



Review of current evidence and future directions in animal-assisted intervention for children with autism

ME O'Haire*

Abstract

Introduction

Autism has been highlighted as a pressing public health issue that may be ameliorated through the inclusion of animals in autism treatment services, also known as animal-assisted intervention. Over the past 20 years, only a few studies have empirically examined the impact of therapeutic interactions with animals for individuals with autism. A review of the existing literature indicates that incorporating animals into autism treatment practices may provide a motivating stimulus for individuals with autism to enhance social functioning. However, more rigorous investigation is critical before widespread implementation can be adopted. In this review, I explore the current literature on animal-assisted intervention for autism, synthesise relevant findings for clinical practice and present targeted directions for future research.

Conclusion

Research suggests positive social functioning outcomes for some children with autism following human-animal interaction. The use of animal-assisted intervention and service animals appear to provide a valuable addition to current autism treatment practices and therefore are worthy of further investigation.

Introduction

When people think of animal-assisted intervention (AAI), they often conjure

images of children with autism who are magically healed after swimming with dolphins. Popular television programs, movies and books, glamorise a seemingly miraculous connection between people with autism and animals. One of the most famous cases is that of Temple Grandin. Despite an early diagnosis of severe autism, Grandin used her unique connection to animals to survive the social challenges of her youth and build a prosperous career as a world-renowned animal behaviourist. She posits that having autism gives her insight into the way animals think. This capacity has enabled her to revolutionise the cattle industry; she has successfully redesigned over half of the cattle handling facilities in the United States to be less stressful, more humane and more efficient¹. The question of whether individuals with autism such as Grandin have superior insight into the animal mind is the subject of ongoing debate and is beyond the scope of this paper. What is of interest is the impact that interacting with animals can have on the functioning and well-being of individuals with autism. Grandin proposes that for many individuals with autism, animals provide a safe haven for positive and supportive social interactions. Of her own experience with the challenges faced in school and in her social life as a child with autism, Grandin says, 'Animals saved me... They kept me going'¹. Yet beyond Grandin's experiences and the enchanting connection touted by popular media, what evidence exists to support the inclusion of animals in autism treatment services? This critical review discusses the current evidence and future directions in AAI for children with autism.

Ethics Statement

The author has referenced some of her own studies in this review. These referenced studies have been conducted in accordance with the Declaration of Helsinki (1964) and the protocols of these studies have been approved by the relevant ethics committees related to the institutions in which they were performed. All human subjects, in these referenced studies, gave informed consent to participate in these studies.

Rationale for animals in autism intervention

Despite impairments in social interaction with humans that characterise autism, many individuals with autism report close and affectionate bonds with the companion animals in their lives. For example, in a case study design, McNicholas and Collis² interviewed family members of three individuals with autism and found that although they demonstrated aggression and difficult behaviours towards humans, they were affectionate and attached to the family pets. This preference for animals over humans has also been demonstrated in an experimental setting, in which children with autism tended to prefer interacting with dogs over humans and other objects³. In preliminary research in a naturalistic setting, Kršková et al.⁴ demonstrated that children with autism consistently preferred interacting with an unfamiliar animal (guinea pig) to an unfamiliar person; they also engaged in increased social interactions with their peers in the presence of the guinea pig. These findings have led to the speculation that social aversion in autism may be human-specific and does not extend to interaction with animals⁵.

* Corresponding author
Email: maggie.ohaire@gmail.com

School of Psychology, The University of Queensland, Brisbane, Australia

There also appear to be noteworthy connections between the characteristic deficits of autism and the improvements associated with interacting with animals. Indeed, three key areas of impairment in autism—social functioning, social support and stress—have been highlighted as areas of improvement in human-animal interaction (HAI) research. The burgeoning field of research called HAI is defined as ‘the mutual and dynamic relationships between people and animals and the ways in which these interactions may affect physical and psychological health and well-being’⁶. With regard to social functioning, autism is primarily characterised by impairment in social interaction⁷; HAI research has demonstrated that interacting with animals may improve social and emotional development in children⁸, particularly through its influence on the neuropeptide oxytocin, which regulates social cognition and behaviour⁹. Due to impairments in social functioning, children with autism often struggle to form social bonds and lack social support¹⁰; HAI research indicates that animals provide social support, both directly by reducing loneliness and providing companionship¹¹ and indirectly by facilitating social encounters with fellow humans¹². Following impairments in communication and social functioning, children with autism often lack appropriate coping mechanisms and are particularly vulnerable to stress¹³; HAI research provides robust physiological evidence for a stress-reducing effect of interacting with animals, such as reduced heart rate and blood pressure following contact with companion animals¹⁴ and reduced self-reported anxiety following animal-assisted therapy sessions¹⁵. Taken together, the HAI literature highlights key benefits from interacting with animals that may be particularly useful for individuals with autism.

Current evidence

Over the past 20 years, only a few studies have empirically examined the impact of interacting with animals for individuals with autism¹⁶. These studies primarily focus on social functioning outcomes and can be broken down into three categories: (1) therapy animals involved in AAI, (2) service animals that accompany individuals with autism in daily life and (3) companion animals or ‘pets’ in the homes of individuals with autism.

Therapy animals

Therapy animals are involved in AAI or ‘any intervention that intentionally incorporates animals as part of a therapeutic or ameliorative process or milieu’¹⁷. The use of AAI dates back to the late 18th century when animals were brought into mental health institutions to increase socialisation among patients¹⁸. Its current implementation has been related to positive treatment outcomes in a number of clinical populations, such as improved physical health and psychological well-being in Alzheimer’s disease patients¹⁹, increased social functioning in patients with schizophrenia²⁰ and reduced aggressive and pathological behaviours among children with conduct disorder and attention-deficit hyperactivity disorder²¹. For a general summary of the literature on AAI, see the paper published in 2010 by the author of this review²².

Dogs and horses

The majority of therapy animal studies have examined AAI with dogs. Reported outcomes from AAI with dogs have included decreases in social isolation and autistic behaviours²³, increased playfulness, focus and social awareness²⁴, increased language and social interaction²⁵, as well as increased positive social behaviours and decreased negative problem behaviours²⁶. Other studies have examined AAI with horses, which generally involve riding horses

as well as engaging in care-related and grooming activities. Studies of AAI with horses have demonstrated increased sensory and social motivation and decreased inattention²⁷, increased communication and social behaviours²⁸ and increased motivation to engage in everyday activities²⁹.

Taken together, the current literature indicates that AAI with domestic animals may improve some aspects of social functioning in children with autism. Yet, despite the unanimous positive outcomes reported, minimal conclusions can be drawn due to a number of limitations in the literature to date. Most notably, the studies had relatively small sample sizes, often lacked a control group, failed to report manipulation checks and consistently used potentially biased informants or non-blind behavioural observations to measure outcomes. There was also a lack of studies with longitudinal data, which are necessary to determine whether AAI is a temporary fix or a long-term strategy³⁰. The literature may also be subject to a file-drawer effect, whereby studies that fail to achieve positive outcomes are filed away instead of published. Finally, drawing unified conclusions from current research is complicated by the variability in intervention methodology—including session format, length, duration and the type of animal involved. The studies to date on AAI with domestic animals and horses therefore highlight potential benefits for individuals with autism, but require further, more rigorous evaluation before widespread implementation can be adopted.

Dolphins

There has been increasing controversy in recent years surrounding the use of dolphins in AAI, also known as dolphin-assisted therapy. Although its allure has not evaded popular media, the scientific basis for its implementation is notably weak. A review of the literature indicates that no empirical

studies have focused specifically on dolphin-assisted therapy for autism. Instead, a handful of studies have evaluated dolphin-assisted therapy for children with 'severe disabilities' and included a small number of children with autism within the larger participant pool³¹. Ultimately, despite its apparent popularity for autism, the current literature appears to discourage the use of dolphins in AAI based on weak empirical validation, ethical concerns for the welfare of wild animals in therapeutic interventions, safety concerns for children interacting with large, wild animals and practical issues regarding the high cost of implementation.

Service animals

Service animals have traditionally been employed to assist disabled persons in specific daily tasks prevented by their disability, such as seeing-eye dogs for the blind or hearing dogs for the deaf. Recently, organisations have begun to certify a new stream of service animals specifically trained to assist individuals with autism. Unlike therapy animals involved only in isolated treatment sessions, service animals remain with clients throughout the day. The primary function of an autism service dog is to provide safety and security by preventing children with autism from bolting or running off without notice, and yet psycho-social benefits have also been proposed.

A small number of qualitative studies have been conducted on service animals for autism. One study reported an increased sense of safety, security and independence for the child with autism, as well as decreased stress for both the children with autism and their caregivers³². Another study found that the service dog provided social facilitation within the family as well as improved socio-emotional communication³³; however, the study was limited by a small sample size and the potential bias of the researcher acting as the observer.

Only one empirical study has examined the impact of service dogs on physiological indicators of stress in children with autism. Results indicated decreases in participants' cortisol awakening response (from 58% to 10%) and problem behaviours in the presence of the dogs, suggesting a decrease in stress when the animals were at home³⁴. These physiological findings provide a solid foundation for future stress-related studies of animals and stress-reduction in autism.

Alongside positive outcomes, some families have also reported drawbacks to service animals, most notably, the work required to care for the animal and maintain its training. However, qualitative interview data from parents over a one-year period indicates that after an initial adjustment period, the perceived benefits of service animals greatly outweigh any initial inconveniences³⁵. Another issue that some families encountered was the denial of animal access in public spaces. Although it is illegal to exclude service animals from public settings, the use of service animals for autism rather than a physical disability is relatively new and will need to be addressed by governments³⁶.

In summary, the research base for service animals in autism is promising yet limited. Current studies indicate potential increases in parent-perceived safety, independence and socio-emotional functioning, as well as potential decreases in physiological indicators of stress. Future studies should expand on initial qualitative research by implementing controlled empirical studies with larger sample sizes and blind observers that address both targeted outcomes and practical implementation issues.

Companion animals

The existing literature indicates that interacting with animals can motivate and enhance social interactions for children with autism;

however, the types of therapeutic facilitation and support necessary to elicit these outcomes have not been systematically extrapolated to the home setting. Only one study to date has empirically evaluated the introduction of a companion animal into the home for children with autism. Findings indicated that pet arrival triggered increased prosocial behaviour³⁷. However, despite promising findings in this study, companion animals should not be interpreted as substitutes for AAI or as certified service animals for autism. The effect of companion animals on individuals with autism and their families is therefore a critical area for further investigation.

Future directions

The professional community has acknowledged the potential utility of AAI and service animals for autism, but as this review demonstrates, it is too early to draw decisive conclusions about their efficacy. The primary reason is the scarcity of robust empirical research. An important area for further research will be to attend to potential biases. The positive picture of animals and autism, painted by the media, may influence people's perceptions of therapeutic outcomes. On the one hand, alluring images in the media may lead to positive expectancy biases, particularly among parents who are often desperate for positive treatment outcomes. Alternatively, glorified media representations of AAI may engender unrealistic expectations of animals as a magical cure for autism. For example, families and caregivers with unrealistically high expectations often fail to appreciate the realistic and measurable benefits that are offered from therapeutic interventions with animals³². In order to minimise these biases, future researchers should routinely incorporate blind behavioural ratings where possible.

It is also important to note that although animals may provide a motivating stimulus to enhance social functioning in some children with autism, they may not be universally beneficial in this population due to the varied nature of autism as a spectrum disorder. For example, anecdotal evidence indicates that for some individuals with autism with sensory issues, the smells and sounds of animals are too overwhelming to allow for positive and beneficial interaction³⁸. Future HAI research should focus on the specific characteristics of the human, the animal and the interaction that lead to the most effective outcomes.

Conclusions

Although there is a popular notion of extraordinary outcomes from HAI in autism, surprisingly little research has been conducted. A preliminary body of literature indicates that individuals with autism appear to seek out and benefit from interactions with animals. The largest portion of research on animals and autism has focused on AAI through brief, weekly sessions, which appear to increase social functioning, as demonstrated through increased social awareness²⁴, increased social interaction and decreased social isolation^{23,25,28}, increased social motivation^{27,29} and increased social skills and behaviours²⁶, in children with autism. Additional findings include increased general motivation^{27,29}, increased language and communication^{25,28}, increased focus or decreased inattention^{24,27} and decreased problem behaviours²⁶. The provision of service animals for autism may provide similar benefits, with parent-reported outcomes including increased safety, independence and socio-emotional functioning^{32,33}, and corroborating parent-report and physiological data may indicate decreases in stress³⁴. Increases in prosocial behaviours may also be elicited by companion animals³⁷.

However, despite predominantly positive outcomes, the current literature is limited by small sample sizes, few controls and often non-blind observation and informant reports. It can therefore be interpreted as a promising basis upon which to build a genuinely rigorous program of research into the potential benefits of including animals in autism treatment services.

In summary, reported improvements from AAI have been primarily anecdotal; however, a nascent body of empirical research suggests that there may be positive social functioning outcomes for some children with autism following HAI. Ultimately, although current findings may not fulfil the magical images enthusiastically portrayed in the media, the use of AAI and service animals does appear to provide a potentially efficacious addition to current autism treatment practices and is therefore deserving of further investigation.

Abbreviations list

AAI, animal-assisted intervention; HAI, human-animal interaction.

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References

- Grandin T, Johnson C. Animals in translation: Using the mysteries of autism to decode animal behavior. New York: Scribner; 2005.p.61.
- McNicholas J, Collis GM, editors. Relationships between young people with autism and their pets. 7th International Conference on human-animal interactions: animals, health and quality of Life. 1995 Sep; Geneva, Switzerland.
- Prothmann A, Etrich C, Prothmann S. Preference for, and responsiveness to, people, dogs and objects in children with autism. *Anthrozoos*. 2009 Jun;22(2): 161-71.

- Kršková L, Talarovičová A, Olexová L. Guinea pigs-The "small great" therapist for autistic children, or do Guinea pigs have positive effects on autistic child social behavior? *Soc Anim*. 2010;18(2):139-51.
- Johnson SC. Detecting agents. *Philos Trans R Soc Lond B Biol Sci*. 2003 Mar;358(1431):549-59.
- Esposito L, McCardle P, Maholmes V, McCune S, Griffin JA. Introduction. In: McCardle P, McCune S, Griffin JA, Esposito L, Freund LS, editors. *Animals in our lives: Human-animal interaction in family, community, and therapeutic settings*. Baltimore, MD: Brookes Publishing Co; 2011. p.1-5.
- American Psychiatric Association. *Diagnostic and statistical manual of mental disorders: DSM-IV-TR*. 4th ed. Washington DC: American Psychiatric Press; 2000.p.70.
- Melson GF. Child development and the human-companion animal bond. *Am Behav Sci*. 2003;47(1):31-9.
- Odendaal JSJ, Meintjes RA. Neurophysiological correlates of affiliative behaviour between humans and dogs. *Vet J*. 2003;165(3):296-301.
- Sebastian C, Blakemore SJ, Charman T. Reactions to ostracism in adolescents with autism spectrum conditions. *J Autism Dev Disord*. 2009 Aug;39(8):1122-30.
- Siegel JM. Stressful life events and use of physician services among the elderly: the moderating role of pet ownership. *J Pers Soc Psychol*. 1990 Jun;58(6):1081-6.
- O'Haire ME, McKenzie SJ, Beck AM, Slaughter V. Social behaviors increase in children with autism in the presence of animals compared to toys. *PLoS One*. 2013;8(2):e57010.
- Groden J, Baron MG, Groden G. Assessment and coping strategies. In: Baron GM, Groden J, Groden G, Lipsitt LP, editors. *Stress and coping in autism*. New York: Oxford University Press; 2006.p.15-41.
- Wilson CC. The pet as an anxiolytic intervention. *J Nerv Ment Dis*. 1991 Aug;179(8):482-9.
- Barker SB, Dawson KS. The effects of animal-assisted therapy on anxiety ratings of hospitalized psychiatric patients. *Psychiatr Serv*. 1998 Jun;49(6):797-801.
- O'Haire ME. Animal-assisted intervention for autism spectrum disorder: A systematic literature review. *J Autism Dev Disord*. 2012 Nov.

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17. Kruger KA, Serpell JA. Animal-assisted interventions in mental health: Definitions and theoretical foundations. In: Fine AH, editor. Handbook on animal-assisted therapy: Theoretical foundations and guidelines for practice. 2nd ed. San Diego, CA: Academic Press; 2006.p.21–38.
18. Serpell JA. Animal-assisted interventions in historical perspective. In: Fine AH, editor. Handbook on animal-assisted therapy: Theoretical foundations and guidelines for practice. 2nd ed. San Diego, CA: Academic Press; 2006.p.3–20.
19. Edwards NE, Beck AM. Animal-assisted therapy and nutrition in Alzheimer's disease. West J Nurs Res. 2002 Oct;24(6):697–712.
20. Barak Y, Savorai O, Mavashev S, Beni A. Animal-assisted therapy for elderly schizophrenic patients: a one-year controlled trial. Am J Geriatr Psychiatry. 2001 Fall;9(4):439–42.
21. Katcher AH, Wilkins GG. Animal-assisted therapy in the treatment of disruptive behavior disorder in childhood. In: Lundberg A, editor. The Environment and Mental Health. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.; 1998.p.193–204.
22. O'Haire ME. Companion animals and human health: Benefits, challenges, and the road ahead. J Vet Behav. 2010;5(5):226–34.
23. Redefier LA, Goodman JF. Brief report: pet-facilitated therapy with autistic children. J Autism Dev Disord. 1989 Sep;19(3):461–7.
24. Martin F, Farnum J. Animal-assisted therapy for children with pervasive developmental disorders. West J Nurs Res. 2002 Oct;24(6):657–70.
25. Sams MJ, Fortney EV, Willenbring S. Occupational therapy incorporating animals for children with autism: A pilot investigation. Am J Occup Ther. 2006 May–Jun;60(3):268–74.
26. Silva K, Correia R, Lima M, Magalhães A, de Sousa L. Can dogs prime autistic children for therapy? Evidence from a single case study. J Altern Complement Med. 2011 Jul;17(7):1–5.
27. Bass MM, Duchowny CA, Llabre MM. The effect of therapeutic horseback riding on social functioning in children with autism. J Autism Dev Disord. 2009 Sep;39(9):1261–7.
28. Keino H, Funahashi A, Keino H, Miwa C, Hosokawa M, Hayashi Y, et al. Psycho-educational horseback riding to facilitate communication ability of children with pervasive developmental disorders. J Equine Sci. 2009;20(4):79–88.
29. Taylor RR, Kielhofner G, Smith C, Butler S, Cahill SM, Ciukaj MD, et al. Volitional change in children with autism: A single-case design study of the impact of hippotherapy on motivation. Occup Ther Ment Health. 2009;25:192–200.
30. Lilienfeld SO, Arkowitz H. Can animals aid therapy? Sci Am Mind. 2008 Jan;19(3):78–9.
31. Nathanson DE, de Castro D, Friend H, McMahon M. Effectiveness of short-term dolphin-assisted therapy for children with severe disabilities. Anthrozoos. 1997;10(2):90–100.
32. Burrows KE, Adams CL, Spiers J. Sentinels of safety: service dogs ensure safety and enhance freedom and well-being for families with autistic children. Qual Health Res. 2008 Dec;18(12):1642–9.
33. Solomon O. What a dog can do: children with autism and therapy dogs in social interaction. EHOS J Society Psychol Anthropol. 2010;38(1):143–66.
34. Viau R, Arsenault-Lapierre G, Fecteau S, Champagne N, Walker C-D, Lupien S. Effect of service dogs on salivary cortisol secretion in autistic children. Psychoneuroendocrinology. 2010 Sep;35(8):1187–93.
35. Burrows KE, Adams CL. Challenges of service-dog ownership for families with autistic children: lessons from veterinary practitioners. J Vet Med Educ. 2008 Winter;35(4):559–66.
36. Schoenbaechler D. Autism, schools and service animals: what must and should be done. J L & Educ. 2010;39(3):455–64.
37. Grandgeorge M, Tordjman S, Lazar-tigues A, Lemonnier E, Deleau M, Hausberger M. Does pet arrival trigger prosocial behaviors in individuals with autism? PLoS One. 2012;7(8):e41739.
38. Grandin T, Fine AH, Bowers CM. The use of therapy animals with individuals with autism. In: Fine AH, editor. Handbook on animal-assisted therapy: Theoretical foundations and guidelines for practice. 3rd ed. San Diego, CA: Academic Press; 2010.p.247–64.