



ANIMAL-ASSISTED ACTIVITIES:

Effects of Animals on Positive Emotional Display
in Children in Inclusion Classrooms

Student Author



Gayatri Mazgaonkar is a junior majoring in Animal Sciences with a concentration in Pre-Veterinary Medicine in the College of Agriculture at Purdue University. She has been working in the Organization for Human-Animal Interaction Research (OHAIRE) lab studying

the effects of animal-assisted activities on children in inclusion classrooms since 2016 as part of the Discovery Park Undergraduate Research Internship and continues to work as a part-time researcher in the lab today. She will be continuing her education as a veterinary student at the Purdue College of Veterinary Medicine after graduating in May 2017 and hopes to pursue a career in small animal veterinary practice and research.

Mentors



Maggie O'Haire is an internationally recognized Fulbright Scholar who is currently an Assistant Professor of Human-Animal Interaction in the Center for the Human-Animal Bond and the Center for Animal Welfare Science in the College of Veterinary Medicine

at Purdue University. She earned her undergraduate degree in Psychology from Vassar College in New

York and her PhD in Psychology from The University of Queensland in Australia. Her program of research focuses on the psychosocial outcomes from interacting with animals for people, including service animals, therapy animals, and companion animals. She has published several articles and book chapters on human-animal interaction, including for autism spectrum disorder, military veterans with post-traumatic stress disorder, and companion animal owners in the community. Her work has been featured in over 250 media outlets worldwide, including The New York Times, Chicago Tribune, The Boston Globe, and National Public Radio.



Noémie A. Guérin is a master's student at Purdue University's Center for the Human-Animal Bond. She obtained a Bachelor of Science in organismal biology and a one-year master's degree in ethology from the University of Rennes, France. At Purdue, Noémie worked

on assessing the reliability and validity of a behavioral coding tool for human-animal interaction research. She is also the behavior coding coordinator for Dr. O'Haire's lab. She trains and manages undergraduate students interested in human-animal interaction research and works with collaborators from child mental health institutions across the United States to assess the behavior of children in the presence of animals.

Abstract

Animals are commonly present in classrooms and may be an important tool in enhancing children's experiences, especially in inclusion classrooms that provide integrative learning for both typically developing children and children with special needs.

The purpose of this study was to investigate the impact of animal-assisted activities on children with autism spectrum disorder (ASD) as well as typically developing (TD) children in inclusion classrooms.

Ninety-nine children from 15 inclusion classrooms were divided into groups of three (two TD children and one child with ASD) to take part in free play sessions with either two guinea pigs or a set of toys. These sessions were videotaped, and the children's behavior was coded. Behaviors that were coded included interactions and emotional display, either positive (smiling, laughing) or negative (frowning). Furthermore, triggers for laughing were classified into three categories: social interaction, animal interaction, and observation of animals or peers.

Both TD children and children with ASD showed increased positive emotional display in the presence of animals compared to toys, but TD children laughed more during the toy sessions while children with ASD laughed more in the animal sessions. Further examination of laughter triggers revealed that TD children laughed due to social interaction while children with ASD laughed due to observation and animal interaction.

These results indicate that guinea pigs can positively enhance the experiences of children in inclusion classrooms and encourage laughter in children with ASD. Future studies could further our knowledge by investigating similar impacts with other animals or examining the correlation between specific animal behaviors and laughter triggers.

Mazgaonkar, G. (2017). Animal-assisted activities: Effects of animals on positive emotional display in children in inclusion classrooms. *Journal of Purdue Undergraduate Research*, 7, 27–33. <https://doi.org/10.5703/1288284316394>

Keywords

smiling, laughing, inclusion classroom, social behaviors, animal-assisted activities, human-animal interaction, typically developing, autism spectrum disorder

INTRODUCTION

Autism spectrum disorder (ASD) is a common developmental disability that causes significant social, communication, and behavioral challenges and is estimated to affect 1 in 68 children in the United States (American Psychiatric Association, 2000; Christensen, Baio, & Braun, 2012). Signs of ASD begin during early childhood and are likely to impact the classroom experiences of affected children. Children with ASD are often integrated into classrooms with typically developing (TD) children, referred to as inclusion classrooms. However, due to the implications of the disorder, children with ASD may experience isolation, bullying, low social engagement, and stress in the classroom (Rowley et al., 2012).

Numerous studies have shown the ability of animals to enhance human experiences, particularly in the aspect of social interaction (Hunt, Hart, & Gomulkiewicz, 1992; McNicholas & Collis, 2000). Thus, animals in classrooms can be used as an experience-enhancement tool for children with ASD as well as TD children. This study was unique in its design, because it investigated the effects of animals on children with ASD and well as TD children, provided a control treatment (in the form of toys) rather than the complete absence of a treatment, and conducted sessions without the presence of a therapist and structured instruction—something which had not been done before in combination. In numerous previous human-animal interaction studies, there was an absence of a control condition, which led to the question of whether or not the animals actually enhanced the situation or whether the reported results might have come about due to the animals being the only object of focus provided.

The main goal of the study was to evaluate the impact of animal-assisted activities (AAA) on children with ASD and TD children in inclusion classrooms. AAA is a form of animal-assisted intervention (AAI), which is the incorporation of animals in various interactive therapeutic formats (Fine, 2010, p. 588). Animal-assisted therapy (AAT) is the other sector of AAI, which includes clinical aspects and specific treatment goals for the participants. This

study did not incorporate AAT and was solely conducted to investigate the effects of animal interaction in the inclusion classroom setting. The frequency of smiling and laughing were measured across both treatments, and the reasons for laughing, or laughter triggers, were examined qualitatively each time laughter occurred and separated into categories. It was hypothesized that both children with ASD and TD would show more positive emotional display in the form of smiling and laughing in the animal sessions compared to the toy sessions.

Although this study focused primarily on positive emotional display and laughter specifically, complete results of the coding analyses from this study have been published separately, which include animal and object interaction, emotional displays, social communication, and problem behaviors for children with ASD (O'Haire, McKenzie, Beck, & Slaughter, 2013) and TD children (Guérin, Barton, & O'Haire, 2016).

METHODS

Participants

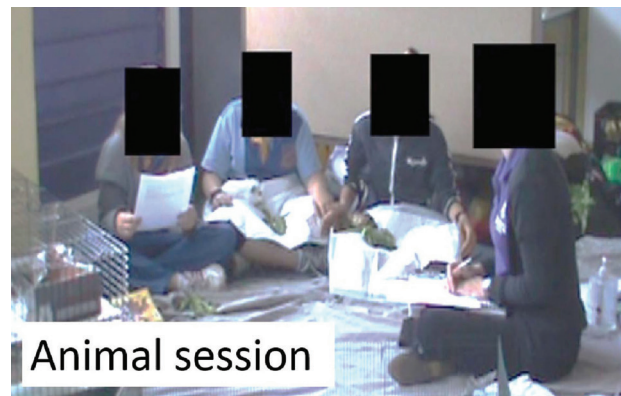
Participants for this study were recruited from four schools in Brisbane, Australia, from kindergarten through seventh grade. Ninety-nine children from 15 inclusion classrooms were divided into groups of three composed of one child with ASD and two TD children. The sample of children with ASD consisted of 33 children, 24 males and 9 females, between the ages of 5.2 and 12.1 years ($M = 9.4$, $SD = 2.3$). These children were chosen based on a previous diagnosis of ASD provided by pediatricians, clinical psychiatrists, or clinical psychologists. Twenty-seven of the thirty-three children qualified for ASD on the Social Communication Questionnaire (SCQ), and the remaining six scored a percentile rank less than 5 on the Social Skills Rating System (SSRS; Gresham & Elliott, 1990). Thus, these participants were reported to exhibit less socially skilled behaviors, less behavioral functioning, and lower academic performance compared to their TD peers. The sample of TD children consisted of 66 children, 28 males and 38 females, between the ages of 5.1 to 12.7 years ($M = 9.0$, $SD = 2.3$). None of these children had a prior diagnosis of any form of ASD, nor did they meet the criteria for ASD or autism on the SCQ (Chandler et al., 2007).

Study Design

Children participated in two types of sessions: animal (experimental) sessions and toy (control) sessions. The sessions took place over a period of 16 weeks, consisting of an 8-week waitlist period and

an 8-week animal-assisted activities period. The toy sessions were held at the start of the waitlist period, at the end of the waitlist period, and at the end of the animal activities period. The animal sessions were held twice weekly during the second 8-week period. Each session was 20 minutes long. In total, there were three toy sessions and sixteen animal sessions.

The animal sessions consisted of participant interaction with two guinea pigs, along with food for the guinea pigs, grooming materials, a camera, a weighing scale, a health checklist, pencils, and other materials to build enrichment items for the animals, such as cardboard boxes, paper, string, glue, and scissors (see Figure 1). A total of 30 guinea pigs were used for the study, and two were housed in each classroom. The toy sessions consisted of participant interaction with various toys, such as coloring materials, building blocks, Beyblades, dolls, and Play-Doh (see Figure 2). All sessions were unstructured and consisted of free play and interaction with either toys or animals in order to observe the participants' natural behaviors and compare them with the variable being the presence or absence of animals.



■ Figure 1. Animal session.



■ Figure 2. Toy session.

Data Collection

All of the sessions that took place were video recorded. Based on a randomized system, 3 minutes from each of the three toy sessions and 3 minutes from three animal sessions were coded for behavior, adding up to a total of 1,768 minutes. Each minute was divided into six segments, consisting of 10 seconds each. Behavior coding was conducted using the Observation of Human-Animal Interaction for Research (OHAIRE) tool, which is an interval-based coding system that uses an online coding system to capture animal and object (toys, in this case) interaction, emotional displays, social communication, and problem behaviors (O’Haire, 2015). Interaction is categorized as talking, looking, gesturing, touching, and being affectionate or prosocial. Emotional displays are categorized as positive (smiling, laughing) or negative (frowning, crying). Problem behaviors are categorized as aggression, isolation, or overactivity.

Behaviors were coded based on their presence or absence (coded as 1 or 0, respectively) in each of the 10-second segments, combining to a score out of 6 for each minute. A primary observer coded 100% of the videos, and a secondary observer coded 20% of the videos. Both coders were blinded to the study design, hypothesis, and conditions of the participants. Interrater reliability was calculated using Cohen’s kappa, a measure correcting for-chance agreement (Cohen, 1960). The overall kappa value between the two coders was high (kappa = 0.81).

To test the hypothesis that both children with ASD and TD children would show more positive emotional display in the animal sessions compared to the toy sessions, the coded behaviors were compared between the two treatments.

Positive emotional display, specifically in the form of laughter, was investigated further, and the events preceding and causing laughter were evaluated and categorized as either observation, animal interaction, or social interaction. Observation meant that the participant was not interacting with peers or animals, and was simply watching without engaging in any

activity when laughter occurred (for example, participant watching peers play a game while he sat in the corner). Animal interaction meant that the participant was actively involved in touching, holding, moving or feeding the animal(s) when laughter occurred (for example, participant cuddling and petting the animal). Social interaction meant that the participant was actively involved in any way with peers and laughter was triggered by a verbal or physical action or reaction (for example, participant telling a joke to his peers). If two or more categories were represented in a situation (for example, participant talking to peer and holding an animal in his lap), then both or all were recorded.

DATA ANALYSIS

Data from the OHAIRE coding tool was analyzed using Hierarchical Generalized Linear Modeling (HGLM), which is equipped to evaluate clustered data with each subject being in a specific group within a classroom (Raudenbush & Bryk, 2002). This approach is also able to measure data that is scored from a range of 0 to 6, which aligns with the scoring of the OHAIRE tool. Additionally, effects were accounted for using Cohen’s *d*, calculated by dividing the difference between group mean values by the total standard deviation, with the values for small, medium, and large effect sizes being 0.2, 0.5, and 0.8, respectively (Lakens, 2013). All analyses of data were performed using IBM SPSS Statistics, V22.0 (IBM Corp., 2013).

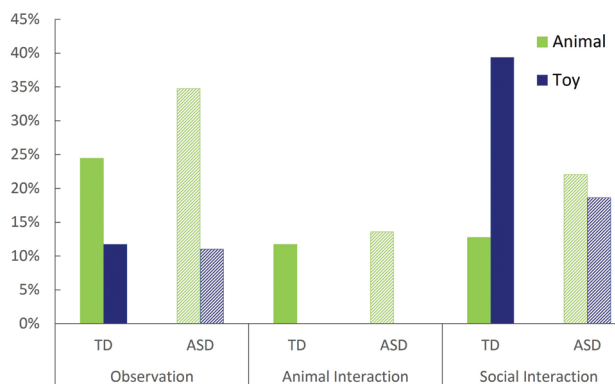
RESULTS

Smiling and Laughing

Children with ASD demonstrated more positive emotional display, including more smiling ($\beta = 0.88$, $SE = 0.12$, $p < .001$, $d = 0.62$) and more laughing ($\beta = 0.57$, $SE = 0.18$, $p < .01$, $d = 0.27$) in the presence of animals compared to toys (see Table 1 and Figure 3). TD children demonstrated more smiling ($\beta = -0.15$, $SE = 0.05$, $p < .001$, $d = 0.24$) and less laughing ($\beta = -0.25$, $SE = 0.11$, $p < .05$, $d = -0.07$) in the presence of animals compared to toys (see Table 1 and Figure 3).

ASD				TD		
	β (SE)	p	d	β (SE)	p	d
Smile	0.88 (0.12)	< 0.001	0.62	-0.15 (0.05)	< 0.001	0.24
Laugh	0.57 (0.18)	< 0.01	0.27	0.25 (0.11)	< 0.05	-0.07

■ **Table 1.** Effects of animal and toy sessions on positive emotional display.



■ **Figure 3.** Positive emotional display.

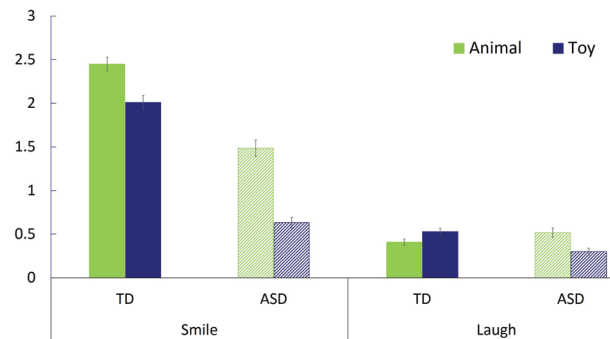
Laughter Triggers

For children with ASD, in the animal sessions, 34.75% of the laughter was triggered by observation, 13.56% by animal interaction, and 22.03% by social interaction. In the toy sessions, 11.02% of the laughter was triggered by observation and 18.64% by social interaction (see Table 2 and Figure 4). The remaining laughter was not identified as being caused by any specific behavior and, therefore, was not included in data evaluation.

For TD children, in the animal sessions, 24.47% of the laughter was triggered by observation, 11.70% by animal interaction, and 12.77% by social interaction. In the toy sessions, 11.70% of the laughter was triggered by observation, and 39.36% by social interaction (Table 2 and Figure 4). The remaining laughter was not identified as being caused by any specific behavior and, therefore, was not included in data evaluation.

DISCUSSION

The results showed that while more smiling was seen in the animal sessions compared to the toy sessions for both children with ASD and TD children, children with ASD laughed more in the animal sessions and children with TD laughed more in the toy sessions. Laughter triggers most common in children with ASD were related to observation,



■ **Figure 4.** Laughter triggers.

while those related to social interaction were most common in TD children.

The results partially aligned with the hypothesis, in that overall positive emotional display was greater in the animal sessions, although TD children showed less laughter in the animal sessions than the toy sessions.

The findings of the study are consistent with previous research in demonstrating that children with ASD smile more (Silva, Correia, Lima, Magalhães, & de Sousa, 2011) and laugh more (Martin & Farnum, 2002) in the presence of animals (in this case, dogs) compared to the absence of animals.

It is interesting that children with ASD laughed more as a result of social interaction in the presence of animals compared to toys, even though social interaction may have been decreased in the presence of animals since the children were interacting less with their peers. However, this is consistent with findings which suggest that children with autism laugh more while they are experiencing positive internal states and less during social interactions (Guérin, Barton, & O'Haire, 2016; Hudenko, Stone, & Bachorowski, 2009).

On the other hand, the group of TD children laughed more in the toy sessions, which aligns with previous studies suggesting that they display more vocal and nonvocal laughter in social situations (Hudenko,

	ASD	TD		
	Animal	Toy	Animal	Toy
Observation	34.75%	11.02%	24.47%	11.70%
Animal Interaction	13.56%	-	11.70%	-
Social Interaction	22.03%	18.64%	12.77%	39.36%

■ **Table 2.** Laughter triggers.

Stone, & Bachorowski, 2009). Playing with peers in the toy sessions also supports evidence that laughter is often provoked by group solidarity (Weisfield, 1993).

Both groups showed overall increased laughter due to the facilitation of social interaction as seen in the laughter triggers analysis, an observation, which has also been seen in past research that describes laughter as a way to alleviate motivational as well as social arousal or excitement, rather than a way to share a humorous idea (Chapman, 1975). For the TD participants, social arousal likely came through playing with their peers, and for the participants with ASD, social arousal came through experiencing positive emotions and social excitement by being around the animals.

In terms of future directions, examination and comparison of social interaction techniques used by children with ASD versus TD children would give insight into the strategies of both groups that contribute to positive emotional display. Additionally, correlations between specific animal behaviors and laughter triggers in children with ASD could also be investigated to find the optimal settings for AAI.

CONCLUSION

Children with ASD as well as TD children showed increased positive emotional display during AAA compared to the control condition of toys. Examination of laughter triggers showed that animals were actively involved in enhancing the experiences of children with ASD by facilitating social interaction. The presence of animals also enhanced the experiences of TD children who displayed increased smiling in the animal sessions as compared to the toy sessions. Overall, AAA created a positive environment in the inclusion classroom and are an asset worth exploring in terms of enhancing the inclusion classroom environment further for both children with ASD and their TD peers.

ACKNOWLEDGMENTS

The author would like to acknowledge the following for their contributions: Center for the Human-Animal Bond, College of Veterinary Medicine, Purdue University; Discovery Park Undergraduate Research Internship; Eunice Kennedy Shriver National Institute of Child Health and Human Development Grant; RSPCA Queensland, Queensland Government Department of Education, Brisbane Catholic Education; Thomas Meloy Foundation; and WALTHAM Centre for Pet Nutrition.

REFERENCES

- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders: DSM-IV-TR*. Washington, DC: Author.
- Chandler, S., Charman, T., Baird, G., Simonoff, E., Loucas, T., Meldrum, D., . . . Pickles, A. (2007). Validation of the social communication questionnaire in a population cohort of children with autism spectrum disorders. *Journal of the American Academy of Child and Adolescent Psychiatry*, 46(10), 1324–1332. <http://dx.doi.org/10.1097/chi.0b013e31812f7d8d>
- Chapman, A. J. (1975). Humorous laughter in children. *Journal of Personality and Social Psychology*, 31(1), 42–49. <http://dx.doi.org/10.1037/h0076235>
- Christensen, D. L., Baio, J., Braun, K. V., Bilder, D., Charles, J., Constantine, J. N., . . . Yeargin-Allsop, M. (2016). Prevalence and characteristics of autism spectrum disorder among children aged 8 years - Autism And Developmental Disabilities Monitoring Network, 11 Sites, United States, 2012. *Surveillance Summaries*, 65(3), 1–23. <http://dx.doi.org/10.15585/mmwr.ss6503a1>
- Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20(1), 37–46. <https://dx.doi.org/10.1177/001316446002000104>
- Fine, A. H. (Ed.). (2010). *Handbook on animal-assisted therapy: Theoretical foundations and guidelines for practice*. San Diego, CA: Academic Press.
- Gresham, F. M., & Elliott, S. N. (1990). *Social skills rating system*. Circle Pines, MN: American Guidance Service.
- Guérin, N. A., Barton, A. K., & O'Haire, M. E. (2016). *Social behaviors and positive emotional displays increase in typically-developing children in the presence of animals compared to toys*. Presented at the 25th International Society for Anthrozoology (ISAZ) Conference, Barcelona, Spain.
- Hudenko, W. J., Stone, W., & Bachorowski, J. (2009). Laughter differs in children with autism: An acoustic analysis of laughs produced by children with and without the disorder. *Journal of Autism and Developmental Disorders*, 39(10), 1392–1400. <http://dx.doi.org/10.1007/s10803-009-0752-1>
- Hunt, S. J., Hart, L. A., & Gomulkiewicz, R. (1992). Role of small animals in social interactions between strangers. *The Journal of Social Psychology*, 132(2), 245–256. <http://dx.doi.org/10.1080/00224545.1992.9922976>
- IBM Corp. (2013). IBM SPSS Statistics, Version 22.0. Armonk, NY: IBM Corp.
- Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: A practical primer for t-tests and ANOVAs. *Frontiers in Psychology*, 4, 863. <https://dx.doi.org/10.3389/fpsyg.2013.00863>
- Martin, F., & Farnum, J. (2002). Animal-assisted therapy for children with pervasive developmental disorders. *Western Journal of Nursing Research*, 24(6), 657–670. <https://dx.doi.org/10.1177/019394502320555403>
- McNicholas, J., & Collis, G. M. (2000). Dogs as catalysts for social interaction: Robustness of the effect. *British Journal of Psychology*, 91(1), 61–70. <https://dx.doi.org/10.1348/000712600161673>
- O'Haire, M. E., Germone, M. M., Daigle, C. L., & Gabriels, R. L. (2015). Development and initial validation of the OHAIRE-M1. Presented at the 25th International Society for Anthrozoology (ISAZ) Conference, Barcelona, Spain.

- O'Haire, M. E., McKenzie, S. J., Beck, A. M., & Slaughter, V. (2013). Social behaviors increase in children with autism in the presence of animals compared to toys. *PLOS ONE*, 8(2), e57010. <https://dx.doi.org/10.1371/journal.pone.0057010>
- Raudenbush, S. W., & Bryk, A. S. (2002). Hierarchical linear models: Applications and data analysis methods. Thousand Oaks, CA: Sage Publications.
- Rowley, E., Chandler, S., Baird, G., Simonoff, E., Pickles, A., Loucas, T., & Charman, T. (2012). The experience of friendship, victimization, and bullying in children with an autism spectrum disorder: Associations with child characteristics and school placement. *Research in Autism Spectrum Disorders*, 6(3), 1126–1134. <https://dx.doi.org/10.1016/j.rasd.2012.03.004>
- Silva, K., Correia, R., Lima, M., Magalhães, A., & de Sousa, L. (2011). Can dogs prime autistic children for therapy? Evidence from a single case study. *The Journal of Alternative and Complementary Medicine*, 17(7), 655–659. <https://dx.doi.org/10.1089/acm.2010.0436>
- Weisfield, G. E. (1993). The adaptive value of humor and laughter. *Ethology and Sociobiology*, 14(2), 141–169.