

# Animal-Assisted Intervention for Autism Spectrum Disorder

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## About This Document

*HABRI Central Briefs are peer-reviewed summaries of particular applications and issues within the field of human-animal interaction. Each Brief presents an overview of the subject matter, assesses the current state of research, then highlights unresolved questions or issues. Key resources are identified for further reading.*

*These Briefs are compiled as a service to the community by the staff of HABRI Central ([www.habricentral.org](http://www.habricentral.org)), the online hub for scholarly information related to the study of human-animal interaction, reviewed by its editorial board ([www.habricentral.org/kb/management--oversight/editorialboard](http://www.habricentral.org/kb/management--oversight/editorialboard)), and funded through the generous support of the HABRI Foundation ([www.habri.org](http://www.habri.org)).*

## Overview

Approximately 1 in 68 children in the United States has Autism Spectrum Disorder (ASD; Autism and Developmental Disabilities Monitoring Network, 2014). There is no cure for ASD; therefore, current treatment efforts focus on behavior management and social skill development. The inclusion of animals in ASD treatment has been suggested as an effective way to enhance social functioning and to ameliorate social stress and anxiety.

Nearly one in four children with ASD has participated in some form of Animal-Assisted Intervention (Christon, Mackintosh, & Myers, 2010). This practice is currently being used by psychologists, social workers, and occupational therapists who treat ASD. A variety of animal species participate, including dogs, horses, and small animals such as guinea pigs. Yet despite the prevalence of Animal-Assisted Intervention for ASD, the empirical study of its use is only just emerging. This brief summarizes the latest literature on animals and autism, with an overview of currently documented outcomes as well as gaps in knowledge for further research.

## State of Current Knowledge

### WHAT IS ASD?

Autism spectrum disorder (ASD) is a prevalent developmental disorder characterized by ongoing deficits in social communication and social interactions across multiple contexts and restricted, repetitive patterns of behavior, interests, or activities (American Psychiatric Association, 2013). Most symptoms cause clinically significant impairment in social functioning which first present during childhood. Individuals with ASD often find everyday social interactions challenging. Their social engagement tends to be described by very little eye contact, lack of interaction with people in their environment, reduced motivation to share enjoyment of toys or activities with others, and abnormal responses to emotional displays of others. Because ASD is a spectrum disorder, the severity and diversity of symptoms can vary widely across individuals, from mild to severe impairments.

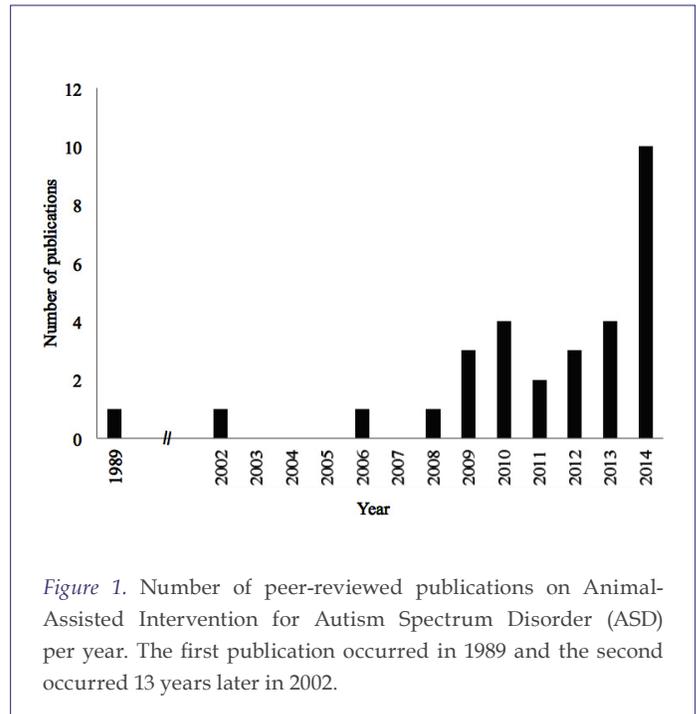
### STANDARD ASD TREATMENTS

A myriad of treatment options are available for individuals with ASD, with varying levels of effectiveness. One of the

most well-established treatments is Applied Behavior Analysis (ABA), which involves a systematic application of learning theory principles to improve and reinforce positive social behaviors (Cooper, Heron, & Heward, 2007). The focus of this approach is primarily on the relationships between the individual's behavior and their environment, where desired changes in behavior are rewarded with positive reinforcement. There are a variety of ABA formats, and early intervention with this technique yields considerable success. Other treatments with empirical support include occupational therapy, sensory integration therapy, speech therapy, and in some cases psychopharmacological therapy. Despite growing evidence for these traditional treatment options, families of children with ASD continue to seek out complementary interventions to enhance treatment progress. One of the most popular complementary techniques is to include animals in the process, known as Animal-Assisted Intervention.

#### **ANIMAL-ASSISTED INTERVENTION (AAI) DEFINITION**

The umbrella term Animal-Assisted Intervention denotes any intervention that intentionally incorporates a live animal into the intervention. It encompasses Animal-Assisted Therapy, a goal-directed intervention with targeted treatment objectives, and Animal-Assisted Activities, a non-directed enrichment activity involving animals (Kruger & Serpell, 2010). The term Animal-Assisted Intervention is also sometimes used to encompass Service Animals, which are specially trained, certified animals who live in the home and provide assistance with specific tasks throughout daily life activities, and Companion Animals, which also live in the home but are not specially trained for specific tasks and do not have permission to accompany an individual in all daily activities such as school or work. The practice of Animal-Assisted Intervention for ASD has grown in popularity in recent years, with several media and anecdotal accounts of its success in this population. To that end, published empirical studies of Animal-Assisted Intervention for ASD have also seen a rapid growth, particularly within the past year (Figure 1). Since our last review on the topic (O'Haire, 2013), the literature has doubled in size, reflecting the increased interest by the scientific community in these practices.



Despite widespread interest and increasing scientific investigation, the terminology used by researchers regarding Animal-Assisted Intervention for ASD is inconsistent. Additional terms that have been used in published ASD research include: Assistance Dogs, Canine-Assisted Therapy, Equine-Assisted Therapy, Equine-Assisted Activities, Hippotherapy, Occupational Therapy with Animals, Pet-Facilitated Therapy, Psycho-Educational Horseback Riding, Therapeutic Animals, Therapeutic Horseback Riding, and Therapy Dogs. Some variability can be attributed to different species and activities, while other variability may be evidence of a multi-disciplinary field of study that is in a nascent stage. The inconsistency in terminology can potentially create confusion among service providers and the general public as they navigate services for individuals with ASD. We therefore recommend consistent use of the broad term Animal-Assisted Intervention, and its sub-categories, Animal-Assisted Therapy and Animal-Assisted Activity, depending on the context in which the animal is utilized within the intervention. In the following sections we will review the state of current knowledge on Animal-Assisted Intervention (AAI), categorized by the most commonly participating species, which are dogs, horses, and guinea pigs (Figure 2).

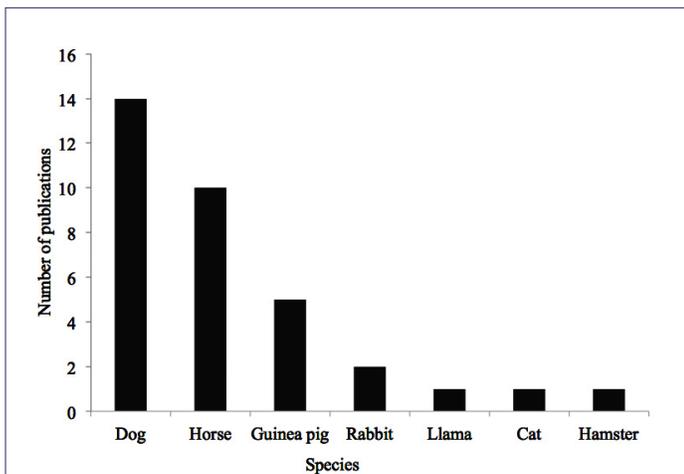


Figure 2. Number of peer-reviewed publications on Animal-Assisted Intervention for Autism Spectrum Disorder (ASD) with each animal species between 1989 and 2014.

### AAI WITH DOGS

Dogs are the most commonly included species in Animal-Assisted Intervention. Research has been conducted on all sub-categories of Animal-Assisted Intervention with dogs, including Animal-Assisted Therapy, Animal-Assisted Activities, Service Animals, and Companion Animals.

### ACTIVITIES

In Animal-Assisted Therapy, dogs are often incorporated into a clinical therapy setting as a means of building rapport between the client and the therapist. Activities may include soft contact such as petting to reduce arousal, interactive games such as ‘fetch’ to provide enrichment for both the human and animal and to foster a positive environment, and social stories with the dog present to facilitate social skills development and perspective taking. In Animal-Assisted Activities, dogs are part of many of the same enrichment activities without individualized, targeted therapeutic goals. With respect to Service Animals, dogs serve a number of purposes, including being tethered to a child to prevent bolting and enhance safety, as well as to provide non-judgmental companionship for the child and family members. Finally, as Companion Animals, dogs offer opportunities for exercise through walks and play, social facilitation by providing a positive source of support, stimulation of conversation in the home, and companionship for children who are often bullied or rejected in social environments outside of the home.

### OUTCOMES

Research on outcomes from Animal-Assisted Intervention with dogs for ASD has focused predominantly on social skills and social behaviors, with supplementary findings related to positive emotions and stress. All studies of Animal-Assisted Therapy and Animal-Assisted Activities with dogs report increases in positive social behaviors and social interactions (Funahashi, Gruebler, Aoki, Kadone, & Suzuki, 2014; Fung & Leung, 2014; Grigore & Rusu, 2014; Martin & Farnum, 2002; Redefer & Goodman, 1989; Sams, Fortney, & Willenbring, 2006). Additional findings include decreases in negative social behaviors (Funahashi et al., 2014; Silva, Correia, Lima, Magalhães, & de Sousa, 2011), reductions in social isolation (Redefer & Goodman, 1989), increases in the use of language and verbalizations (Fung & Leung, 2014; Sams et al., 2006), increases in indicators of positive mood such as smiling (Funahashi et al., 2014; Silva et al., 2011) and playfulness (Martin & Farnum, 2002), and a reduction in parental stress (Wright et al., 2015).

Research on Service Animals shows benefits at the individual and family level, including increased family feelings of safety and independence (Burgoyne et al., 2014; Burrows, Adams, & Spiers, 2008), increased family reported quality of life (Solomon, 2010), and improved quality and quantity of sleep for both parents and children (Burrows et al., 2008). Most of the service dog literature has been qualitative in nature; however, one study integrated a physiological assessment of stress and observed a reduced salivary cortisol awakening response in children with ASD during the time period when a service dog was in the home (Viau et al., 2010). The findings for Companion Animals mirror outcomes for other areas of Animal-Assisted Intervention, such as increased social skills and interactions (G. Carlisle, 2014; G. K. Carlisle, 2014; Grandgeorge, Tordjman, et al., 2012), more smiling (Grandgeorge, Tordjman, et al., 2012), and reduced stress (G. Carlisle, 2014).

### AAI WITH HORSES

Horses are the second most commonly included species in Animal-Assisted Intervention (Figure 2). Research on horses for ASD has been conducted on both sub-categories of Animal-Assisted Intervention, including Animal-Assisted Therapy and Animal-Assisted Activities. Although the Americans with Disabilities Act specifies

that miniature horses are eligible to qualify as Service Animals, no research has been conducted on this practice for ASD and there are relatively few, if any, anecdotal reports of miniature horses used in this context. More common anecdotes reference horses as Companion Animals, although this area has not yet been subjected to empirical investigation.

#### **ACTIVITIES**

There are a wide range of activities that have been studied with horses in the context of Animal-Assisted Therapy and Animal-Assisted Activities. Some studies include only ground-based activities, without any horseback riding; whereas others focus predominantly on mounted activities. Ground-based activities tend to include grooming, feeding, and observation of natural horse behavior. Mounted activities range from simple walking to more complex games and challenges such as navigating an obstacle course or controlling variable horse speed and range of motion. Activities with horses focus on motor control, rhythmic breathing, clear communication, and confidence-building. One consideration for participating in Animal-Assisted Intervention with horses is that more personnel tend to be required for this type of intervention compared to other animal species. This is due to the fact that one to two side walkers are required for each horse, in addition to the therapeutic riding instructor.

#### **OUTCOMES**

The most commonly reported outcomes of Animal-Assisted Intervention with horses for children with ASD are increased social functioning (Bass, Duchowny, & Llabre, 2009; Keino et al., 2009; Lanning, Baier, Ivey-Hatz, Krenek, & Tubbs, 2014; Memishevikj & Hodzhikj, 2010; Ward, Whalon, Rusnak, Wendell, & Paschall, 2013), increased physical functioning (Bass et al., 2009; Gabriels et al., 2012; Holm et al., 2014; Jenkins & Reed, 2013; Lanning et al., 2014), and increased stability of mood and emotions (Gabriels et al., 2012; Jenkins & Reed, 2013; Kern et al., 2011; Lanning et al., 2014; Taylor et al., 2009). Some studies have also described improvements in verbal skills (Gabriels et al., 2012; Memishevikj & Hodzhikj, 2010), sensory processing (Bass et al., 2009; Ward et al., 2013), and attention (Bass et al., 2009; Holm et al., 2014). These benefits have been observed to extend beyond the riding sessions where children exhibited improved social communication, attention, tolerance, and reactivity to sensory input in their regular school classroom (Lanning et al., 2014; Ward et al., 2013). When children participating in Animal-Assisted

Therapy either once a week, three times per week, or five times per week were compared, improvements were positively associated with the frequency of the sessions, where children who participated more frequently exhibited the most improvement throughout the study (Holm et al., 2014). The positive effects of Animal-Assisted Therapy with horses also extend to families, because parents of children receiving Animal-Assisted Therapy report an increased quality of life after their child has participated in Animal-Assisted Therapy with horses (Kern et al., 2011).

#### **AAI WITH GUINEA PIGS**

Guinea pigs are an emerging species in research on Animal-Assisted Intervention for ASD. They have been incorporated into both Animal-Assisted Therapy and Animal-Assisted Activities. They are also a common species of Companion Animal, particularly among families with children.

#### **ACTIVITIES**

Guinea pigs are social, prey animals that must be well socialized from a young age to be suitable for Animal-Assisted Intervention. Common activities with guinea pigs include holding, stroking, feeding, and grooming. They can act as a biofeedback tool (Glueck & Stroebel, 1975; Swingle, 2008), whereby humans use mindful breathing techniques to relax themselves and monitor associated signals of relaxation in the animal, such as decelerated heart rate, relaxed eyes, and eating (which guinea pigs will not do if stressed; Rood, 1972; Sachser & Lick, 1989). Their small size makes them suitable for gently holding close to one's chest or face to experience the added benefits associated with soft touch and nurturing contact. They also enable exercises in perspective taking and empathy, where the child is asked to imagine the guinea pigs' needs and perceptions to subsequently create enrichment materials for them such as tunnels or houses. Activities with guinea pigs are often associated with lower mobility and energy than many activities with larger species such as dogs or horses, which may be more suitable for the child depending on their individual needs and situation.

#### **OUTCOMES**

Similar to the findings associated with Animal-Assisted Intervention in dogs and horses, results from research investigating the impact of guinea pigs on ASD suggest

promise for this species as a candidate for Animal-Assisted Intervention for ASD. Outcomes with guinea pigs have included increased social engagement (Grandgeorge, Deleau, Lemonnier, Tordjman, & Hausberger, 2012; Kršková, Talarovicová, & Olexová, 2010; O’Haire, McKenzie, McCune, & Slaughter, 2014), increased frequency of positive affect such as smiling or laughing (O’Haire, McKenzie, Beck, & Slaughter, 2013), and reduced physiological arousal during social interactions (O’Haire, McKenzie, Beck, & Slaughter, 2015). Interestingly, a new stream of research has shown that while guinea pigs act as social catalysts for children with ASD by encouraging positive social interactions with humans, children with ASD are less likely to physically engage with unfamiliar guinea pigs than their typically-developing peers (Grandgeorge et al., 2014; Grandgeorge, Deleau, et al., 2012). These findings suggest that children with ASD may exhibit different types of interactions with new animals, compared to typically developing children. However, children with ASD are more likely to interact with an unfamiliar animal (guinea pig) than an unfamiliar person (Kršková et al., 2010), supporting the need for further investigation into this area. Our increased understanding of the impact of guinea pig interactions will be essential to explore differences based on novelty and familiarity of both the human and the animal, and whether these interactions change occur over time.

## Areas for Future Investigation

The field of research on Animal-Assisted Intervention for ASD is relatively new. Initial studies have demonstrated the potential efficacy of animals to increase social engagement among children with ASD in conjunction with increased positive affect and reduced anxious arousal. Despite positive preliminary findings, the existing body of literature is relatively small compared to other areas of ASD intervention research. Further investigation is necessary in several key areas.

### GENERALIZABILITY AND SPECIFICITY

Although positive outcomes have been experienced for a number of individuals, it is likely that not all persons with ASD will benefit equally from Animal-Assisted Intervention. Individual-level outcomes should be evaluated with respect to age, gender, ASD severity, verbal ability, sensory sensitivities, and other factors to have a

clear picture of how Animal-Assisted Intervention can best be used within the ASD community. Developing psychological profiles for those most likely to benefit will enable efficient and effective allocation of resources.

### TECHNIQUE REFINEMENT

There is wide variability with respect to treatment protocols and techniques. No two studies have replicated the same protocol and there are few, if any, published treatment manuals of Animal-Assisted Intervention for ASD. These limitations make consistent testing and application of protocols difficult for researchers, and slow the advancement of the knowledge base for practitioners to achieve evidence-based outcomes. This disconnect may be due to the relatively few studies evaluating the most effective ways of incorporating animals into ASD intervention. For example, is Animal-Assisted Intervention with dogs more effective in a group or individualized setting? Is Animal-Assisted Intervention with horses most effective when there are mounted riding activities, ground-based activities, or a combination of the two? Does it matter if the animal species is a dog or a cat or a horse or a guinea pig? These types of questions will enable the field to progress towards providing consistent, evidence-based services that maximize positive outcomes.

### MEASUREMENT

The majority of the research to date has used self-report measures from parents, teachers, or therapists. These sources of data can be highly informative because they provide perceptions from people who are intimately familiar with the participants. However, the subsequent results may be subject to expectancy biases, whereby the individuals want, or expect, to see changes from animals; therefore they report seeing these changes regardless of whether they have actually occurred. In the future, corroborating these reports with potentially less biased measurements such as blinded behavioral observation or physiological assessments will enhance our understanding of the true effects of the Animal-Assisted Intervention. A behavioral coding tool has recently been developed to establish an unbiased measurement of the results from an Animal-Assisted Intervention; it is the Observation of Human-Animal Interaction for Research (OHAIRE), which was specifically designed to capture the unique interactions between children with ASD and animals in a format that can be compared to alternative

activities without the presence of an animal. The OHAIRE has been used to document increased social behaviors among children with ASD in the presence of guinea pigs, compared to toys (O’Haire et al., 2013), and is currently being used to document outcomes related to Animal-Assisted Interventions with other species including dogs and horses. Another useful measurement tool is the Autism Impact Measure (AIM), which is a 25-item instrument that has been piloted and is currently under large scale testing. Preliminary evidence suggests that this instrument will offer the ability to measure change in behaviors associated with ASD over a short period of time and will be of value in interventional studies (Kanne et al., 2014).

## Conclusions

The rigorous evaluation of *Animal-Assisted Intervention* in empirical studies is in the nascent stages, and therefore our understanding of the full range of benefits from these programs has not yet been elucidated. Current evidence suggests that the inclusion of animals in ASD intervention is associated with positive outcomes related to social interaction, mood, and stress. However, the state of the research is best characterized as initial proof-of-concept studies, whose positive outcomes justify the commitment of resources to enable more detailed, large-scale investigation.

By standardizing the terminology used within the field, and applying consistent methodologies across studies, researchers will be able to provide relevant, practical information to those facing the challenges associated with ASD in their daily life. Using consistent methodologies and terminologies will facilitate the successful execution of large-scale studies that can begin to identify specific benefits and caveats of different *Animal-Assisted Interventions* that will facilitate best practices for practitioners in the field.

## Key Resources

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.

*This review paper provides an overview of six studies on Animal-Assisted Intervention with dogs, published between 1989 and 2010. It highlights work done in the sub-categories of Animal-Assisted Therapy and Service Animals. The authors discuss core outcomes related to improvements in social behaviors and language use. They speculate that positive changes may be due to the affectionate responses of dogs to human attention, which acts as an emotional*

*bridge or social catalyst. They also highlight the need for more standardized intervention protocols and larger scale research.*

Grandin, T., Fine, A. H., O’Haire, M. E., Carlisle, G., & Bowers, C. M. (In Press). The use of therapy animals for individuals with autism spectrum disorder. In A. H. Fine (Ed.), *Handbook on animal-assisted therapy: Theoretical foundations and guidelines for practice* (4th ed.). San Diego, CA: Academic Press.

*This book chapter is part of the leading handbook on Animal-Assisted Intervention. Temple Grandin, a world-renowned academic with ASD, and co-authors provide insight into both anecdotal and research-based reports of animal interaction among individuals with ASD. It provides a reader-friendly overview of the nuanced relationships between children with ASD and animals. Targeted recommendations are made for practitioners who wish to incorporate animals into their practice. The Handbook in its entirety is an excellent resource for anyone interested in learning more about Animal-Assisted Intervention practices.*

Maujean, A., Pepping, C., & Kendall, E. (2014). A systematic review of randomized controlled trials of animal-assisted therapy on psychosocial outcomes. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, 28(1), 23-36.

*This review paper provides an excellent overview and synthesis of eight studies on Animal-Assisted Intervention for psychosocial outcomes. To enhance the methodological rigor of reviewed studies, only Randomized Controlled Trials were included. The authors highlight key populations that may be likely to benefit from Animal-Assisted Intervention, one of which is children with ASD. They provide a useful exploration of methodological strengths and weaknesses in the current literature, with targeted advice for future studies such as the use of active control groups and long-term follow-up assessments.*

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. doi:10.1007/s10803-012-1707-5

*This systematic review paper collates all published, empirical literature on Animal-Assisted Intervention for ASD through June 2012. Fourteen studies were reviewed to achieve three key aims: (1) describe the characteristics of interventions with animals for ASD, (2) critically evaluate the research design and methods, and (3) summarize the reported outcomes. Results of the review show that the presentation of the interventions was highly variable, with little consistency across studies. The preliminary nature of many of the studies places the research in a “proof-of-concept” phase, where initial efficacy studies are conducted to demonstrate potential benefits. The most commonly reported outcome was improvement in social interaction and communication. Strategic recommendations are provided for further investigation in this area.*

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