data on parents/guardians who choose not to participate in our study. All we know about the non-responders is that they have a child diagnosed by the Irish Health Services Executive (HSE) as being on the autism spectrum. We also know that the families and children come from a variety of social backgrounds. The centre we studied is a national charity centre and all the dogs are leased to the families. There is no charge for the service.

Comment: Pg 8 #38 how did you correct for the significant differences between the waiting list control and experimental group regarding gender, age, and schooling?
Response: One of the things we had to address in our study, was how to deal with the fact that children who are on a waiting list for a dog are younger that children who have received a dog. These age differences affected the demographics on schooling. One reason for the differences between the groups is that the demand for assistance dogs in Ireland has exceeded the supply, and so some families are on the waiting list for extended periods.

After we analysed the full data set we attempted to address the age and schooling differences between the ‘with a dog’ and ‘waiting list’ groups in two ways.
1. Author 5 suggested that we exclude the over tens from the analysis since these comprised 40% of Group 1. We discussed this with author 3 (biostatistician) who agreed that this would offer more useful results since it would not be possible to remove the age effect using a linear model.
2. After removing the over tens we had n-84 in our waiting list sample and n=80 in our sample of families with a dog. There were some remaining significant differences between the groups with respect to age and education. We controlled for these factors together with gender by fitting a linear regression.

Comment: Pg 11 #12 no significant difference was found between the groups but even the waiting list group had full expectation of a dog. Perhaps a control for a dog would be good, perhaps a robotic dog or cat or planned activity would have been a better control.
Response: We realise that our study is limited by it being a cross sectional study comparing a group of parents/guardians who have a dog for their child with ASD, to parents/guardians on the wait list for

a dog. Unfortunately due to limited resources it was not feasible to use a control such as the ones mentioned. We have noted this comment in our study limitations. We have added a sentence to paragraph two of the Discussion (line 8). Ideally we would employ a planned activity, another animal such as a cat, or a robotic dog as a control.

Comment: Pg 12 #5 presents selected qualitative data, how representative? Was there any concerns expressed?
Response: We asked parents/guardians to tell us the main benefits and constraints of having an assistance dog via open ended questions. For the first and second listed benefits we had 80/80 (100%) and 79/80 (99%) responses from participants who have a child with a dog. For the first and second listed constraints we had 75/80 (93.75%) and 53/80 (66%) responses from families with a dog.

For the first and second listed benefits we had 84/84 (100%) and 83/84 (99%) responses from participants on the waiting list. For the first and second listed constraints we had 78/84 (93%) and 54/84(64%) responses from families on the waiting list.

There was one category from the constraints which contained statements that we could not categorise – open single codes – so we excluded these from the analysis (n=5).

Concerns expressed by parents are presented in paragraph 10 in the Results section and supported by a schematic of the themes and categories in Figure 2. We have added the response rates and overall percentages to the Figures in the Paper.

Comment: What was the training of the dog versus just being a pet?
Response: The Irish Guide Dogs for the Blind who are the participating centre in this study are accredited members of the governing body Assistance Dogs International. There are specific standards followed for training of guide dogs and assistance dogs. This accreditation is now noted on line 12 of the abstract.

Pups are born in a breeding stock holding family, and move to the puppy block in the training centre at 6-7 weeks for routine medical procedures (worming, microchip etc) and socialisation. They are sent to the puppy walking homes around 8-9 weeks where they remain for approximately one year. During this year they are regularly visited by trainers from the centre and they attend training groups at the centre. Once the pups have reached 12-14 months they return to the centre to begin their adult training. Each trainer works with a group of dogs for 12-14 weeks at which time they are usually at a level where they can be passed on to an instructor who will 'finish off' the training and match the dog to a suitable client. Happy to provide detailed training information if required.

Comment: Pg 14 #38 authors note that "not assess the views of parents/guardians who do not want an assistance dog for their child." but why? This questions the validity of the waiting list control since there was already a pre-selection for a positive outcome.
Response: This was inelegantly phrased. There was no pre-selection of parents/guardians who do not want a dog. We sampled all parents/guardians who have received a dog and all of those who are on the waiting list. We note that one of the study limitations is that we did not assess the views of parents/guardians who do not want a dog (because perhaps they do not like dogs or are scared of dogs, or do not want the responsibility of a dog). For this reason our results can only be relevant to parents/guardians with children with ASD who are open to having an assistance dog. This is now noted in the limitations section of the paper (Discussion, paragraph 2, line 8-11). 'Thirdly we did not assess the views of parents/guardians who are not registered with the assistance dog centre. Our results therefore can only be relevant to parents who are open to the possibility of having an assistance dog'

Comment: Pg 15 #8 give one general 2007 review article, which does not specifically address ASD so a better citation would be a more recent and specific review; O'Haire, M. E. (2013). Animal-assisted intervention for autism spectrum disorder: A systematic literature review. Journal of Autism and Developmental Disorders 43(7): 1606-1622.
Response: The Introduction now includes the review suggested, and another paper by Marguerite O'Haire.
O'Haire (2010) Companion animals and human health: Benefits, challenges and the road ahead. Journal of Veterinary Behaviour 5, 226-234.
O'Haire (2010) – Introduction (lines 1-2)
O'Haire (2013) – Introduction (lines 10-13)

Comment: Pg 18 #34 the author's comment that "Our quantitative findings authenticate the role of assistance dogs in providing this service." Is a bit of an exaggeration.
Response: Thank you. We agree that using 'authenticate' is indeed a bit of an exaggeration and now the word reads 'support'. (Discussion, Paragraph 3, line 17)

Comment:Pg 16 #24 does not seem to cite none of the extensive literature that exists for assessing caregivers, much in the nursing literature.
Response: We have added two papers to the Discussion in the section on Caregiver Strain. This section now reads. Firstly, it is known that being a parent/guardian of a child with ASD can affect quality of life with respect to levels of care and support required, and the resulting impacts on family finance and family time (Jarbrink 2008, Cassidy et al 2008). In our study parents/guardians expressed that the dedication required to care for a dog is a main constraint. Assistance dogs require feeding, exercise, affection, grooming and regular company. Expressed constraints associated with having an assistance dog could have affected responses on the CGSQ. The added tasks of looking after an assistance dog may not therefore impact positively upon levels of caregiver strain.

Cassidy A, McConkey R, Truesdale-Kennedy M and Slevin E Preschoolers with autism spectrum disorders: the impact on families and the supports available to them. Early Child Development and Care Vol 178(2),115–128

Jarbrink K (2008) The economic consequences of autistic spectrum disorder among children in a Swedish municipality. Autism Vol 11(5) 453–463

Comment: Pg 17 #22 notes the importance of appreciating the difference between a therapy dog and a service dog but does not fully explain the issue.
Response: We have added a line to the discussion to explain that a therapy dog works with a trained therapist
(Discussion, Paragraph 5, lines, 23-26). The sentences now read: That assistance dogs may facilitate social interaction in children with ASD is not in dispute. However, this role may be more suited to animal assisted therapy (AAT), where a trained therapist may work with a dog to reach specific cognitive or behavioural goals for a child (AAT).

Reviewer Name: Marguerite O'Haire

The authors would like to thank Marguerite O'Haire for her insight and very useful comments. We hope that we have addressed the comments sufficiently in our revised submission.

Major areas that need to be addressed include:
1) Include statistical test information not just p-values
2) Present analyses for the full sample not just the under tens

3) Emphasize in abstract and conclusions that results are about parents perceptions and not actual behaviour change

ABSTRACT
Comment: Page 2, Line 50: How is “intensity of positive feeling” operationalized?
Response: We have expanded the sentence containing this phrase to read as follows ‘There was an intensity of positive feeling towards assistance dog programmes with particular focus on safety and comfort for children, and a sense of freedom from family restrictions associated with ASD.

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It is also noted in the Limitations (Discussion, Paragraph 2 lines 1-3)
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INTRODUCTION

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These papers are now cited in the Introduction as follows: O'Haire (2010) – Introduction (lines 1-2) O'Haire (2013) – Introduction (lines 10-13), Berry et al., (2013) – Introduction (lines 13-14)

DATA ANALYSIS

Comment: It is unclear when linear regression was used given that the prior sentence states that t-tests were used on all outcome variables. Please clarify.
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Qualitative data were analysed via open coding, followed by a process of categorisation which facilitated the emergence of themes. Author LB analysed the qualitative data initially and author LD completed a second analysis and cross check.

RESULTS

Comment: What are the demographic characteristics of the parents who completed the survey? Were there any differences based on parent demographics (e.g., gender, SES)
Response: We did not measure gender and SES of parents. We have information on where the family home is located only (urban, rural, suburb etc). We asked that the primary care giver for the child complete the questionnaire, so it is likely that a majority of parents/guardians are women. We are

aware that clients of the assistance dog centre come from a variety of social and economic backgrounds. This centre is a charity organisation, so families are not required to pay a fee for the dog which lends the service to a wider demographic. All the dogs are leased to the families for the duration of their working lives.

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Response: We know that the assistance dogs at the centre are given to families whereby the child has received a formal diagnosis of ASD via the Health Services Executive (Irish Health Service). The diagnosis is normally made by a multidisciplinary therapeutic team with a psychologist or psychiatrist on board. Assessment tools used are ADOS (autism diagnostic observation schedule) which looks at play, social interaction, communication and any stereotypical behaviours; a parent interview using the ADI-R (autism diagnostic interview) or DISCO (diagnostic interview for social communication). We have now mentioned these diagnostic tools in the Methods in the subsection 'Study Design and Participants'. All children who receive an assistance dog from this centre have been formally diagnosed with ASD via the Irish Health Services Executive (HSE) and using standard tools such as the ADOS (Autism Diagnostic Observation Schedule), the ADI-R (Autism Diagnostic Interview) and the DISCO (Diagnostic Interview for Social Communication). We do not have any data on the severity of ASD in the children. We do know that the assistance dogs centre do not lease dogs to families with children who have major challenges with regard to aggression, or exhibit strong behaviours that could harm the child-assistance dog relationship. All families are assessed for suitability for a dog before the dogs are placed.

Comment: How long had the assistance dog been with the family?
Response: The ASD intervention at this centre was started in 2005. We sampled the entire population who have received a dog and all of those on the waiting list. We did not ask how long participants had been in receipt of a dog, but we do know that some will have had a dog for 3 months and some will have had their dog for up to 7 years.

Comment: There is a larger proportion of non-responders among those with a dog (35%) compared to those without a dog (19%). Were there any differences between responders and non-responders to the questionnaire with respect to demographics?
Response: Thank you for pointing this out. Unfortunately we do not have access to data on parents/guardians who choose not to participate in our study. All we know about the non-responders is that they have a child diagnosed by the Irish Health Services Executive (HSE) as being on the autism spectrum and that they either have a dog or are waiting for a dog.

Comment: Given that the linear regression model controls for age it seems unnecessary to exclude almost half of the sample based on age (40% over age 10). Were there any differences in responses between those over 10 and those under 10? Was the analysis different when these participants were included or excluded? I would recommend including these participants and controlling for age in the model and reporting or discussing and age based differences.
Response: Thank you for considering this. There were n=54 over tens with a dog and n=3 over tens without a dog. When the over tens were included in the initial analysis, we found that there were significant differences with respect to some of the items on the Caregiver Strain Questionnaire, although there were no significant differences for the summary items . There were larger differences between the groups with respect to safety and public perception and competence. On consultation with author 4 (child psychologist), and on the suggestion of author 5 (specialising in psychometrics) we excluded the over tens from this particular paper.

We have discussed reintroducing the over tens in the analysis with the project statistician (author 3). We fitted the linear regression to the data with the over tens included, and we did get consistent results. However, it is recommended by our statistician that although such figures are not wrong, they are less useful. It forces one to assume that the benefit of having a dog (as measured by the average difference) does not vary between the age groups. He also recommends that it is not possible to remove the age effects (when the over tens are included) using a linear model since the differences are so extreme (n=54 and n=3). We would really need larger numbers to do this. Author 6 advises that the practical relevance of the findings are enhanced by confining the analyses to well defined age groups. We are happy to answer any further queries on this.

Comment: What other medical conditions (in addition to ASD) do the children have?
Response: Other medical conditions included mild to moderate learning disabilities, ADHD, Asthma and Epilepsy. Of those children with a dog 24 (30%) had other medical conditions. Of those on the waiting list 27 (32%) had other medical conditions. Please note that we found an error on Table 1 with respect to this variable. We have now corrected this (n=24 with a dog have other conditions – we had n=47 written here). We have re- checked all the figures on this Table. We have written the types of conditions that children have in addition to ASD into the results section under demographics (Results: paragraph 2, lines 3-4).

Comment: To remove age differences from the school type variable, you could reduce the categories to just two: special school/class compared to mainstream school/class. The core variable of interest is whether the children are in a specialised program, rather than the age-grade level of the program. Age differences should then be reported separately.
Response: We acknowledge that reducing the categories to two would be very useful particularly if we had larger numbers. However we encounter difficulty here since many of the children are in a special class within a main stream primary school (With a dog n=17 (21.3%) Waiting for a dog n=29 (34.5%). For this reason we kept the school categories separate. We hope that this explanation for not collapsing the categories is sufficient.

Comment: Were there any differences in outcomes based on verbal ability?
Response: With respect to the outcome variables, we didn't find a significant interaction between having a dog/being on the waiting list and whether a child was verbal or non-verbal.

Comment: The full results of statistical tests should be reported rather than just the percents (which are also reported in Table 2). It is not sufficient to say that there are 'significant differences' without reporting the full details of the tests. Also, given that the descriptive statistics (means) are reported in the tables they should not be repeated in the text.
Response: We have amended Table 2 to make it read more clearly, and we have tested the differences between these categorical demographic data using a series of chi-square tests. We have included a new foot note to indicate our use of the chi square test. We have increased the space between the variables to make it clear that the p values for age, location and education are relevant for the entire variable e.g., location was a 3x2 table and education was a 3x2 table. We have added to the results sections 'Environmental Hazards and Public Awareness' and 'Perceived Competence and Caregiver Strain' indicating in the text where we used t-tests. We are not sure of the protocol on including the full output of the statistical tests (t statistic and chi-square values etc) in the paper and we are happy to be guided by the editor on this. Author 3 (statistician) has advised that It is not standard procedure to publish the full output of specific tests.

Comment: Given that there are different group sizes between dog and wait list group it would be useful to show percentages rather than sample size in the qualitative outcomes (including in the figures)
Response: We have indicated the percentages of participants who responded to the qualitative questions in footnotes to the figures. We would suggest that it is potentially misleading to readers to show percentages in the figures summarizing the qualitative data, since the questions about benefits

and constraints were open ended and completely unstructured.

Comment: More detail on the definitions of some categories is needed. For example, under physical factors what are ‘management’ and ‘physiological’?
Response: We have explained the categories ‘management’ and ‘physiological’ and two other categories which were not immediately obvious for readers ‘dog life’ and ‘acceptance’. The explanations are now as footnotes to the figures.

Category ‘Physiological’ refers to how assistance dogs can facilitate a child with respect to mobility and ambulation. Category ‘Management’ refers to how assistance dogs can facilitate day to day management of their child. Category ‘Dogs life’ refers to concerns about what happens when an assistance dog retires/dies. Category ‘Acceptance’ refers to challenges around family and children’s acceptance of an assistance dog.

Comment: The authors highlight several important limitations. As per my comment above, I do not believe that randomisation was the main limitation. I think the self –report nature of the findings and the lack of a group who does not want an assistance dog are the main limitations of the study. I think the second limitation could be fixed in the current dataset, as per my above recommendations.
Response: We agree that the self-report nature of the study and the lack of a third group who do not want a dog are important limitations of our study. These limitations are acknowledged in the limitations section (Discussion paragraph 2). We have added the following text to this section.

Firstly, our findings are based on self-reports and parents/guardians personal perceptions and are thus subject to participant overestimation and recall bias. Also since we did not include any objective measures, we cannot know if parents perceptions reflect reality e.g., were children actually safer and did the public actually view them more positively when accompanied by an assistance dog
(Discussion paragraph 2 lines 1-5)

Thirdly we did not assess the views of parents/guardians who are not registered with the assistance dog centre. Our results therefore can only be relevant to parents who are open to the possibility of having an assistance dog.
(Discussion paragraph 2 lines 9-12)

We are not sure how it would be possible to fix the second limitation with the current dataset. We did this study with parents/guardians who were on the waiting list for a dog, and those who have an assistance dog. We did not get the view of parents/guardians who are not open to having an assistance dog. We agree that such a third group would have been useful.

Comment: I suggest discussing the results prior to listing the limitations.
Response: The limitations are listed after the first paragraph in the Discussion as per the BMJ Open, author instructions. We are happy to ask the editor if we can move the limitations further into the paper so that the Discussion flows better.

Comment: Page 15, Line 8: Clarify or justify why this is particularly the case for assistance dog programs. Based on the current literature there does not seem to be more evidence for assistance dog programs compared to other forms of AAT for ASD.
Response: We acknowledge that with respect to social and behavioural functioning the literature does not show more evidence for assistance dog interventions compared to other interventions. However assistance dog interventions play a role in promoting the physical safety of a child. The child is attached to the dog via a) a leash and belt system or b) a handle which the child holds. We have added to the following sentence to convey what we mean more clearly. Once a child is attached to a dog via the leash and belt system they cannot ‘bolt’.(Discussion, Paragraph 3, lines 9-10)

Comment: Page: 16, CGSQ Findings: With regard to the first explanation, does this mean that the stress of caring for the child with ASD is replacde by the stress of caring for the dog? With regards to the second explanation, it still does not explain the lack of a difference between the dog and no dog groups. It seems that a third explanation would be that the service dogs do not ameliorate caregiver stress/strain. This explanation needs to be considered and if not valid, a rationale for why this is not true should be discussed. At present, discussion of the CGSQ findings seems incomplete. It is important to try to disentangle why there were no differences on parental strain, even though parents felt their child was more safe and secure and that they were more competent.
Response: We agree that we need to explain why there were no significant differences between the groups in terms of caregiver stain. We have added the following text to paragraph five in the Discussion. Firstly, it is known that being a parent/guardian of a child with ASD can affect quality of life with respect to levels of care and support required, and the resulting impacts on family finance and family time (Jarbrink 2008, Cassidy et al 2008). In our study parents/guardians expressed that the dedication required to care for a dog is a main constraint. Assistance dogs require feeding, exercise, affection, grooming and regular company. Expressed constraints associated with having an assistance dog could have affected responses on the CGSQ. The added tasks of looking after an assistance dog may not therefore impact positively upon levels of caregiver strain.

Comment: Page 16, line 53. The section on promoting calm should start a new paragraph.
Response: This was on account of BMJ open author instructions for five paragraphs in this section but we are happy to ask the editor for this section to be split into two paragraphs. We have done this for the current version of the paper. We agree that it should start a new paragraph.

Comment: Page 17, line 8. Reference #34 appears to be related to hearing dogs rather than social development in individuals with ASD.
Response: Thank you for pointing this out. We have taken out this reference.

Comment: Lines 20-24: Another explanation for this difference may be that although parents anticipate changes in social interaction, this does not emerge as the most important benefit of the assistance dogs. Indeed parents do not say that social interaction is not a benefit, but it is not commonly listed in the top two benefits which were analysed. There seem to be more benefits listed among the no dog group than the dog group. Did the no dog group actually list more benefits?
Response: The number of participant's responses is now noted in Figures 1 and 2. n=79 (99%) of our participants with a dog listed at least two benefits and n=83 (99%) of participants waiting for a dog listed at least two. Thank you, we have now noted that although parents anticipate changes in social interaction, this does not emerge as the most important benefit of the assistance dogs when a dog is received. We have added the following text to paragraph 6 in the Discussion (lines 11-16). It may be that although parents waiting for a dog anticipate changes in social interaction, this does not emerge as the most important benefit once they actually get a dog. That assistance dogs may facilitate social interaction in children with ASD is not in dispute. However, this role may be more suited to animal assisted therapy (AAT), where a trained therapist may work with a dog to reach specific cognitive or behavioural goals for a child.

Comment: The Discussion seems to end somewhat abruptly with a reiteration of results rather than a discussion of findings. Why do you think there were differences in expectations of constraints between the no dog and dog groups? Some discussion of why certain experiences in the no dog group did not match the actualities in the dog group would be useful.
Response: We feel that your earlier explanation helps us with this question. Expectations pre-dog do not emerge as the most important post-dog. We have added the following text to paragraph 6 in the Discussion. More of those with a dog expressed concern about the increase in housekeeping tasks,

and specific hygiene activities associated with having a dog in the family home. Parents/guardians with children on the wait list were more concerned about whether the dog will be accepted by the child and family, and logistics during family holiday time. Our findings suggest that some of the anticipated constraints do not necessarily emerge as the most important constraints once a dog is placed in the home.

Comment: In general the fact that the dog and waitlist group both give relatively similar responses to the qualitative items indicates that there may be some expectancy biases, whereby parents expect certain outcomes and therefore believe that they have experienced these outcomes. Areas where this is not the case are of particular interest and should be more fully explored in the discussion.
We agree that there may be some expectancy biases in the qualitative results and have now highlighted that in the study limitations. The second sentence in the limitations now reads: Firstly, our findings are based on self-reports and parents/guardians personal perceptions and are thus subject to participant overestimation, recall bias and possible subject expectancy effects. We have now added to the discussion with respect to the differences in qualitative results between the two groups as per the responses to the previous two comments.

Comment: Another finding that does not appear to be sufficiently discussed is that there were differences in caregiver competence. Why would a parent with a service animal feel more competent?
Response: Thank you. We have added the following text to paragraph 5 in the Discussion. It is interesting to note that although there were no significant differences between parents/guardians who have a dog and those on the wait list for a dog with respect to caregiver strain, there were significant differences with respect to perceived competence. Why do parents/guardians with a dog feel more competent but no less strained? A possible explanation is that the process and actual event of getting an assistance dog, and the specific procedures followed with respect to working with the dog, may make parents/guardians feel more competent. Having a dog may add more structure to parent's management technique without reducing level of strain associated with having a child with ASD.

CONCLUSIONS

Comment: The conclusions should be reframed to highlight that all outcomes are parent perceptions. The final sentence implies that the findings were predominantly related to social and emotional development, which was not the case.
Response:
Re: the final sentence. This was inelegantly phrased. Our concluding sentence meant to convey that our study did not support the case that assistance dogs can act as facilitators of social and emotional development, although we had some positive qualitative findings to this end. We meant to convey that a stronger design would be required to support such a case. To this end we have eliminated the final sentence from the conclusions. The conclusions now read: Our findings indicate that parents/guardians perceive assistance dog interventions are valuable in the treatment of ASD, particularly in relation to the control of elopement. They also perceive that assistance dogs help to promote calmness and provide a source of comfort for children.

TABLES and FIGURES

Table 1

Comment: Indicate which measures were validated (give their names). It is recommended that the exact items on the investigator designed measures be published so that they can be replicated.
Response: We have indicated which measures were validated or used in previous work in Table 1 by inserting the Vancouver reference number and author names.

We have added to the Measures section in the Methods. We are conscious that if we include all the items in table (38 in total), that Table 1 will need to be split into several tables. We are happy to include the full set of items in a supplementary file or in the main paper if that is agreeable to the editor and the authors of the measures. In the interim we have added sample items to the text in the Methods section.

The text we have added reads as follows.
The PCS is a measure of one of three fundamental psychological needs within Self Determination Theory (Deci and Ryan). Like other measures within behavioural change theory, items on the PCS are typically written to be specific to the relevant behaviour or domain being examined. A sample item from the PCS we used for this study is 'I am able to do my own routine caring for my child with autism'.

The CGSQ asked participants to consider the past 6 months in terms of the problems presented by items such as: 'interruption of personal time resulting from your child's emotional or behavioural problem (Objective Strain)', 'how embarrassed did you feel about your child's emotional or behavioural problem (Subjective Externalised Strain)' and 'How worried did you feel about your child's future (Subjective Internalised Strain)'.

Table 2
Why is the p-value not reported for each category?
Some variables were tested using 3x2 tables and thus the p-value is relevant for the group e.g., 'education' and 'location'.

Figures 1 and 2
Use percents (%) rather than sample sizes (n).
We have now indicated the percentages of participants who responded to the qualitative questions in footnotes to the figures. We would suggest that it is possibly misleading to readers to show percentages in the figures summarizing the qualitative data, since the questions about benefits and constraints were open ended and completely unstructured.

VERSION 2 – REVIEW

REVIEWER	Marguerite O'Haire The University of Queensland Australia
REVIEW RETURNED	06-May-2014

GENERAL COMMENTS	Thank you for your careful review of my comments on your manuscript. Please find my responses below each comment in blue. Major areas that need to be addressed include: 1) Include statistical test information not just p-values 2) Present analyses for the full sample not just the under tens 3) Emphasize in abstract and conclusions that results are about parents perceptions and not actual behaviour change **ABSTRACT** **Comment: Page 2, Line 50: How is "intensity of positive feeling" operationalized?**

Response: We have expanded the sentence containing this phrase to read as follows ‘*There was an intensity of positive feeling towards assistance dog programmes with particular focus on safety and comfort for children, and a sense of freedom from family restrictions associated with ASD.*

Perhaps I should have been more specific. How was intensity measured? By the number of people who reported positive feelings? By the strength of their reports?

Comment: The conclusions should be tempered by the fact that results are patients’ perceptions rather than an unbiased behavioural outcome. This should be noted as a limitation and/or as a qualifier of the conclusion.

Response: This is now noted in the Conclusions (Line 1) and the Limitations (Discussion, Paragraph 2 lines 1-3). *Our findings indicate that parents/guardians perceive assistance dog programmes are a valuable intervention in the treatment of ASD, particularly in relation to the control of elopement.*

It is also noted in the Limitations (Discussion, Paragraph 2 lines 1-3) *Firstly, our findings are based on self-reports and parents/guardians personal perceptions, and are thus subject to participant overestimation and recall bias.*

Good.

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Great.

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Perfect.

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positively when accompanied by an assistance dog.

Excellent.

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OK.

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Qualitative data were analysed via open coding, followed by a process of categorisation which facilitated the emergence of themes. Author LB analysed the qualitative data initially and author LD completed a second analysis and cross check.

Excellent.

RESULTS

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Response: We did not measure gender and SES of parents. We have information on where the family home is located only (urban, rural, suburb etc). We asked that the primary care giver for the child complete the questionnaire, so it is likely that a majority of parents/guardians are women. We are aware that clients of the assistance dog centre come from a variety of social and economic backgrounds. This centre is a charity organisation, so families are not required to pay a fee for the dog which lends the service to a wider demographic. All the dogs are leased to the families for the duration of their working lives.

OK. In the future, it would be useful to have more information about the informants whose perceptions are the basis of all conclusions in the study. However, I understand that this data has been collected and thus this is not an option in the current study.

Comment: What are the exact diagnoses of the children with ASD? Who made these diagnoses? Was there any independent confirmation of participant diagnosis and/or severity?

Response: We know that the assistance dogs at the centre are given to families whereby the child has received a formal diagnosis of ASD via the Health Services Executive (Irish Health Service). The diagnosis is normally made by a multidisciplinary therapeutic team with a psychologist or psychiatrist on board. Assessment tools used are ADOS (autism diagnostic observation schedule) which looks at play, social interaction, communication and any stereotypical behaviours; a parent interview using the ADI-R (autism diagnostic interview) or DISCO (diagnostic interview for social communication). We have now mentioned these diagnostic tools in the Methods in the subsection ‘Study Design and Participants’. *All children who receive an assistance dog from this centre have been formally diagnosed with ASD via the Irish Health Services Executive (HSE) and using standard tools such as the ADOS (Autism Diagnostic Observation Schedule), the ADI-R (Autism Diagnostic Interview) and the DISCO (Diagnostic Interview for Social Communication).* We do not have any data on the severity of ASD in the children. We do know that the assistance dogs centre do not lease dogs to families with children who have major challenges with regard to aggression, or exhibit strong behaviours that could harm the child-assistance dog relationship. All families are assessed for

	suitability for a dog before the dogs are placed. Thank you for including the diagnostic information. Given that there were further selection criteria (e.g. aggression), I recommend also including this information in the same section. **Comment: How long had the assistance dog been with the family?** Response: The ASD intervention at this centre was started in 2005. We sampled the entire population who have received a dog and all of those on the waiting list. We did not ask how long participants had been in receipt of a dog, but we do know that some will have had a dog for 3 months and some will have had their dog for up to 7 years. This would have been useful information to evaluate benefits over time, but I understand that it is not available. **Comment: There is a larger proportion of non-responders among those with a dog (35%) compared to those without a dog (19%). Were there any differences between responders and non-responders to the questionnaire with respect to demographics?** Response: Thank you for pointing this out. Unfortunately we do not have access to data on parents/guardians who choose not to participate in our study. All we know about the non-responders is that they have a child diagnosed by the Irish Health Services Executive (HSE) as being on the autism spectrum and that they either have a dog or are waiting for a dog. OK. **Comment: Given that the linear regression model controls for age it seems unnecessary to exclude almost half of the sample based on age (40% over age 10). Were there any differences in responses between those over 10 and those under 10? Was the analysis different when these participants were included or excluded? I would recommend including these participants and controlling for age in the model and reporting or discussing and age based differences.**

Response: Thank you for considering this. There were n=54 over tens with a dog and n=3 over tens without a dog. When the over tens were included in the initial analysis, we found that there were significant differences with respect to some of the items on the Caregiver Strain Questionnaire, although there were no significant differences for the summary items . There were larger differences between the groups with respect to safety and public perception and competence. On consultation with author 4 (child psychologist), and on the suggestion of author 5 (specialising in psychometrics) we excluded the over tens from this particular paper.

We have discussed reintroducing the over tens in the analysis with the project statistician (author 3). We fitted the linear regression to the data with the over tens included, and we did get consistent results. However, it is recommended by our statistician that although such figures are not wrong, they are less useful. It forces one to assume that the benefit of having a dog (as measured by the average difference) does not vary between the age groups. He also recommends that it is not possible to remove the age effects (when the over tens are included) using a linear model since the differences are so extreme (n=54 and n=3). We would really need larger numbers to do this. Author 6 advises that the practical relevance of the findings are enhanced by confining the analyses to well defined age groups. We are happy to answer any further queries on this.

Thank you for your thoughtful consideration of my comment. Your justification seems satisfactory and I appreciate your thorough explanation.

Comment: What other medical conditions (in addition to ASD) do the children have?

Response: Other medical conditions included mild to moderate learning disabilities, ADHD, Asthma and Epilepsy. Of those children with a dog 24 (30%) had other medical conditions. Of those on the waiting list 27 (32%) had other medical conditions. Please note that we found an error on Table 1 with respect to this variable. We have now corrected this (n=24 with a dog have other conditions – we had n=47 written here). We have re- checked all the figures on this Table. We have written the types of conditions that children have in addition to ASD into the results section under demographics (Results: paragraph 2, lines 3-4).

Good.

Comment: To remove age differences from the school type variable, you could reduce the categories to just two: special school/class compared to mainstream school/class. The core variable of interest is whether the children are in a specialised program, rather than the age-grade level of the program. Age differences should then be reported separately.

Response: We acknowledge that reducing the categories to two would be very useful particularly if we had larger numbers. However we encounter difficulty here since many of the children are in a special class within a main stream primary school (With a dog n=17 (21.3%) Waiting for a dog n=29 (34.5%). For this reason we kept the school categories separate. We hope that this explanation for not collapsing the categories is sufficient.

This makes more sense now. I recommend clarifying in the text that the special class is *within* a mainstream school, at least in the first instance.

Comment: Were there any differences in outcomes based on verbal ability?

Response: With respect to the outcome variables, we didn't find a significant interaction between having a dog/being on the waiting list and whether a child was verbal or non-verbal.

OK. Thank you for checking. A recent study indicated that verbal ability in children with ASD was related to increased interaction with an animal, so I thought it would be worth checking. This is the paper, for your reference.

Grandgeorge, M., Bourreau, Y., Alavi, Z., Lemonnier, E., Tordjman, S., Deleau, M., & Hausberger, M. (2014). Interest towards human, animal and object in children with autism spectrum disorders: an ethological approach at home. *European Child & Adolescent Psychiatry*, 1-11. doi: 10.1007/s00787-014-0528-9

Comment: The full results of statistical tests should be reported rather than just the percents (which are also reported in Table

2). It is not sufficient to say that there are ‘significant differences’ without reporting the full details of the tests. Also, given that the descriptive statistics (means) are reported in the tables they should not be repeated in the text.

Response: We have amended Table 2 to make it read more clearly, and we have tested the differences between these categorical demographic data using a series of chi-square tests. We have included a new foot note to indicate our use of the chi square test. We have increased the space between the variables to make it clear that the p values for age, location and education are relevant for the entire variable e.g., location was a 3x2 table and education was a 3x2 table. We have added to the results sections ‘Environmental Hazards and Public Awareness’ and ‘Perceived Competence and Caregiver Strain’ indicating in the text where we used t-tests. We are not sure of the protocol on including the full output of the statistical tests (t statistic and chi-square values etc) in the paper and we are happy to be guided by the editor on this. Author 3 (statistician) has advised that It is not standard procedure to publish the full output of specific tests.

The updated table is much easier to read. I would also recommend using a symbol other than *, which generally indicates a significant outcome. Instead, you might use a dash - . The reporting of full statistics (e.g. t-value or chi-square value as well as degrees of freedom) must be field-specific so I will leave it up to your judgment and the journal regulations.

Comment: Given that there are different group sizes between dog and wait list group it would be useful to show percentages rather than sample size in the qualitative outcomes (including in the figures)

Response: We have indicated the percentages of participants who responded to the qualitative questions in footnotes to the figures. We would suggest that it is potentially misleading to readers to show percentages in the figures summarizing the qualitative data, since the questions about benefits and constraints were open ended and completely unstructured.

Thank you for explaining your rationale, which sounds suitable.

Comment: More detail on the definitions of some categories is needed. For example, under physical factors what are ‘management’ and ‘physiological’?

Response: We have explained the categories ‘management’ and ‘physiological’ and two other categories which were not immediately obvious for readers ‘dog life’ and ‘acceptance’. The explanations are now as footnotes to the figures.

Category ‘Physiological’ refers to how assistance dogs can facilitate a child with respect to mobility and ambulation. Category ‘Management’ refers to how assistance dogs can facilitate day to day management of their child. Category ‘Dogs life’ refers to concerns about what happens when an assistance dog retires/dies. Category ‘Acceptance’ refers to challenges around family and children’s acceptance of an assistance dog.

Excellent. Thank you for including these explanations.

Comment: The authors highlight several important limitations. As per my comment above, I do not believe that randomisation was the main limitation. I think the self –report nature of the findings and the lack of a group who does not want an assistance dog are the main limitations of the study. I think the second limitation could be fixed in the current dataset, as per my above recommendations.

Response: We agree that the self-report nature of the study and the lack of a third group who do not want a dog are important limitations of our study. These limitations are acknowledged in the limitations section (Discussion paragraph 2). We have added the following text to this section.

Firstly, our findings are based on self-reports and parents/guardians personal perceptions and are thus subject to participant overestimation and recall bias. Also since we did not include any objective measures, we cannot know if parents perceptions reflect reality e.g., were children actually safer and did the public actually view them more positively when accompanied by an assistance dog (Discussion paragraph 2 lines 1-5)

Thirdly we did not assess the views of parents/guardians who are

not registered with the assistance dog centre. Our results therefore can only be relevant to parents who are open to the possibility of having an assistance dog.
(Discussion paragraph 2 lines 9-12)

We are not sure how it would be possible to fix the second limitation with the current dataset. We did this study with parents/guardians who were on the waiting list for a dog, and those who have an assistance dog. We did not get the view of parents/guardians who are not open to having an assistance dog. We agree that such a third group would have been useful.

Good additions to the limitations section.

Comment: I suggest discussing the results prior to listing the limitations.
Response: The limitations are listed after the first paragraph in the Discussion as per the BMJ Open, author instructions. We are happy to ask the editor if we can move the limitations further into the paper so that the Discussion flows better.

Good to know about the instructions. Thank you for pointing this out. No need to change.

Comment: Page 15, Line 8: Clarify or justify why this is particularly the case for assistance dog programs. Based on the current literature there does not seem to be more evidence for assistance dog programs compared to other forms of AAT for ASD.
Response: We acknowledge that with respect to social and behavioural functioning the literature does not show more evidence for assistance dog interventions compared to other interventions. However assistance dog interventions play a role in promoting the physical safety of a child. The child is attached to the dog via a) a leash and belt system or b) a handle which the child holds. We have added to the following sentence to convey what we mean more clearly. *Once a child is attached to a dog via the leash and belt system they cannot ‘bolt’.*(Discussion, Paragraph 3, lines 9-10)

Good clarification.

Comment: Page: 16, CGSQ Findings: With regard to the first explanation, does this mean that the stress of caring for the child with ASD is replaced by the stress of caring for the dog? With regards to the second explanation, it still does not explain the lack of a difference between the dog and no dog groups. It seems that a third explanation would be that the service dogs do not ameliorate caregiver stress/strain. This explanation needs to be considered and if not valid, a rationale for why this is not true should be discussed. At present, discussion of the CGSQ findings seems incomplete. It is important to try to disentangle why there were no differences on parental strain, even though parents felt their child was more safe and secure and that they were more competent.

Response: We agree that we need to explain why there were no significant differences between the groups in terms of caregiver stain. We have added the following text to paragraph five in the Discussion. *Firstly, it is known that being a parent/guardian of a child with ASD can affect quality of life with respect to levels of care and support required, and the resulting impacts on family finance and family time (Jarbrink 2008, Cassidy et al 2008). In our study parents/guardians expressed that the dedication required to care for a dog is a main constraint. Assistance dogs require feeding, exercise, affection, grooming and regular company. Expressed constraints associated with having an assistance dog could have affected responses on the CGSQ. The added tasks of looking after an assistance dog may not therefore impact positively upon levels of caregiver strain.*

Good explanation here, and in the subsequent addition starting with “It is interesting…”

Comment: Page 16, line 53. The section on promoting calm should start a new paragraph.

Response: This was on account of BMJ open author instructions for five paragraphs in this section but we are happy to ask the editor for this section to be split into two paragraphs. We have done this for the current version of the paper. We agree that it should start a new paragraph.

OK – hopefully it can be two paragraphs; otherwise that is fine.

Comment: Page 17, line 8. Reference #34 appears to be related to hearing dogs rather than social development in individuals with ASD.
Response: Thank you for pointing this out. We have taken out this reference.

Good.

Comment: Lines 20-24: Another explanation for this difference may be that although parents anticipate changes in social interaction, this does not emerge as the most important benefit of the assistance dogs. Indeed parents do not say that social interaction is not a benefit, but it is not commonly listed in the top two benefits which were analysed. There seem to be more benefits listed among the no dog group than the dog group. Did the no dog group actually list more benefits?
Response: The number of participant's responses is now noted in Figures 1 and 2. n=79 (99%) of our participants with a dog listed at least two benefits and n=83 (99%) of participants waiting for a dog listed at least two. Thank you, we have now noted that although parents anticipate changes in social interaction, this does not emerge as the most important benefit of the assistance dogs when a dog is received**.** We have added the following text to paragraph 6 in the Discussion (lines 11-16). *It may be that although parents waiting for a dog anticipate changes in social interaction, this does not emerge as the most important benefit once they actually get a dog. That assistance dogs may facilitate social interaction in children with ASD is not in dispute. However, this role may be more suited to animal assisted therapy (AAT), where a trained therapist may work with a dog to reach specific cognitive or behavioural goals for a child.*

Good updates. However, the final sentence is a bit confusing with the word "suited." I recommend changing "suited to" to "salient in."

Comment: The Discussion seems to end somewhat abruptly with a reiteration of results rather than a discussion of findings. Why do you think there were differences in expectations of constraints between the no dog and dog groups? Some

discussion of why certain experiences in the no dog group did not match the actualities in the dog group would be useful.
Response: We feel that your earlier explanation helps us with this question. Expectations pre-dog do not emerge as the most important post-dog. We have added the following text to paragraph 6 in the Discussion. *More of those with a dog expressed concern about the increase in housekeeping tasks, and specific hygiene activities associated with having a dog in the family home. Parents/guardians with children on the wait list were more concerned about whether the dog will be accepted by the child and family, and logistics during family holiday time. Our findings suggest that some of the anticipated constraints do not necessarily emerge as the most important constraints once a dog is placed in the home.*

This is a good addition. You might also add that differences in expectations versus reality such as those listed highlight the importance of working with families to best understand their needs and concerns both before and after obtaining an assistance dog in order to foster successful outcomes.

Comment: In general the fact that the dog and waitlist group both give relatively similar responses to the qualitative items indicates that there may be some expectancy biases, whereby parents expect certain outcomes and therefore believe that they have experienced these outcomes. Areas where this is not the case are of particular interest and should be more fully explored in the discussion.
We agree that there may be some expectancy biases in the qualitative results and have now highlighted that in the study limitations. The second sentence in the limitations now reads: *Firstly, our findings are based on self-reports and parents/guardians personal perceptions and are thus subject to participant overestimation, recall bias and possible subject expectancy effects.* We have now added to the discussion with respect to the differences in qualitative results between the two groups as per the responses to the previous two comments.

Good.

Comment: Another finding that does not appear to be

sufficiently discussed is that there were differences in caregiver competence. Why would a parent with a service animal feel more competent?

Response: Thank you. We have added the following text to paragraph 5 in the Discussion. *It is interesting to note that although there were no significant differences between parents/guardians who have a dog and those on the wait list for a dog with respect to caregiver strain, there were significant differences with respect to perceived competence. Why do parents/guardians with a dog feel more competent but no less strained? A possible explanation is that the process and actual event of getting an assistance dog, and the specific procedures followed with respect to working with the dog, may make parents/guardians feel more competent. Having a dog may add more structure to parent's management technique without reducing level of strain associated with having a child with ASD.*

Excellent.

CONCLUSIONS

Comment: The conclusions should be reframed to highlight that all outcomes are parent perceptions. The final sentence implies that the findings were predominantly related to social and emotional development, which was not the case.

Response:

Re: the final sentence. This was inelegantly phrased. Our concluding sentence meant to convey that our study did not support the case that assistance dogs can act as facilitators of social and emotional development, although we had some positive qualitative findings to this end. We meant to convey that a stronger design would be required to support such a case. To this end we have eliminated the final sentence from the conclusions. The conclusions now read: *Our findings indicate that parents/guardians perceive assistance dog interventions are valuable in the treatment of ASD, particularly in relation to the control of elopement. They also perceive that assistance dogs help to promote calmness and provide a source of comfort for children.*

Good.

TABLES and FIGURES

Table 1

Comment: Indicate which measures were validated (give their names). It is recommended that the exact items on the investigator designed measures be published so that they can be replicated.

Response: We have indicated which measures were validated or used in previous work in Table 1 by inserting the Vancouver reference number and author names.

We have added to the Measures section in the Methods. We are conscious that if we include all the items in table (38 in total), that Table 1 will need to be split into several tables. We are happy to include the full set of items in a supplementary file or in the main paper if that is agreeable to the editor and the authors of the measures. In the interim we have added sample items to the text in the Methods section.

I appreciate your updates. To clarify, I did mean as a supplementary file, not as a part of the table. If they cannot be included, at least readers will be able to contact you for a copy if they would like to replicate or build upon your study.

The text we have added reads as follows.

The PCS is a measure of one of three fundamental psychological needs within Self Determination Theory (Deci and Ryan). Like other measures within behavioural change theory, items on the PCS are typically written to be specific to the relevant behaviour or domain being examined. A sample item from the PCS we used for this study is 'I am able to do my own routine caring for my child with autism'.

The CGSQ asked participants to consider the past 6 months in terms of the problems presented by items such as: 'interruption of personal time resulting from your child's emotional or behavioural problem (Objective Strain)', 'how embarrassed did you feel about your child's emotional or behavioural problem (Subjective Externalised Strain)' and 'How worried did you feel about your child's future (Subjective Internalised Strain)'.

Table 2

Why is the p-value not reported for each category?

Some variables were tested using 3x2 tables and thus the p-value is relevant for the group e.g., ‘education’ and ‘location’.

OK.

Figures 1 and 2

Use percents (%) rather than sample sizes (n).

We have now indicated the percentages of participants who responded to the qualitative questions in footnotes to the figures. We would suggest that it is possibly misleading to readers to show percentages in the figures summarizing the qualitative data, since the questions about benefits and constraints were open ended and completely unstructured.

OK.

Thank you for your thoughtful and attentive revisions to the manuscript, which will provide useful and informative data for those interested in animal-assisted intervention and assistance dogs for children with ASD.

VERSION 2 – AUTHOR RESPONSE

Objectives: Whilst there is an emerging literature on the usefulness of assistance dogs for children with Autism Spectrum Disorder (ASD), there is a dearth of quantitative data on the value of assistance dog interventions for the family unit and family functioning. Using previously validated scales and scales developed specifically for this study, we measured parents/guardians perceptions of having an assistance dog on (a) child safety from environmental dangers, (b) public reception of ASD, (c) levels of caregiver strain and sense of competence. We also obtained open ended response data from parents/guardians on benefits and constraints of having an assistance dog.

Setting: This study was based in the primary care setting, within the context of a specific accredited assistance dog centre in Ireland.

Participants: A total of 134 parents/guardians with an assistance dog, and 87 parents of children on the wait list were surveyed.

Primary and Secondary Outcome Measures: The primary outcome measures were scores on environmental hazards and public reception scales. Secondary outcome measures were scores on caregiver strain and competence scales.

Results: Parents/guardians of children who have ASD and an assistance dog rate their child as significantly safer from environmental dangers (p<0.001), perceive that the public act more respectfully and responsibly towards their child (p<0.001), and feel more competent about managing their child (p=0.023) compared to parents on the wait list. There was a concentration of positive feeling towards assistance dog interventions with particular focus on safety and comfort for children, and a sense of freedom from family restrictions associated with ASD. The amount of dedication and commitment required to care for a dog were viewed as the primary constraints

Conclusions: Our findings indicate that parents perceive that assistance dog interventions can be a valuable intervention for families with children who have ASD.