
Animal-Assisted Therapy for Fetal Alcohol Spectrum Disorder

Brooke Vincent
Caley Kropp
Andrew M. Byrne

Abstract -- Fetal alcohol spectrum disorder (FASD) occurs as a result of alcohol consumption by a woman during pregnancy. Infants with FASD may have lifelong cognitive, behavioral, physical, or learning disabilities as a result. Animal-assisted therapy (AAT) is a type of goal-oriented therapy for improving social, emotional, cognitive, and physical functioning. The use of animal-assisted therapy has been found effective in the treatment of some disabilities; however there is a paucity of literature addressing this therapy for individuals with FASD. This article provides rehabilitation counselors with an overview of FASD, followed by a review of AAT, and then an application of AAT to developmental disabilities and more specifically to FASD.

Keywords: Fetal alcohol syndrome, fetal alcohol spectrum disorder, animal assisted therapy, developmental disabilities

In the United States, one in eight pregnant women drink alcohol, while one in fifty women binge drink during pregnancy (Centers for Disease Control and Prevention [CDC], 2005a). Alcohol can have negative effects on unborn babies. Fetal alcohol spectrum disorder (FASD) describes the various disabilities that are caused by prenatal exposure to alcohol (Nulman, Ickowicz, Koren, Knittel-Keren, 2007). This exposure can cause behavioral, cognitive, physical, or learning disabilities (Nulman et al., 2007), which have lasting developmental effects. Although there is no cure for fetal alcohol spectrum disorder, treatment options are available to aid in child development. This paper proposes the use of animal-assisted therapy for treatment of fetal alcohol spectrum disorders in children and adolescents in rehabilitation counseling contexts. However, a lack of research exists on this treatment modality in relation to fetal alcohol spectrum disorder. Due to this fact, this article will examine the benefits of animal-assisted therapy with developmental disorders that exhibit common symptoms of fetal alcohol spectrum disorders. This information will then be utilized to suggest the benefits of animal-assisted therapy as a treatment for individuals with fetal alcohol spectrum disorder.

Fetal Alcohol Spectrum Disorder

Prenatal alcohol exposure can have a variety of negative consequences on a developing baby. The term fetal alcohol spectrum disorder (FASD) refers to the range of learning, behavioral, physical, and cognitive impairments that a child can be born with due to prenatal exposure to alcohol (CDC, 2005a; Chudley et al., 2005; Nulman et al., 2007). It can be classified into four categories: fetal alcohol syndrome (FAS), partial fetal alcohol syndrome (partial FAS), alcohol-related birth defects (ARBD), and alcohol-related neurological disorders (ARND; Chudley et al., 2005).

The most severe form of FASD is FAS, which consists of mental and physical birth defects (Nulman et al., 2007). Some common characteristics include problems with hearing, vision, behavior, memory, attention, problem solving, and learning in addition to growth deficits, facial abnormalities, and brain damage (Department of Health and Human Services & Centers for Disease Control and Prevention [CDC], n.d.; Jones & Streissguth, 2010; Nulman et al., 2007). Chudley and colleagues (2005) list diagnostic criteria for FAS to include: at least one form of evidence of growth impairment (weight-to-height ratio in the 10th percentile, a birth weight or length that is less than or equal to the 10th percentile for that gestational age, or height or weight at the 10th percentile or below for the indi-

vidual's age); the concurrent appearance of a thin upper lip, short palpebral fissure (the space between the corner of the eye where the upper and lower eye lids meet), and a smooth philtrum (the area between the nose and upper lip); and three or more central nervous system impairments (academic achievement, cognition, communication, brain structure, abstract reasoning, social skills, executive functioning, or social communication); and maternal alcohol exposure. Due to the physical features present, FAS is probably the most easily diagnosed FASD.

Partial FAS involves some growth impairments and facial anomalies along with cognitive and behavior idiosyncrasies that cannot be attributed to developmental level (Nulman et al., 2007). Partial FAS has a similar diagnosis to FAS, but with fewer symptoms. The diagnosis includes two facial anomalies, three central nervous system impairments, and confirmed alcohol use by the mother during pregnancy (Chudley et al., 2005).

A diagnosis of ARND applies when a child has cognitive and functional impairments, such as abnormalities in the brain structure, smaller head size, and some mental and behavioral oddities (Nulman et al., 2007). Three impairments of the central nervous system are required for this diagnosis, along with confirmation that the person was exposed to alcohol prenatally (Chudley et al., 2005). Since ARND is comprised of cognitive and functional impairments, it is harder to diagnose and may go undiagnosed until the child enters school.

When a child exhibits physical deformities, a diagnosis of ARBD is suggested (Nulman et al., 2007). Some of these defects include malformations of the skeleton, eye, kidney, or ear (Nulman et al., 2007). These diagnostic categories help demonstrate the wide spectrum of variability for this disorder.

Clinicians may misdiagnose FASD due to inexperience (Bertrand et al., 2004; O'Connor et al., 2002). Some signs may not be obvious (Bertrand et al., 2004; Nulman et al., 2007), while some symptoms may be mistaken as other disorders (Bertrand et al., 2004; Nulman et al., 2007). A variety of diagnoses exist with parallel characteristics to FASD, such as phenylketonuria (PKU), fetal solvent syndrome, Williams syndrome, attention-deficit/hyperactivity disorder, and Aarskog-Scott syndrome (Nulman et al., 2007). Individuals with these disorders may exhibit neurodevelopmental and physical characteristics that are similar to those displayed by people with FASD (Nulman et al., 2007). In order to establish the correct diagnosis, it is important for clinicians to establish whether an individual was exposed to alcohol prenatally.

Mental health disorders, behavior problems, and attachment disorders are commonly linked to a FASD diagnosis (O'Connor, Kogan, & Findlay, 2002; O'Connor et al., 2002; Nulman et al., 2007). Some common mental health diagnoses include depression, bipolar disorders, conduct disorder, anxiety disorders, mood disorders, eating disorders, and alcohol/drug dependence (Nulman et al., 2007; O'Connor et al., 2002). O'Connor and colleagues (2002) found that children who were prenatally exposed to alcohol

exhibited insecure attachments. This is essential because attachment styles have been found to predict socio-emotional outcomes. If an individual has been diagnosed with a FASD, it is important to be watchful for symptoms of a psychiatric disorder. On the other hand, if an individual is diagnosed with a psychiatric disorder, it is a good idea to look for a history of prenatal alcohol exposure to ensure that the correct treatment is provided.

Prevalence of Fetal Alcohol Spectrum Disorder

Worldwide, estimates on the prevalence of FASD tend to vary. Vaux and Chambers (2012) report a wide array of prevalence rates due to differing diagnostic understandings as well as varied assessment techniques, citing 1 case per 1000, as well as less than 1 per 10,000. To illustrate prevalence rate variance, Sampson et al. (1997) made a comparison between 1970s rates in Seattle, Washington, US (2.8 per 1000), Cleveland, Ohio, US (4.6 per 1000), and Roubaix, France (between 1.3 and 4.8 per 1000). Other reports within the United States estimate the prevalence of FAS to be between 0.6 to 3 cases per 1,000 people (Nulman et al., 2007; O'Connor, Kogan, & Findlay, 2002; O'Connor et al., 2002). When ARNDs are included in the count, the prevalence increases to 9.1 to 10 per 1,000 people, or nearly 1 in 100 (Nulman et al., 2007; O'Connor, Kogan, & Findlay, 2002). It has been estimated that the prevalence for FASD is four times that of the prevalence of FAS (CDC, 2005b).

Barriers and Challenges of Fetal Alcohol Spectrum Disorder

Because FASD is linked with mental health and developmental disabilities (O'Connor, Kogan, & Findlay, 2002; O'Connor et al., 2002; Nulman et al., 2007), barriers to employment and other psychosocial factors result. Streissguth, Barr, Kogan and Bookstein (1996) found associations between FASD and barriers to school and employment, for instance. Difficulties may include impaired memory and decision making (Institute of Medicine, 1996). The learning, interaction, and mental health issues associated with FASD are typically lifelong (Institute of Medicine) and would thus manifest themselves in school-to-work transition, family, and social relationships.

Conventional Treatments for Fetal Alcohol Spectrum Disorder

The literature is lacking in evidence based practices for the treatment of FASD. To date, prevention seems to be the primary focus in treating this disorder. Prevention methods have focused on reducing the number of women who drink during pregnancy and/or increasing the number of people using birth control while participating in sexual activity and drinking behaviors (Department of Health and Human Services, The Arc, & Centers for Disease Control and Prevention, nd.; Idrus & Thomas, 2011; Nulman et al.,

2007). Women may drink alcohol before they realize that they are pregnant, so education encouraging protected sex while drinking may help reduce the number of children who are exposed to alcohol prenatally (Department of Health and Human Services et al., nd.; Floyd & Sidhu, 2004). Education for the client, family, schools, health professionals, and community is an important form of prevention (Chudley et al., 2005; Nulman et al., 2007); however, education alone has been shown to be insufficient in creating meaningful and lasting behavior changes (Olson, Oti, Gelo, & Beck, 2009) making the case for direct treatment options.

Direct treatment recommendations include starting treatment early to prevent secondary disorders from developing (Chudley et al., 2005; Nulman et al., 2007; Streissguth et al., 2004), using a multidisciplinary treatment team (Nulman et al., 2007), encouraging parental involvement (Kodituwakku & Kodituwakku, 2011), living in a stable home environment (O'Connor, Kogan, & Findlay, 2002; Streissguth et al., 2004), and connecting with community resources (Nulman et al., 2007). Idrus and Thomas (2011) recommend enriching the environment in which the child is living in order to help increase brain plasticity. This can be accomplished through motor, social, and sensory stimulation (Idrus & Thomas). Furthermore, some studies have found that nutrition supplements can be utilized to help counteract any possible additional defects from malnutrition caused by alcohol use (Idrus & Thomas). More research is needed on effective treatments for children and adults with FASD. Therapies aimed at minimizing developmental deficiencies, such as AAT, would be beneficial to members of this group at any age.

Animal-Assisted Therapy

Research has shown that human interactions with animals can increase quality of life, reduce depression, and increase socialization (Hart, 2006). Animals can also help to relax and calm people and reduce pain (Hart, 2006; Stoffel & Braun, 2006). Furthermore, animal interactions have been linked to an increase in social interaction, especially when the animals can serve as icebreakers (Martin & Farnum, 2002). Some people, especially those with physical disabilities or disfigurements, find it easier to connect and socialize with animals than with family members or peers because of the animal's non-judgmental nature (Friesen, 2010). These health and socialization benefits imply that it may be worthwhile to incorporate animals into treatment.

Animal-assisted therapy (AAT) is a type of goal-oriented therapy that aims to improve social, emotional, cognitive, and physical functioning (Benda, McGibbon, & Grant, 2003; Delta Society, 2008; Johnson, 2011; Kaplan & Ludwig-Beymer, 2004; Stoffel & Braun, 2006). This therapy is provided by a health or human services professional (Fine, 2006) and treatment progress is measureable (Chandler, 2012). The animal is thought to enhance treatment by providing motivation (Delta Society, 2008) and enhancing quality of life outcomes (Chandler,

2012). A variety of animals can be utilized for AAT such as dogs, cats, horses, dolphins, guinea pigs, fish, and birds (Rothe, Vega, Torres, Soler, & Pazos, 2005; Stoffel & Braun, 2006). The best type of animal to use in treatment will depend on the individual's disorder, what is available, and ultimately the preference of the individual receiving the therapy. This therapy can be utilized with a variety of age and disability populations. Petting a dog or cat to improve muscle strength and fine motor skills is a simple example of AAT (Nimer & Lundahl, 2007). In this example, the animal serves as a motivation for what may typically be an arduous aspect of therapy.

The use of animals in therapeutic settings has a rich history, dating back to 1792 when animals were used for emotional therapeutic support at the York Retreat in England (Parshall, 2003). Florence Nightingale reportedly documented discoveries yielded through the therapeutic use of animals in the 1800s as well (Matuszek, 2010). Animal-assisted therapy (AAT) and animal-assisted activities (AAA) are two distinct terms for the therapeutic use of animals. For example, AAAs are not individual-goal-oriented, as they are not designed to fit a specific individual's needs; instead they typically involve animals visiting numerous people at the same time (Delta Society, 2008; Hart, 2006). While AAT visits are usually scheduled, AAAs can be spontaneous since a treatment plan is not necessary (Delta Society, 2008). Providing education, motivation, recreation opportunities, and enhancing the quality of life of individuals are some common goals of AAAs (Delta Society, 2008). Both AAT and AAAs have benefits for treatment; however this article is focused more on the use of AAT.

Extensive positive outcomes for AAT are available from the literature. Animals can help normalize the experience of living with a disability, serve as motivation during treatment, and increase socialization (Benda et al., 2003; Friesen, 2010; Hart, 2006; Macauley & Gutierrez, 2004). They can also distract an individual from his or her illness (Kaplan & Ludwig-Beymer, 2004). Hippotherapy, or equine-assisted therapy, the use of horses in AAT, not only improves muscle strength in people with physical disabilities, but also provides different visual views, something that children often learn from playing (Benda et al., 2003). Horses have been used to foster culturally relevant treatments as well. In a research study conducted to measure the use of horses as a component for substance abuse treatment for First Nations and Inuit adolescents, Dell and colleagues (2011) wove AAT into a culturally relevant aboriginal milieu. Their findings included benefits in the areas of spiritual connection, communication, and psychoeducation. Research has shown that AAT lowers blood pressure and improves cardiopulmonary pressure in individuals with heart failure (Cole, Gawlinski, Steers, & Kotlerman, 2007; Kaplan & Ludwig-Beymer, 2004). This treatment is linked to a reduction in discomfort for individuals with chronic pain (Marcus et al., 2012). Diminished feelings of anxiety and increased feelings of well-being in family members of the people receiving treatment for chronic pain has also been linked to the use of AAT (Marcus et al., 2012). When

an individual participates in AAT after surgery, the amount of pain medication needed is reduced (Kaplan & Ludwig-Beymer, 2004). A study by Baumgartner, Burnett, DiCarlo and Buchanan (2012) found pets listed among the most prominent members of children's support systems.

AAT enjoys a global following. In 2003, the First International Symposium on the Human Animal Bond was held in South Korea (Chandler, 2012). Chandler notes that in Thailand, preliminary findings have shown behavioral and emotional improvement among four boys with autism after just three weeks of elephant therapy, which held the individuals' attention longer than smaller animals. He also documents elephant therapy in South Africa for goal-directed concentration and self-discipline outcomes as well as self-esteem and belonging. Prominent AAT organizations using dogs and cats are also found in India and Jerusalem (Chandler, 2012), as well as dolphins in Brazil (Fine, 2006). These general health, psychological, and physiological benefits of interacting with animals suggest that it may be valuable to incorporate animals into rehabilitation counseling practices.

Animal-Assisted Therapy and People with Developmental Disabilities

Throughout the years, AAT has been utilized to treat a variety of developmental disabilities. Although it is not universally known as an evidence-based practice, the benefits of this therapy have been reported in the literature. Evidence-based practice is the utilization of a treatment with the best supporting evidence along with the clinician's knowledge of the patient (APA Presidential Task Force on Evidence-Based Practice, 2006; McKibbin, 1998). AAT does not qualify as an evidence-based practice because research is scarce and lacks solid methodology. Hart (2006) found that AAT calmed individuals with conduct disorders, attention deficit hyperactivity disorder, and autism (Hameury et al., 2010). It also helped individuals with pervasive developmental disabilities focus more on their environments than on their own private thoughts (Katcher & Teumer, 2006; Martin & Farnum, 2002). Martin and Farnum (2002) found that AAT facilitated more focus and awareness of social interactions in children with pervasive developmental disorders and reduced anxiety among people with epilepsy (Hameury et al., 2010; Hart, 2006). Additionally, it has been linked to a reduction in negative arousal and an increase in positive attitudes (Katcher & Teumer, 2006; Rothe et al., 2005; Stoffel & Braun, 2006). Furthermore, AAT provided physical benefits. Children with spastic cerebral palsy who participated in AAT horseback riding were found to have more muscle symmetry, in that overactive muscles reduced activity, while underactive muscles activity increased (Benda et al., 2003). Macauley and Gutierrez (2004) found that hippotherapy helped individuals with language-learning disabilities improve their skills. An additional benefit is an increase in autonomy for individuals with intellectual disabilities (Borioni et al., 2011). Research has shown that AAT can be an effective treatment tool for

people with developmental disabilities (Benda et al., 2003; Hameury, 2010; Hart, 2006; Macauley and Gutierrez, 2004; McKibbin, 1998).

Animal-Assisted Therapy for People with Fetal Alcohol Spectrum Disorder

Although little, if any, research has been conducted on the value of AAT in treating individuals with FASD, the success of this therapy with other disability populations indicates that this treatment may be useful for the FASD population, which exhibit similar symptoms. Some areas specific to FASD symptomology to which AAT may be applied as part of a rehabilitation counseling intervention, are highlighted below.

Executive Function. Rasmussen (2005) indicated that individuals with FASD often exhibit deficits in executive functioning. Some of these deficits include issues with planning, cognitive flexibility, and inhibition (Green et al., 2009; Kodituwakku, 2009; Rasmussen, 2005). Hart (2006) and Nulman and colleagues (2007) found that AAT can promote better executive functioning. These two studies found that AAT can have a calming effect on individuals with conduct disorders and attention deficit hyperactivity disorder (Hart, 2006; Nulman et al., 2007). These disorders share similar characteristics and are commonly comorbid with FASD, suggesting that AAT may have similar calming effects with this population. Additional research found that AAT can help individuals focus on what is going on around them; this finding could help individuals with FASD fill in the gap of the learning deficiencies that are often associated with these disorders (Katcher & Teumer, 2006; Martin & Farnum, 2002).

Socialization and Anxiety. Individuals with FASDs often experience increased anxiety and trouble socializing. Thus, the finding that AAT can increase socialization is important for people with FASD, who may experience socialization weaknesses (Breitenbach, Stumpf, Fersen, & Ebert, 2009; Friesen, 2010; Granados & Agís, 2011; Prothmann, Bienert, & Ettrich, 2006). Furthermore, increases in autonomy of people with intellectual disabilities, as a result of AAT, suggest that this treatment modality may be useful for increasing autonomy and assertiveness in people with FASD (Borioni et al., 2011), creating an opportunity for them to be more social. AAT has been linked to a reduction in anxiety in people with epilepsy (Hart, 2006). This connection can be applied to the common seizure activity in people with FASD, and the related anxiety (Nulman et al., 2007). Animals can reduce the anxiety many individuals feel about social interactions and increase the general communication and interaction skills that lead to socialization (Breitenbach et al., 2009; Friesen, 2010). Moreover, feelings of unconditional positive regard experienced by the client when interacting with a therapeutic animal may build confidence and increase pro-social risk-taking in everyday life (Friesen, 2010). Overall, AAT should reduce anxiety and increase socialization in people with FASD.

Although there is not specific research validating AAT as an effective treatment for FASD, the efficacy of this treatment with comorbid disorders and disorders with similar characteristics supports the idea that AAT may be a valuable treatment option for people with fetal alcohol spectrum disorder. For example, a hypothetical client: Fatima, a female aged 17 attends an alternative school program and has an individual education plan (IEP) which provides support for an intellectual disability. Fetal alcohol syndrome is included among her diagnostic features and she demonstrates difficulty in the areas of focus and interpersonal behavior, including social anxiety. Specifically, Fatima's teaching staff report that she demonstrates restlessness and vocalizes her frustration with sitting still during class. She refuses to focus on her work, and reacts with anger when she is asked to return to her seat. Additionally, she has trouble interacting appropriately with peers. Her IEP team, including a special education teacher, a parent, a physical education teacher, and her vocational rehabilitation counselor, convenes to review progress. The VR counselor's role on the IEP team is to provide transitional services to support Fatima's needs as she moves from school to work. Among the possibilities for Fatima's transition are supported employment and work adjustment training, such as postsecondary vocational training or other job coaching. Fatima's rehabilitation counselor notes that attention and anxiety seem to pose barriers to current education, and introducing a new job coach or workplace to Fatima's environment could backfire if she is not accustomed to focusing on a task for substantial periods of time. She wonders if one of the area animal assisted therapists would be helpful, and the IEP team identifies a funding source. Fatima's IEP is amended to reflect an hour of exposure to a therapy dog in the classroom, two days per week. Fatima practices reading to the dog, and even gives a brief speech about her hobbies, while stroking the dog. After Fatima becomes comfortable giving a speech to her therapy dog, she starts introducing the dog to peers in the classroom to help ease social anxiety. Since her attention span seems to be longer, other possibilities are considered for the future, when comparable benefits may provide for a therapy dog to accompany Fatima to situational work sample assessments in order to measure whether she can focus for longer periods of time after gently petting and talking with the dog. Her classroom team observes to see if Fatima's attention and reduced anxiety are better after the dog has left, as well. The team concludes that AAT has had a positive influence on Fatima's focus, classroom behavior, anxiety, and peer interactions. The multifaceted, ecological perspective of rehabilitation counseling offers unique opportunities for applying AAT in working with clients with FASD. By utilizing AAT with people with FASDs, a counselor can reduce the numbers of barriers this population experiences, including those associated with education and employment.

Incorporating AAT Practices

It is potentially beneficial for clinicians and agencies to establish ways for AAT to be funded through alter-

native funding sources. A wider range of treatment options and increased scope of practice can be offered by RCs who become certified animal-assisted therapists. Practitioners looking for an accessible, initial foray into the use of animals for therapeutic enhancement may want to consider AAAs first, and then build intentional goals into individual plans for AAT. For practitioners within the United States, both the American Psychological Association (APA) and the American Counseling Association (ACA) have approved subdivisions on AAT (Chandler, 2012). The Delta Society (2012) has over 10,000 current animal and handler teams throughout Canada, Italy, Japan, Korea, Mexico, Norway, and the United States. Therapy Dogs International (TDI, 2012) is the oldest and largest therapy dog organization, with 24,000 registered handler teams in Canada and the United States.

For RCs looking to incorporate a therapy animal into practice, the literature notes several characteristics allowing them to succeed in their work environments. The animals must be regarded as being loving, meaning that they are accepting of different types of people, willing to meet new people, and are able to appropriately greet strangers on a regular basis. Having a mild, easy-going temperament is a requisite characteristic for a therapy animal to have, which makes services significantly easier and much more enjoyable for the client (Fine, 2006). Typically in the U.S., therapy animals must be at least one year of age and they must have also been through obedience training (Fine). The Delta Society trains and screens volunteers and their pets for visiting animals programs in hospital settings, nursing homes, rehabilitation centers, and other suitable facilities (Delta Society, 2012). Parshall (2003) notes that matching an animal with a client involves careful consideration for client fears, allergies, cultural differences, liabilities, and a high regard for considering the animal's ethical treatment as well. Parshall also warns that AAT is considered a supplemental treatment option, not a replacement for other treatments.

Implications for Rehabilitation Counselors

As members of interdisciplinary teams in schools, state vocational rehabilitation agencies, hospitals, community mental health, and employment related settings; RCs will encounter clients with FASD. They are likely to work with youth from families in regions and cultures where high rates of alcohol consumption are common among pregnant women, due to lack of awareness or alcohol dependence. In order to provide the most holistic and effective treatments, RCs who work with at-risk children and youth need to be familiar with the diagnosis specifications of FASD and also the common comorbid disorders (O'Connor et al., 2002) as a component of rehabilitation counselor education in both assessment and treatment planning. Additionally, RCs should be aware of the various community resources for children with FASD, which include AAT providers. Finally, since there is a paucity in the literature on evidence-based practices to treat individuals with FASD using AAT, researchers should seek out and establish information

on therapies that have demonstrated beneficial results and alternative therapies, such as AAT, and develop protocols rigorous enough to bring these practices into the mainstream. RCs are in a unique position to incorporate a wide variety of services into treatment as the point person in planning school-to-work transition, mental health treatment, or disability adjustment services among multiple providers and psychosocial settings.

At this time, specific training is not required to utilize AAT in practice. However, RCs can acquire information about the use of this therapy through books, articles, online sources, and conferences. The designation of Certified Animal Assisted Therapy Professional (CAATP) can be achieved by completing a designated program on this topic; however, these programs are not accredited since accreditation does not currently exist. No matter how RCs obtain information about incorporating AAT into their practice, it is important that they do research to assure that they are correctly and effectively integrating this treatment.

Conclusion

Fetal alcohol spectrum disorder is a term used to explain the variety of disabilities caused by prenatal alcohol exposure. Four diagnoses exist under this umbrella term: fetal alcohol syndrome, partial fetal alcohol syndrome, alcohol-related birth defects, and alcohol-related neurological disorders. Animal-assisted therapy is a goal-oriented therapy that is provided by a human services professional using an animal. The goal of this therapy is to enhance social, emotional, cognitive, and physical functioning through the use of an animal. Many beneficial outcomes have been associated with the use of AAT with individuals with various developmental disabilities. The effectiveness of AAT in treating symptoms and comorbid diagnoses of FASD provides a basis for the efficacy of this treatment with this population. Despite a lack of evidence-based treatments for FASD, AAT may be a foundational option for enriching developmental lifespan outcomes for this population and many others. Rehabilitation counselors are in a unique position to incorporate the use of AAT into practice and to develop much needed further research into treatment for FASD.

References

APA Presidential Task Force on Evidence-Based Practice. (2006). Evidence-based practice in psychology. *American Psychologist*, 61(4), 271-285. doi:10.1037/0003-066X.61.4.271

Barford, S. W. & Whelton, W. J. (2010). Understanding burnout in child and youth care workers. *Child & Youth Care Forum*, doi: 10.1007/s10566-010-9104-8

Baumgartner, J., Burnet, L., DiCarlo, C. F., & Buchanan, T. (2012). An inquiry of children's social support networks using eco-maps. *Child & Youth Care Forum*, 41(4) 357-369. doi: 10.1007/s10566-011-9166-2

Benda, W., McGibbon, N., & Grant, K. (2003). Improvements in muscle symmetry in children with cerebral palsy after equine-assisted therapy (hippotherapy). *Journal of Alternative & Complementary Medicine*, 9(6), 817-825.

Bertrand J., Floyd, R. L., Weber, M. K., O'Connor, M., Riley, E. P., Johnson, K. A., Cohen, D. E., National Task Force on FAS/FAE. (2004). *Fetal alcohol syndrome: Guidelines for referral and diagnosis*. Atlanta, GA: Centers for Disease Control and Prevention

Borioni, N., Marinaro, P., Celestini, S., Del Sole, F., Magro, R., ... Bonassi, S. (2011) Effect of equestrian therapy and onotherapy in physical and psycho-social performances of adults with intellectual disability: A preliminary study of evaluation tools based on the ICF classification. *Disability and Rehabilitation*, 1-9. doi: 10.3109/09638288.2011.605919

Breitenbach, E., Stumpf, E., Fersen, L. V., & Ebert, H. (2009). Dolphin-assisted therapy: Changes in interaction and communication between children with severe disabilities and their caregivers. *Anthrozoös*, 22(3), 277-289. doi:10.2752/175303709X457612

Centers for Disease Control and Prevention. (2005a). *Alcohol use and pregnancy* [Fact Sheet]. Retrieved from <http://www.cdc.gov/ncbddd/fasd/freematerials.html>

Centers for Disease Control and Prevention. (2005b). *Fetal alcohol spectrum disorders* [Fact Sheet]. Retrieved from <http://www.cdc.gov/ncbddd/fasd/freematerials.html>

Chandler, C. (2012). *Animal assisted therapy in counseling* (2nd. Ed.). New York, N.Y.: Routledge, Taylor & Francis Group.

Chudley, A. E., Conry, J., Cook, J. L., Looock, C., Rosales, T., & LeBlanc, N. (2005). Fetal alcohol spectrum disorder: Canadian guidelines for diagnosis. *Canadian Medical Association Journal*, 172(Suppl), S1-S21. doi:10.1503/cmaj.104030 Retrieved from http://www.cmaj.ca/content/172/5_suppl/S1.full

Cole, K. M., Gawlinski, A., Steers, N., & Kotlerman, J. (2007). Animal-assisted therapy in patients hospitalized with heart failure. *American Journal of Critical Care*, 16(6), 575-585

Dell, C. A., Chalmers, D., Bresette, N., Swain, S., Rankin, D., & Hopkins, C. (2011). A healing space: The experiences of first nations and Inuit youth with equine-assisted learning (EAL). *Child & Youth Care Forum*, 40(4), 319-336. Doi: 10.1007/s10566-011-9140-z

Delta Society. (2012). Pet Partners-Delta Society. Retrieved from <http://www.deltasociety.org>

Delta Society. (2008). What are animal-assisted activities/therapy? Retrieved from <http://www.deltasociety.org/Document.Doc?id=10>

Department of Health and Human Services & Centers for Disease Control and Prevention. (n.d.) *I never thought I'd get pregnant...let alone have a baby with fetal alcohol syndrome* [Brochure]. Retrieved from <http://www.cdc.gov/ncbddd/fasd/freematerials.html>

Department of Health and Human Services, The Arc, Centers for Disease Control and Prevention. (n.d.). *Think before you drink* [Brochure]. Silver Spring, MD: Authors

Fine, A. (Ed.). (2006). *Handbook on animal-assisted therapy: Theoretical foundations and guidelines for practice* (2nd Ed). San Diego, CA US: Academic Press.

Floyd, R. L., & Sidhu, J. S. (2004). Monitoring prenatal alcohol exposure. *American Journal of Medical Genetics. Part C, Seminars in Medical Genetics*, 127C, 3-9.

Friesen, L. (2010). Exploring animal-assisted programs with children in school and therapeutic contexts. *Early Childhood Education Journal*, 37(4), 261-267. doi:10.1007/s10643-009-0349-5

Granados, A., & Agis, I. (2011). Why children with special needs feel better with hippotherapy sessions: A conceptual review. *The Journal of Alternative And Complementary Medicine*, 17(3), 191-197. doi:10.1089/acm.2009.0229

Green, C. R., Mihic, A. M., Nikkel, S. M., Stade, B. C., Rasmussen, C., Munoz, D. P., & Reynolds, J. N. (2009). Executive function deficits in children with fetal alcohol spectrum disorders (FASD) measured using the Cambridge Neuropsychological Tests Automated Battery (CANTAB). *The Journal of Child Psychology and Psychiatry*, 50(6), 688-697. doi: 10.1111/j.1469-7610.2008.01990.x

Hameury, L. L., Delavous, P. P., Teste, B. B., Leroy, C. C., Gaboriau, J. C., & Berthier, A. A. (2010). Équithérapie et autisme. *Annales*

- Médico-Psychologiques*, 168(9), 655-659. doi:10.1016/j.amp.2009.12.019
- Hart, L. A. (2006). Community context and psychosocial benefits of animal companionship. In A. H. Fine (Ed.), *The handbook on animal-assisted therapy* (2nd ed, pp.73-94). San Diego, CA: Academic Press.
- Institute of Medicine. (1996). *Fetal alcohol syndrome: Diagnosis, epidemiology, prevention, and treatment*. Washington, D.C.: National Academy Press.
- Idrus, N. M., & Thomas, J. D. (2011). Fetal alcohol spectrum disorders: Experimental treatments and strategies for intervention. *Alcohol Research & Health*, 34(1), 76-85.
- Johnson, R. A. (2011). Animal-assisted interventions in health care contexts. In P. McCardle, S. McCune, J. A. Griffin, & V. Maholmes (Eds.), *How animals affect us: Examining the influence of human-animal interaction on child development and human health* (pp. 183-192). Washington, D.C.: American Psychological Association.
- Jones, K., & Streissguth, A. P. (2010). Fetal alcohol syndrome and fetal alcohol spectrum disorders: A brief history. *Journal Of Psychiatry & Law*, 38(4), 373-382.
- Kaplan, P., & Ludwig-Beymer, P. (2004). The impact of animal assisted therapy (AAT) on the use of pain medications after a surgical procedure in an acute care hospital. Retrieved from <http://www.paws4therapy.com/theresearch.html>
- Katcher, A. & Teumer, S. (2006). A 4-year trial of animal-assisted therapy with public school special education students. In A. H. Fine (Ed.), *The handbook on animal-assisted therapy* (2nd ed, pp.227-242). San Diego, CA: Academic Press.
- Kodituwakku, P. W. (2009). Neurocognitive profile in children with fetal alcohol spectrum disorders. *Developmental Disabilities Research Reviews*, 15(3), 218-224. doi: 10.1002/ddr.73
- Kodituwakku, P. W., & Kodituwakku, E. (2011). From research to practice: An integrative framework for the development of interventions for children with fetal alcohol spectrum disorders. *Neuropsychology Review*, 21(2), 204-223. doi:10.1007/s11065-011-9170-1
- Macauley, B. L., & Gutierrez, K. M. (2004). The Effectiveness of Hippotherapy for Children with Language-Learning Disabilities. *Communication Disorders Quarterly*, 25(4), 205-217. doi:10.1177/15257401040250040501
- Marcus, D. A., Bernstein, C. D., Constantin, J. M., Kunkel, F. A., Breuer, P., & Hanlon, R. B. (2012). Animal-assisted therapy at an outpatient pain management clinic. *Pain Medicine*, 13(1), 45-57. doi:10.1111/j.1526-4637.2011.01294.x
- Martin, F., & Farnum, J. (2002). Animal-assisted therapy for children with pervasive developmental disorders. *Western Journal Of Nursing Research*, 24(6), 657-670. doi:10.1177/019394502320555403
- Matuszek, S. (2010). *Animal-facilitated therapy in various patient populations: Systematic Literature Review. Holistic Nursing Practice*, 187-203.
- McKibbin, K. A. (1998). Evidence-based practice. *Bulletin of the Medical Library Association*, 86(3), 396-401.
- Nimer, J., & Lundahl, B. (2007). Animal-assisted therapy: A meta-analysis. *Anthrozoös*, 20(3), 225-238. doi:10.2752/089279307X224773
- Nulman, I., Ickowicz, A., Koren, G., & Knittel-Keren, D. (2007). Fetal alcohol spectrum disorder. In I. Brown & M. Percy (Eds.), *A comprehensive guide to intellectual and developmental disabilities* (pp. 213-227). Baltimore, MD: Paul H. Brookes Publishing Co.
- O'Connor, M. J., Kogan, N., & Findlay, R. (2002). Prenatal alcohol exposure and attachment behavior in children. *Alcoholism: Clinical and Experimental Research*, 26(10), 1592-1602. doi:10.1111/j.1530-0277.2002.tb02460.x
- O'Connor, M. J., Shah, B., Whaley, S., Cronin, P., Gunderson, B., & Graham, J. (2002). Psychiatric illness in a clinical sample of children with prenatal alcohol exposure. *The American Journal of Drug And Alcohol Abuse*, 28(4), 743-754. doi:10.1081/ADA-120015880
- Olson, H.C., Oti, R., Gelo, J. & Beck, S. (2009). Family matters: Fetal alcohol spectrum disorders and the family. *Developmental Disabilities Research Reviews*, 15(3), 235-249.
- Parshall, D. (2003). Research and reflection: Animal-assisted therapy in mental health settings. *Counseling And Values*, 48, 47-56.
- Prothmann, A., Bienert, M., & Ettrich, C. (2006). Dogs in child psychotherapy: Effects on state of mind. *Anthrozoös*, 19(3), 265-277. doi:10.2752/089279306785415583
- Rasmussen, C. (2005). Executive Functioning and Working Memory in Fetal Alcohol Spectrum Disorder. *Alcoholism: Clinical and Experimental Research*, 29(8), 1359-1367. doi: 10.1097/01.alc.0000175040.91007.d0
- Rothe, E., Vega, B., Torres, R., Soler, S., & Pazos, R. (2005). From kids and horses: Equine facilitated psychotherapy for children. *International Journal of Clinical And Health Psychology*, 5(2), 373-383.
- Sampson, P. D., Streissguth, A. P., Bookstein, F. L., Little, R. E., Clarren, S. K., Dehaene, P., ... Graham, J. M. Jr. (1997). Incidence of fetal alcohol syndrome and prevalence of alcohol-related neurodevelopmental disorder. *Teratology*, 56(5), 317-326.
- Stoffel, J. & Braun, C. (2006). Animal-assisted therapy: An analysis of patient testimonials. *Journal of Undergraduate Nursing Scholarship*, 8(1).
- Streissguth, A.P., Barr, H.M., Kogan, J. & Bookstein, F. L. (1996) Understanding the occurrence of secondary disabilities in clients with Fetal Alcohol Syndrome (FAS) and Fetal Alcohol Effects (FAE). Final Report to the Centers for Disease Control and Prevention (CDC), August. Seattle: University of Washington, Fetal Alcohol & Drug Unit, Tech. Rep. No. 96-06.
- Streissguth, A. P., Bookstein, F. L., Barr, H. M., Sampson, P. D., O'Malley, K., & Young, J. (2004). Risk Factors for Adverse Life Outcomes in Fetal Alcohol Syndrome and Fetal Alcohol Effects. *Journal of Developmental And Behavioral Pediatrics*, 25(4), 228-238. doi:10.1097/00004703-200408000-00002
- Therapy Dogs International. (2012). Retrieved from <http://www.tdi-dog.org>
- Vaux, K. K., & Chambers, C. (2012) Fetal alcohol syndrome. Medscape. Retrieved from: <http://emedicine.medscape.com/article/974016>
- Brooke Vincent, MS, CRC** is a Vocational Rehabilitation Specialist at Oklahoma Department of Rehabilitation Services in Tulsa.
- Caley Kropp, MS, CRC** is a Project Manager at Carolina Institute for Developmental Disabilities, University of North Carolina at Chapel Hill.
- Andrew M. Byrne, PhD, CRC** is an Assistant Professor at the Department of Counseling and Higher Education, Ohio University in Athens.

Copyright of Journal of Applied Rehabilitation Counseling is the property of National Rehabilitation Counseling Association and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.