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The Effect of Therapy Dogs on Attachment and Theory of Mind in Children

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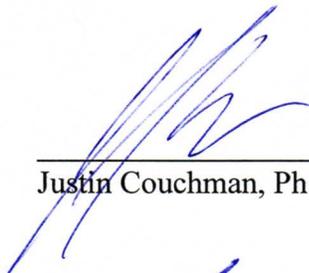
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The Effect of Therapy Dogs on Attachment and Theory of Mind in Children

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Abstract

The purpose of this experiment was to analyze the effects of therapy dogs on theory of mind in children. The current study examined whether the presence of a licensed therapy dog improved, impaired, or kept constant a child's performance on theory of mind tasks. In this case we used a simple false belief task. Success in this task would mean that the child understands the mental states of others. This study also analyzed how these children felt about the therapy dog, and whether the children had empathy for or could take the perspective of the dog. It was predicted that therapy dogs would improve performance in children while doing false belief theory of mind tasks. It was also predicted that the dog would increase executive functioning, such that children would be able to give correct responses to the task by pointing or through verbal responses. Another prediction was that adding a dog to the task would eliminate social pressure imposed by having another adult, so therefore the children would be more comfortable in completing the task and be able to infer the thoughts of others more accurately. Children participated in both a questionnaire and a simple false belief task. In the false belief task, children performed significantly above chance. In regards to the questionnaire, various correlations showed that the children tended to view the dog as similar to their best friend or their teacher.

The Effect of Therapy Dogs on Attachment and Theory of Mind in Children

Theory of Mind includes the ability to understand the thoughts and intentions of others. This also includes the ability to empathize and assign responsibility. This applies not just to humans, but also to animals. Theory of Mind is especially important during the development of the child. Often, important changes in the child's understanding of mental states starts to occur during the pre-school years (Tahiroglu, Moses, Carlson, Mahy, Olofson, & Sabbagh, 2014). By the age of 2, children's Theory of Mind consists of them being able to have a basic understanding of emotions, intentions, and desires. However, they still have difficulty understanding that someone else's beliefs may differ from their own. They also have difficulties in understanding that appearance may differ from reality, and that people can have different visual perspectives of the same event (Tahiroglu et al., 2014). By ages 4 and 5, children develop a more adult-like understanding of these matters.

The test usually used to determine Theory of Mind is also known as a false belief task. In the original false belief task (Perner, 1983), pre-school children were the subjects. A child watched a puppet put an object in place A. The puppet then moved the object from place A to place B, without the awareness of another subject or agent, usually the experimenter. The children were then asked to predict where the puppet will look for the object. The younger the child, the more likely it was that they would predict the puppet to look in object B, where the child knew the object was currently. This result seems to represent a lack of development in theory of mind. Older children, or children who have a theory of mind, would say that the puppet

would look in place A, which is where the puppet should have been looking (Gopnik & Astington, 1988). This task is especially successful once the child can give a verbal belief such as, “The puppet believes the object is in location A” and give a correct verbally complex report (e. g., “Where I think the puppet will think the object is”).

It has been found that there are a number of reasons for why children have failed this task in the past. For example it may be hard for children to explicitly explain their reasoning for their decision, so this task may be too linguistically challenging for certain ages (Perner, et al., 2002). Therefore, failure or completion of this task should not be too reliant on language ability. It is often very difficult for children to explicitly explain themselves; therefore they may perform the task correctly thus showing that they have a theory of mind, but they may just still be too young to explicitly talk about their thoughts, feelings, and actions. They may have trouble explaining their mental representations as well. It has also been found that even though children sometimes verbally give incorrect responses, they are often looking in the right direction, or they seem to be sensitive to false belief or theory of mind measures in other ways (Onishi & Baillargeon, 2005). Therefore, children may verbally give an incorrect response because that ability is not yet fully developed, but that does not mean that their thoughts are not fully developed.

For these reasons false-belief tasks have been linked to many aspects of language ability (de Villiers, 2000; Milligan, Astington, & Dack, 2007). At least one researcher has argued that Theory of Mind is entirely dependent on language mastery (de Villiers, 2007), though it may also be possible to use tasks that tap into Theory of Mind and related abilities without relying on language (Couchman et al., 2012).

Some other problems with the classic theory of mind task include accidental experimenter cues. In other words, the experimenter knows where the child should be looking, and an observant child may pick up on where the experimenter is looking, or in which direction the experimenter is leaning, so children tend to be paying attention to nonverbal behavior (Bowler, Briskman, & Grice, 1999). Younger children are more likely to be intimidated by adults, and they are also more likely to feel as though they need to please or correctly answer adults. Past research has shown that there is an audience effect, in that people act differently while being observed by others (Chevallier, Parish-Morris, Tonge, Le, Miller, & Schultz, 2014). Older children are more likely to be used to performing in front of adults, so this factor may not be as prevalent in this case.

Therefore, in order to make this task successful it is important to alleviate any social stress or pressure that an adult may cause. The addition of a therapy dog has been shown to cause children to feel less stressed and more relaxed while completing a task. It has also been found that the addition of a dog reduced blood pressure in the child during various tasks (Gee, Church, & Altobelli, 2010).

Past research seems to reveal benefits from dog-child interactions (Gee, Belcher, Grabski, DeJesus, & Riley, 2012). It has also been found that children perform a task faster while still being accurate, and that they were more likely to adhere to specific directions when a therapy dog was present. In one study, preschoolers' speed and accuracy of performance on a set of motor skills tasks were recorded in the presence or absence of a trained therapy dog. The results were that the children performed the task faster in the presence of the dog, without sacrificing any accuracy. It was also found that children were more likely to listen to instructions when a dog modeled the task than when a human or stuffed dog modeled the task. Therefore, it appears

that the presence of a therapy dog may actually enhance a child's performance on task, instead of impeding it or being a distraction. Past reports have also found evidence that there is a positive relationship between empathy and companion-animal bonding in children (Gee et al., 2012).

When children were asked to do a match-to-sample object recognition task where a child is asked to match two similar items together, children were shown to make fewer mistakes when a therapy dog was present. This finding indicates that there is something special about the presence of a real dog that helps to focus their attention on the task (Gee et al., 2012). It was also found that memory performance in the presence of a dog increased, which could be the result of a motivational effect that the dog help enhances in this situation.

The presence of a therapy dog has been found to help children who are typical, developmentally disabled, emotionally disturbed, immigrant, and children undergoing psychiatric treatment (Gee, Church, & Altobelli, 2010). Thus, there are a wide range of populations – essentially everyone – who might benefit from the presence of a dog. Research has also shown that the presence of a dog significantly lowered arousal in children who were in stressful situations. Interacting with dogs also seems to benefit children in an educational setting. For example, improvements in social competence in empathy increase when a dog is present, and increasing in positive behaviors has been seen, as well as an improvement in social responsiveness in developmentally disabled children. Emotional stability in children with severe emotional disorders was also seen to be improved, and beliefs about aggression were altered in a positive way. An increased desire for social contact was also seen (Gee, Church, & Altobelli, 2010).

Past research has found that Theory of Mind seems to often be deficient or absent in those with autism (Leslie & Thaiss, 1992). Autism Spectrum Disorders are characterized by restricted and repetitive behaviors (Berry, Borgi, Francia, Alleva, & Cirulli, 2013). The use of assistance dogs in families or children affected with ASD resulted in multiple beneficial effects, including decreased anxiety and anger, increased calmness, reduction in number of emotional outburst, and more manageable bedtime routines (Berry et al., 2013). When children with ASD were introduced to a dog, their cortisol awakening response was decreased, and was found to rise again at the absence of the dog. Parents also reported a decrease in the number of problematic behaviors, such as self-stimulation (Berry et al., 2013). There are types of therapies for these children that aim to teach these autistic children about the importance of intentions and thoughts of others, also known as Theory of Mind. This supposedly helps to build social cognitive skills, as well as group interactive skills (Ozonoff & Miller, 1995).

It has also been found that when the presence of a therapy dog was added, children with Autism Spectrum Disorder (ASD) who were usually withdrawn showed significant increases in the frequency of verbal and nonverbal social behaviors, and this improvement can be seen up to one month after the dog has been removed (Berry et al., 2013). In the presence of a therapy dog, these children showed an increased awareness of the environment, as well as a more playful mood. Children also tended to engage with the dog and talk to the dog, which caused more engaged interactions with the therapist as well. The therapy dog seems to become a social catalyst for increasing positive behaviors in these children (Berry et al., 2013). Therefore, this type of therapy may cause meaningful changes in an autistic child's skill set, and being able to attribute inferences and thoughts of others is an important life skill that is needed in every day

functioning. Adding a therapy dog to a traditional false belief task may eliminate some of these factors that cause children to accidentally fail.

Similarly, reasoning skills involved in Theory of Mind are usually intact in patients with speech disorders (Apperly et al., 2006). This occurs even though verbal responses are usually impaired. Therefore, this finding suggests that perhaps the verbal and nonverbal aspects of Theory of Mind are separate and distinct, although they are still closely related in children. Therapy dogs may increase verbal understanding and processes in children's responses, and they may also help to increase executive functioning. This may help children to understand their implicit and non-verbal understanding of other's thoughts. This would translate into the child's ability to explicitly respond to and explain the thoughts of others in a verbally meaningful way.

Children with severe emotional and behavioral disorders have also been found to benefit from the use of a therapy dog. Animal Assisted Interventions or Activities have been found to increase motivational, educational, and recreational therapeutic areas which help to improve quality of life (Bassette & Taber-Doughty, 2013). When placed in a classroom, these behaviorally challenged children showed a decrease in disruptive behaviors, and an increase in positive social interactions with peers, as well as decreased aggression and increased empathy (Bassette & Taber-Doughty, 2013). These students gained confidence and self-esteem when taught how to correctly give commands to the dog. They also showed less helplessness and an improved sense of control. Students were also found to stay on task better when given the opportunity to read aloud to a therapy dog (Bassette & Taber-Doughty, 2013).

In the current study we attempted to determine the effect of therapy dogs on children's Theory of Mind. We hypothesized that it would be easier for a child to empathize with a dog

than with a human adult, and that executive processes might increase (Gee et al., 2012) that would give rise to better theory of mind.

Method

Participants

Twenty-two children participated in the experiment, with a mean age of 6 years, $SD = 2.1$. Children were recruited from a day care facility, and ranged from the ages of 3 through 10. 17 additional children participated in the attachment questionnaire, with a mean age of 6.15 years.

Materials

Blue, a 3 year old female Blue Heeler and a certified therapy dog was used. She was certified as a therapy dog by Therapy Dogs International, which requires obedience, human-animal interaction, and working with a variety of populations. She had experience doing previous experiments with a similar set of participants. Brown and pink puppets were also used, and the sessions were video recorded. Five cards were used while administering the Attachment Questionnaire. Each card showed a different facial expression. The cards ranged from happy to sad. The children were asked to point to the card that showed their subsequent emotion after having been asked a question.

We created a 34-item attachment scale in order to explore how the children saw the dog and whether or not they could attribute mental states to the dog or to a human. The Appendix shows these questions.

Procedure

Two trials were performed for each participant, one with and one without the dog. The order was randomized so that some children had their first trial with the dog and some the second. In both trials, children entered a cordoned-off “castle” area commonly used for this type of research, in which the experimenter and materials were set up. When the dog was present, children were told that they were going to play with Blue, and Pink, the dog and the puppet. They were then asked to identify which one was Blue, and which was Pink. This was a test to ensure they understood and were attending to the task, and all children successfully made the identifications. The participants were then shown a toy by the experimenter, and told that this was Blue’s favorite toy. The participant was then shown that Blue hides her toy under a bowl, Location A, when she is done playing with it. Blue then left, and the participant witnessed the puppet moving the toy from location A to location B, a box. Finally, just before Blue returned the child was asked to point to where they think Blue would look for the toy. The participant was then asked by the experimenter to identify where the toy really was, and where Blue put it in the beginning. Blue then entered, looked initially at Location A and did not find the toy. Figure 1 shows this procedure. When the dog was not present, the methods were exactly the same, except the puppet, Brown, replaced Blue. During the trials we videotaped participants in order to examine their behaviors. Specifically, we counted the number of times each participant smiled to get a rough gauge of happiness. Of course this is not a perfect measure, but it allowed us to consider small differences that might not emerge from task performance alone.

The participants were then asked to answer a series of 34 questions in an attachment questionnaire. These questions were designed to analyze the amount of empathy and attachment the children felt towards the therapy dog. They also completed a survey that stated whether they had a dog or any other pet. They were also asked what their favorite animal was. All questions

were asked in random order. These questions aimed to research emotional attachment to Blue, emotional attachment to humans, general emotion, and dog empathy. Children rated each question using a 1-5 non-verbal scale (1 being a frowning face and 5 a smiling face). They simply pointed to which face best expressed their reaction to each scenario. Note that due to the extensive nature of the questionnaire, and the tendency of children to not sustain attention for too long, occasionally questions went unanswered. None of these missed questions significantly affected the overall results.

Results

Experimental Task

A binomial sign task showed that when the dog was present, the children provided the correct answer significantly above chance level, $p < .001$. In the no dog condition, the correct answer was provided significantly above chance level $p < .01$. A t -test was performed, which showed no significant difference in performance between groups. However, the video analysis showed significantly more smiling, $t(7) = 3.1$, $p < .05$, based on overall number of smiles, when the dog was present, suggesting that they enjoyed this condition more even if it did not help or hinder performance. Although most children performed the task correctly in both conditions, a non-significant level of improvement was seen for the youngest children who failed the no dog condition but passed the dog condition. Figures 2 and 3 show these results.

Attachment Questionnaire

Several items were tested to compare perceptions and Theory of Mind attribution to the dog vs. to a human or human activity. Generally the dog was perceived as similar to most positive experiences or items. That is to say, t -tests revealed no differences between these items.

The children found the dog to be comparable to their best friend or classroom teacher – e.g., they were just as happy to see them, hypothetically live with/adopt them, just as sad to see them leave, etc – and they believed that the dog felt negative experiences such as pain in a way similar way to themselves. Past research found that pet dogs have been shown to be equivalent to fathers and siblings in regards to attachment. Pet owners have been found to develop caregiving and attachment bonds with their pet dogs (Kurdek, 2008).

In other cases, the experiences such as playing with the dog were rated higher than some activities. For example, it was found that playing with the dog was rated significantly higher than playing a video game, $t(35) = 2.9, p < .05$. Also, playing with the dog was rated significantly higher than reading a book, $t(36) = 2.3, p < .05$.

In addition to the similarities between the dog and relevant humans, and the superiority of the dog experience in some cases, there was some relationship between their liking of the dog and how willing they were to attribute feelings to the dog. For example, there was a significant correlation between how the child felt when they saw the dog, and how they child thought the dog felt about seeing them, $r(33) = .36, p < .05$. This suggests that some reciprocity or perceived reciprocity may exist in the relationship. Thus, dogs may benefit certain children more than others. Figure 4 shows these results.

A few other items of interest emerged from the attachment survey. We found significant correlations between how they felt when they saw the dog and how they felt about seeing a classroom teacher, $r(33) = .36, p < .05$, how they felt about reading a book, $r(33) = .39, p < .05$, and their happiness about getting a favorite meal, $r(33) = .584, p < .01$. That is, the more they enjoyed seeing the dog the more they enjoyed each of these activities. This suggests that some

underlying factor, such as excitement about or appreciation of valued activities, mediates children's experience with the dog.

Finally, we did find one curious case in which the children's own feelings contrasted sharply with the feelings they attributed to the dog. It was also found that children were very happy about the possibility of not having to attend school for the day, but believed the dog would feel sad if she did not get to go to school, $t(16) = 5.2, p < .001$. Children apparently do not like school, or at least welcome a break in their everyday routine. Because the dog only visited occasionally, it makes sense that they would think that she feels sad when she doesn't get to attend class. Figure 5 shows these results. Even so, the possibility remains that empathizing with the dog could increase enjoyment or help break the schema that "school is not cool" because the dog, whom they admire and relate to in many other areas, is believed to enjoy it.

Discussion

This study shows that therapy dogs probably increase overall happiness in children. Children smiled significantly more when the dog was present, which is a good indicator of happiness. It is also possible that therapy dogs increase attention and focus in children. This could improve their performances on things like false belief tasks or theory of mind tasks. The presence of a therapy dog also did not hinder the performance of the children on a false belief task, and the dog did not serve as a distraction to the children while attempting to perform the task. Therapy dogs may also improve verbal understanding and processes in children's responses during a task. The presence of a therapy dog may also increase executive functioning in children.

No overall improvement in Theory of Mind was found, but this was probably due to several factors unrelated to the hypothesis. First, in both conditions the children saw the dog at

some point. This could have inadvertently affected the child's performance on the task by causing them to have more success than they normally would have. That is, if the presence of a dog improves performance, it might have done so in both conditions due to contamination of the control condition (in which the dog was not "present" for the task, but was nearby and visible immediately beforehand). Indeed, when children were recruited from their normal class they were fully aware that they were doing the "dog experiment" and thus might have experienced increased excitement before they even arrived.

Second, all participants were very good at the task. Both conditions also performed significantly above chance. This could have been due to increased performance through dog interaction. Or, the task might have been too easy for them. Future research should explore this using a more difficult false belief task or even a more complex Theory of Mind or morality task.

The addition of a therapy dog may also decrease stress that the child feels while performing a task. The dog could also alleviate some of the intimidation that the child feels, due to the presence of an adult. This decrease in stress could also cause the child to perform better on a task than they normally would, without the therapy dog present. We did not address the children's ability to take the perspective of friends, classroom teachers, or other humans, but future research could look at how those abilities compare to their ability to empathize with dogs. Past Theory of Mind research usually utilizes puppets in false belief tasks rather than humans in order to decrease things like experimenter error.

We did find that children were able to empathize with the therapy dog. They felt as though the dog occupied a psychological space that was shared by teachers or their best friend. The children also seemed to attribute their own thoughts, feelings, and beliefs to the therapy dog.

For example, they seemed to feel as though dogs felt the same way as they did when experiencing pain, and the more they liked the dog the more they felt that the dog liked them.

Because therapy dogs have been shown to have various benefits such as increasing attention and focus in different settings, the fields of educational psychology, developmental psychology, and cognitive psychology may be affected by our paradigm. Future research could extend these findings to include a larger sample size – and specifically to include younger children in the false belief task – or to use other tasks that might measure increased attentional focus, happiness, stress, or Theory of Mind abilities.

Overall, our findings suggest that therapy dogs are a useful tool for researching and improving theory of mind, and new experiments could potentially open an important line of research that could help children improve their cognitive abilities.

References

- Apperly, I. A., Samson, D., Carroll, N., Hussain, S., & Humphreys, G. (2006). Intact first- and second-order false belief reasoning in a patient with severely impaired grammar. *Social Neuroscience*, 1(3-4), 334-348. doi:10.1080/17470910601038693
- Barker, S. B., Knisely, J. S., McCain, N. L., Schubert, C. M., & Pandurangi, A. K. (2010). Exploratory study of stress-buffering response patterns from interaction with a therapy dog. *Anthrozoös*, 23(1), 79-91. doi:10.2752/175303710X12627079939341
- Bassette, L. A., & Taber-Doughty, T. (2013). The effects of a dog reading visitation program on academic engagement behavior in three elementary students with emotional and behavioral disabilities: A single case design. *Child & Youth Care Forum*, 42(3), 239-256. doi:10.1007/s10566-013-9197-y
- Berry, A., Borgi, M., Francia, N., Alleva, E., & Cirulli, F. (2013). 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. doi:10.1089/acm.2011.0835
- Bowler, D. M., Briskman, J. A., & Grice, S. (1999). Experimenter effects on children's understanding of false drawings and false beliefs. *The Journal of Genetic Psychology: Research and Theory on Human Development*, 160(4), 443-460. doi:10.1080/00221329909595558
- Chevallier, C., Parish-Morris, J., Tonge, N., Le, L., Miller, J., & Schultz, R. T. (2014). Susceptibility to the audience effect explains performance gap between children with and

- without autism in a theory of mind task. *Journal of Experimental Psychology: General*, 143(3), 972-979. doi:10.1037/a0035483
- Couchman, J. J., Beran, M. J., Coutinho, M. V. C., Boomer, J., Zakrzewski, A., Church, B., & Smith, J. D. (2012). Do actions speak louder than words? A comparative perspective on implicit versus explicit meta-cognition and theory of mind. *British Journal of Developmental Psychology*, 30, 210-221.
- De Villiers, J. (2007). The interface of language and Theory of Mind. *Lingua. International Review of General Linguistics. Revue Internationale de Linguistique Generale*, 117(11), 1858–1878. doi:10.1016/j.lingua.2006.11.006
- Gee, N., Belcher, J., Grabski, J., DeJesus, M., Riley, W. (2012). The presence of a therapy dog results in improved object recognition performance in preschool children. *Anthrozoös*, 25(3), 289-300
- Gee, N. R., Church, M. T., & Altobelli, C. L. (2010). Preschoolers make fewer errors on an object categorization task in the presence of a dog. *Anthrozoös*, 23(3), 223-230. doi:10.2752/175303710X12750451258896
- Gopnik, A., & Astington, J. W. (1988). Children's understanding of representational change and its relation to the understanding of false belief and the appearance-reality distinction. *Child Development*, 59(1), 26-37. doi:10.2307/1130386
- Kurdek, L. A. (2008). Pet dogs as attachment figures. *Journal of Social and Personal Relationships*, 25, 247-266. doi: 10.1177/0265407507087958

- Leslie, A. M., & Thaiss, L. (1992). Domain specificity in conceptual development: Neuropsychological evidence from autism. *Cognition*, 43(3), 225-251. doi:10.1016/0010-0277(92)90013-8
- Milligan, K., Astington, J. W., & Dack, L. A. (2007). Language and theory of mind: Meta-analysis of the relation between language ability and false-belief understanding. *Child Development*, 78(2), 622-646. doi:10.1111/j.1467-8624.2007.01018.x
- Onishi, K. H., & Baillargeon, R. (2005). Do 15-month-old infants understand false beliefs? *Science*, 308(5719), 255-258. doi:10.1126/science.1107621
- Ozonoff, S., & Miller, J. N. (1995). Teaching theory of mind: A new approach to social skills training for individuals with autism. *Journal of Autism and Developmental Disorders*, 25(4), 415-433. doi:10.1007/BF02179376
- Perner, J., Stummer, S., Sprung, M., & Doherty, M. (2002). Theory of Mind finds its Piagetian perspective: Why alternative naming comes with understanding belief. *Cognitive Development*, 17, 1451-1472
- Solomon, O. (2010). What a dog can do: Children with autism and therapy dogs in social interaction. *Ethos*, 38(1), 143-166. doi:10.1111/j.1548-1352.2010.01085.x
- Tahiroglu, D., Moses, L. J., Carlson, S. M., Mahy, C. V., Olofson, E. L., & Sabbagh, M. A. (2014). The Children's Social Understanding Scale: Construction and validation of a parent-report measure for assessing individual differences in children's theories of mind. *Developmental Psychology*, 50(11), 2485-2497. doi:10.1037/a0037914

Wimmer, H., Perner, J. (1983). Beliefs about beliefs: Representation and constraining function of wrong beliefs in young children's understanding of deception. *Cognition*, 103-128.

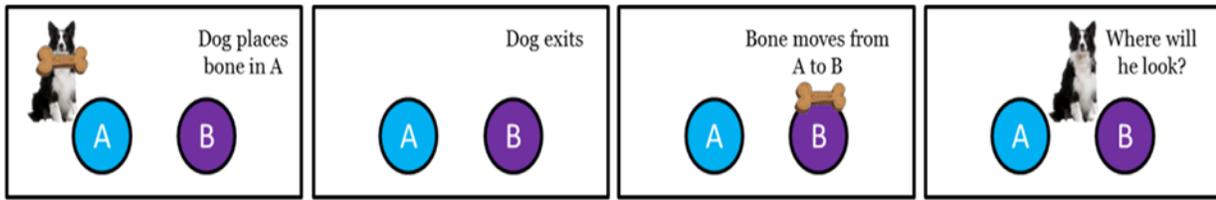


Figure 1. Diagram of the task structure. In the task the dog used a rubber toy bone. In the without-dog condition the same procedures were followed but did the relevant movements instead of the dog. Also, in the third panel, for both conditions, a different puppet moved the toy bone.

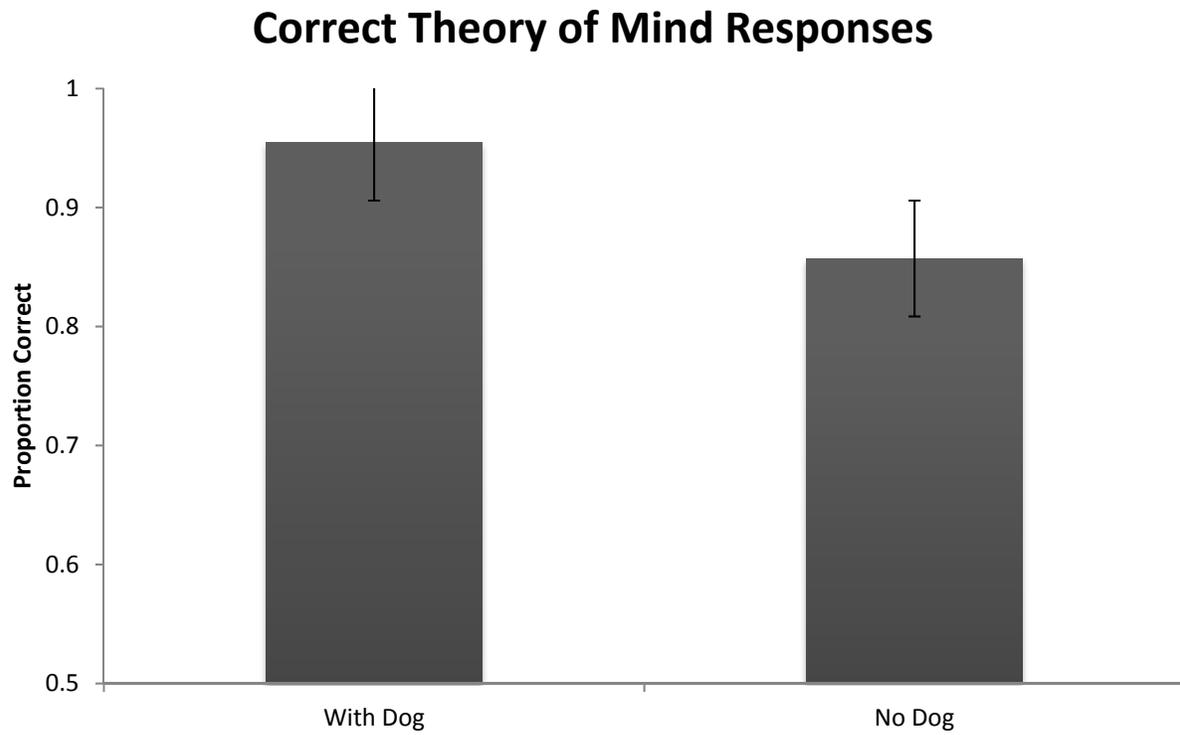


Figure 2. Correct Theory of Mind responses in the dog and no dog condition. Error bars indicate standard error.

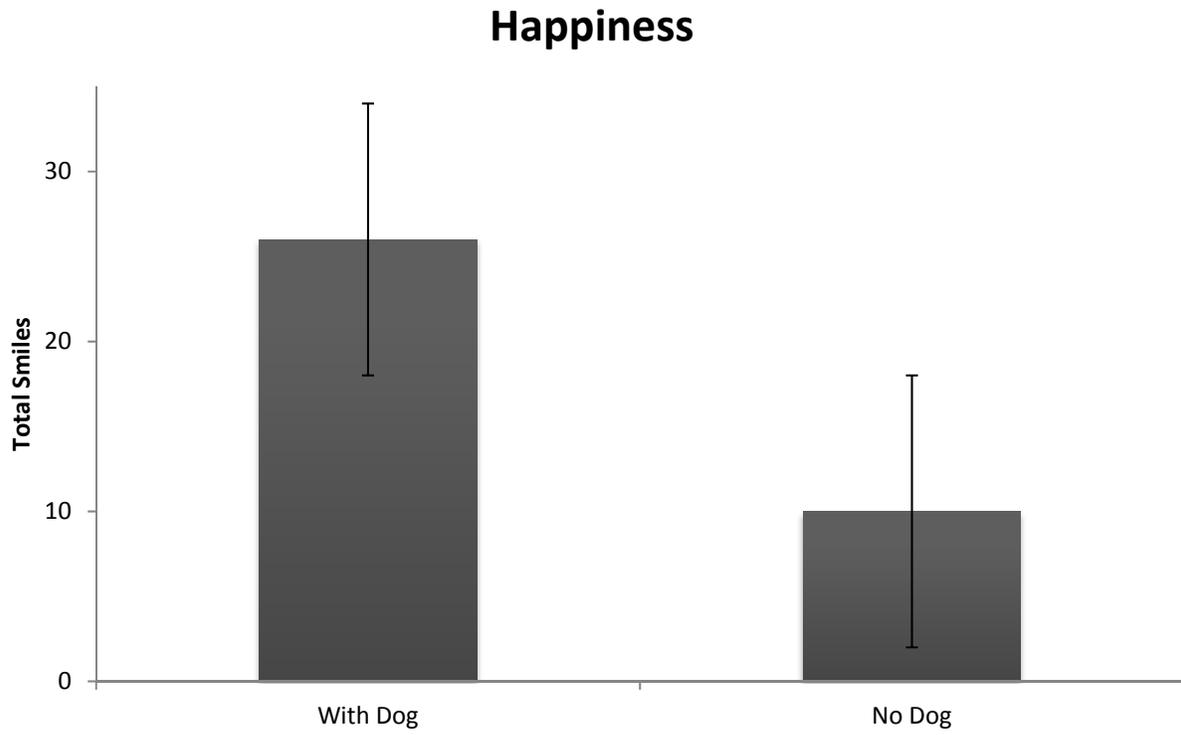


Figure 3. Overall happiness ratings in both the dog and no dog conditions.

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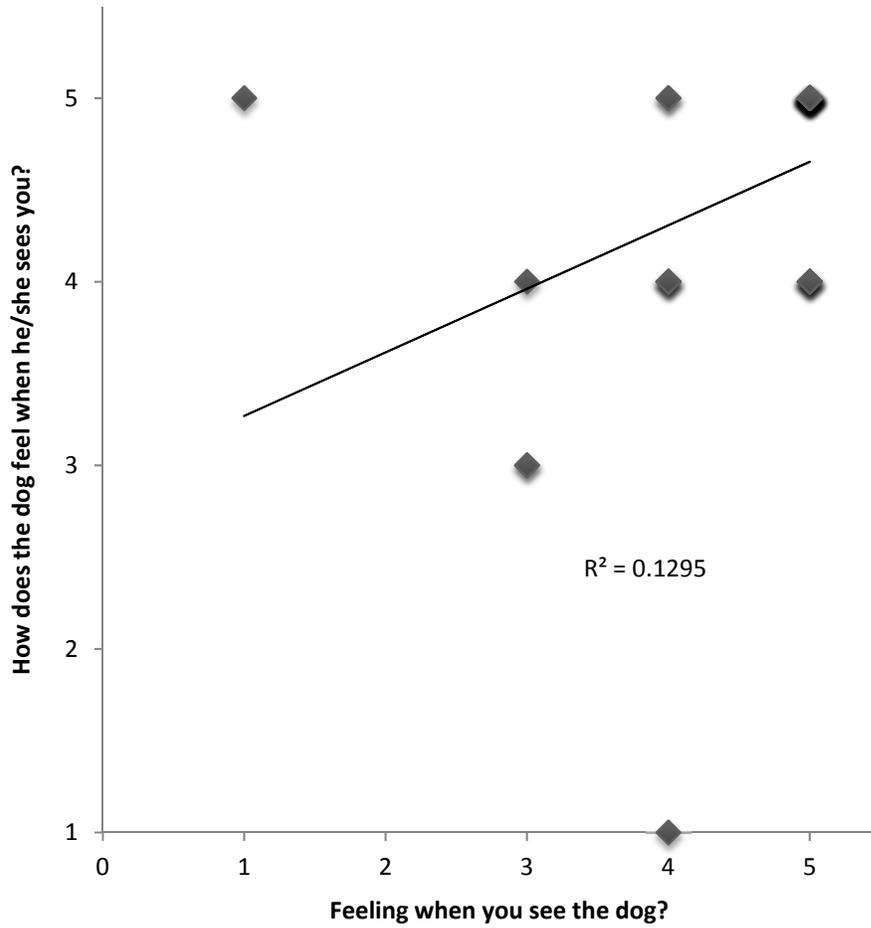


Figure 4. Perceptions on how the dog feels about seeing child, and how the child feels when seeing the dog. Error bars indicate standard error.

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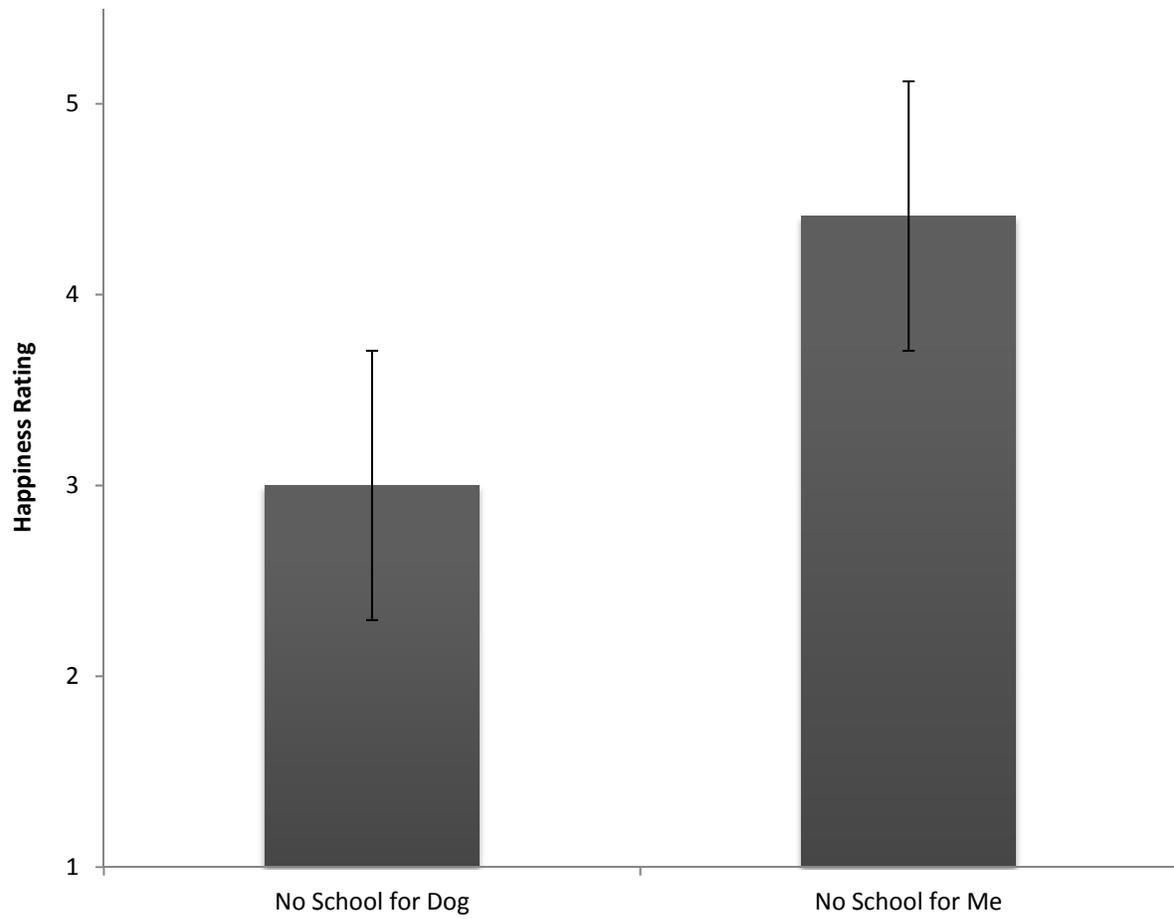


Figure 5. Happiness ratings for dog not going to school and child not going to school. Error bars indicate standard error.

Appendix

Therapy Dog Attachment Scale for Kids

Emotional Attachment to Dog

1. How do you feel when you get to see BLUE?
2. How do you feel when it's time to say goodbye to BLUE for the day?
3. How would you feel if you got to see BLUE every day?
4. How would you feel if you got to take BLUE home to be your very own dog?
10. How do you feel with you get sit with BLUE and just hang out?
11. How do you feel when you get to ask BLUE to do a trick?
12. How would you feel if you got make Fletcher [alternate therapy dog] chase the laser dot?
13. How would you feel if you got to take BLUE for a walk?
14. How would you feel if you got to run around and play with BLUE?
15. How do you feel when you are touching or petting BLUE?

Emotional Attachment to Humans

5. How do you feel when you get to see your classroom teacher?
6. How do you feel when you get to see your best friend?
7. How do you feel when it's time to say goodbye to your best friend?
8. How would you feel if you got to see your best friend every day?
9. How would you feel if your best friend moved into your house to live with you?
16. How do you feel when you get to play with your best friend?
19. How do you feel when you get to go somewhere with your mom/dad?

General Emotion

17. How do you feel when you get to read a book?
18. How do you feel when you get to play a video game?
28. How do you feel when it's dinner time and you see your favorite meal on the dinner table?
29. How would feel if someone pulled your hair?
30. How do you feel when someone pats you on the back and tells you that you did a good job?
32. How does it feel to you when you get a cut or a scratch?
33. How do you feel when you don't have to go to school for the day?
34. How do you feel when you get a birthday present?

Dog Empathy

20. How do you think BLUE feels when he/she gets to see you?
21. How do you think BLUE feels when you pet him/her?
22. How do you think BLUE feels when he/she gets to do his/her tricks for you?
23. How do you think BLUE would you feel if he/she didn't get to come to visit with you?
24. How do you think BLUE feels when you give them a treat?
25. How do you think BLUE would feel if someone pulled their hair?
26. How do you think BLUE feel when they get a cut or a scratch?
27. How do you think BLUE feel when they don't go to school for the day?
31. How do you think BLUE feel when you pat them on them on the back and tell them they did good?