# *The Use of Animal-Assisted Interventions in Social Services: A literature Synthesis*

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ABSTRACT

The field of Animal---Assisted Interventions (AAI's) is emerging and developing steadily, however the available literature which addresses this field is limited. This literature synthesis includes 27 articles from this limited pool and addresses what AAI programs exist, how they are being studied, and what the results of these studies are. This synthesis identifies characteristics of current AAI programs, and the methods being used to assess them, and groups findings from all 27 articles thematically. Findings suggest that AAI's help participants in developing life skills, improve their desire to attend and participate in the intervention, support feelings of non---judgement and the generation of trust within the therapeutic relationship, help to alleviate a variety of symptoms, and are typically cost efficient. Findings also indicate the potential for AAI's to improve participants levels of sociability and self---esteem but these findings are not consistent across studies. Finally, a number of questions and areas for further research are identified, which will support continued development, and improve effectiveness of these interventions.

**Keywords:** Animal-assisted interventions, social services, human-animal bond, alternative interventions.

The following is a literature synthesis which discusses the topic of Animal---Assisted Interventions (AAI's) in social services. Following a comprehensive scan of the literature, with the inclusion and exclusion criteria noted below, 27 articles were chosen. As AAI's are an emerging field, the available literature on this topic is limited, and the studies currently available typically assess the effectiveness of a single AAI program or organization. Therefore, this literature synthesis fills a gap in the literature by comparing these existing studies and addressing the questions; with which populations are AAI's being used? What

AAI formats are being implemented? What core methods are being utilized for the assessment of AAI effectiveness? And, what core themes exist in the findings across AAI studies? This report will address the characteristics of AAI studies and the programs they are assessing, followed by a discussion of the themes in findings, limitations in the current studies, and implications for further research.

## Literature Search Methods and Criteria

A literature search was conducted using the databases ProQuest, EBSCOhost, Web of Science, Ovid, and an internet search. The following keywords were used to search the databases; “Animal Assisted Therapy”, “Animal Assisted Interventions”, “Animal Therapy”, “Canine Assisted”, “Equine therapy”, and “Hippotherapy”. Results were limited to peer reviewed scholarly journals and articles published in English between the dates of January 2005 and May 2015. The titles and abstracts of the results were screened to identify which articles were studies of Animal Assisted Intervention (AAI) programs in social services. Many of the study results were related to the veterinary sciences and treatment of ailments in animals, and where therefore excluded. Additionally, some literature focused on animal---human bond unrelated to a structured intervention, and these results were also excluded. A total of twenty---seven articles were selected for this synthesis.

## Summary of Literature Characteristics

*Country of Origin*

Eleven of the studies were conducted in the United States (Ajzenman, & et al., 2013; Barker, & et al., 2015; Engelman, 2013; Ewing, & et al., 2007; Jasperson, 2013; Kern, et al., 2011; Lanning, & Krenek, 2013; Macauley, 2006; Marcus, et al., 2012; Nurenberg, et al., 2015; Wesley, & et al., 2009), four were from Italy (De Rose, & et al., 2011; Menna, et al., 2012; Mossello, & et al., 2011; Stefanini, et al., 2015), three from Norway (Berget, & et al., 2011; Pedersen, et al., 2012; Pedersen, et al., 2011), two from Australia (Kemp, & et al.,

2014; O'Haire, et al., 2013), and two from Canada (Dell, & et al., 2011; Pollack, 2009). There was one article from each Croatia (Vrbanac, et al., 2013), Spain (Balluerka, & et al., 2014), Taiwan (Chu, & et al., 2009), the UK (Holmes, & et al., 2012), and Israel (Nathans---Barel, & et al., 2005).

*Population*

Eleven of the articles focused on various populations of children. Of these articles the studies focused on autism (Ajzenman, & et al., 2013; Kern, et al., 2011; O'Haire, et al., 2013), mental health concerns (Dell, & et al., 2011; Ewing, & et al., 2007; Holmes, & et al., 2012; Stefanini, et al., 2015), hospitalized children (Barker, & et al., 2015), sexually abused children (Kemp, & et al., 2014), children in neuropsychiatric rehabilitation (De Rose, & et al., 2011), and youth in residential care (Balluerka, & et al., 2014).

The articles focused on health included Alzheimer's and Dementia (Menna, et al., 2012; Mossello, & et al., 2011), aphasia from left---hemisphere strokes (Macauley, 2006), palliative care (Engelman, 2013), and outpatient pain management (Marcus, et al., 2012). Nine articles addressed mental health concerns, including schizophrenia (Chu, & et al., 2009; Nathans---Barel, & et al., 2005; Nurenberg, et al., 2015), anxiety and depression (Berget, & et al., 2011; Pedersen, et al., 2012; Pedersen, et al., 2011), substance abuse (Pollack, 2009; Wesley, & et al., 2009), and quality of life and depression in veterans (Lanning, & Krenek, 2013). Two articles focused on female inmates (Jasperson, 2013) and geriatric nursing home residents (Vrbanac, et al., 2013).

*Intervention Format*

The intervention formats of the studies analyzed vary in a number of ways including; length of intervention, duration of each session, frequency, and the treatment type. The studies that occurred over a number of sessions ranged from three weeks (Wesley, & et al., 2009) to approximately six months (De Rose, & et al., 2011; Kern, et al., 2011; Vrbanac, et

al., 2013). Based on the studies which included more than one session of the intervention, the average length was 12.9 weeks, with twelve weeks being the most common length (Ajzenman, & et al., 2013; Balluerka, & et al., 2014; Berget, & et al., 2011; Macauley, 2006; Pedersen, et al., 2012; Pedersen, et al., 2011). Three of the studies were based on one---time interactions between the participant and the intervention method and therefore where not included in the calculation of the mean and mode for length of intervention (Barker, & et al., 2015; Engelman, 2013; Marcus, et al., 2012). Three of the studies did not clearly specify the length of the intervention, and therefore where excluded from the calculation of mean and mode (Holmes, & et al., 2012; Menna, et al., 2012; Pollack, 2009).

Of the 27 articles, only two did not specify the duration of each session (Engelman, 2013; Pedersen, et al., 2012). The study which focused on youth in residential care was unique from other studies as it included an overnight component where the participants would stay overnight at the farm where the intervention was taking place (Balluerka, & et al., 2014). The other 25 studies included interventions with individual sessions ranging from one minute to three hours. Five of these studies (Kemp, & et al., 2014; Lanning, & Krenek, 2013; Marcus, et al., 2012; Nurenberg, et al., 2015; Pedersen, et al., 2011) indicated that each session could vary in length, fluctuating by as much as an hour difference (Lanning, & Krenek, 2013; Pedersen, et al., 2011). The additional 19 studies all specify set durations for each animal---assisted intervention ranging from 10 minutes to three hours, with a mean of seventy---five minutes and a mode of 60 minutes (Ajzenman, & et al., 2013; Barker, & et al., 2015; Berget, & et al., 2011; Chu, & et al., 2009; Dell, & et al., 2011; De Rose, & et al., 2011; Ewing, & et al., 2007; Holmes, & et al., 2012; Jasperson, 2013; Kern, et al., 2011; Macauley, 2006; Menna, et al., 2012; Mossello, & et al., 2011; Nathans---Barel, & et al., 2005; O'Haire, et al., 2013; Pollack, 2009; Stefanini, et al., 2015; Vrbanac, et al., 2013; Wesley, & et al., 2009).

Fourteen of the studies include interventions with weekly sessions (Ajzenman, & et al., 2013; Chu, & et al., 2009; De Rose, & et al., 2011; Jasperson, 2013; Kemp, & et al., 2014; Kern, et al., 2011; Lanning, & Krenek, 2013; Macauley, 2006; Menna, et al., 2012; Nathans-Barel, & et al., 2005; Nurenberg, et al., 2015; Pollack, 2009; Stefanini, et al., 2015; Wesley, & et al., 2009). Of the other studies, five include two sessions per week (Berget, & et al., 2011; Dell, & et al., 2011; Ewing, & et al., 2007; Pedersen, et al., 2012; Pedersen, et al., 2011), four include three sessions per week (Balluerka, & et al., 2014; Mossello, & et al., 2011; O'Haire, et al., 2013; Vrbanac, et al., 2013), and one is unspecified (Holmes, & et al., 2012). The final three studies include one---time visits (Barker, & et al., 2015; Engelman, 2013; Marcus, et al., 2012).

The treatment type used in the experimental group in each study as defined by the author(s) of each study varies. Twelve studies define their experimental group as receiving Animal Assisted Therapy (AAT) (Balluerka, & et al., 2014; Berget, & et al., 2011; De Rose, & et al., 2011; Engelman, 2013; Jasperson, 2013; Kemp, & et al., 2014; Macauley, 2006; Marcus, et al., 2012; Nathans---Barel, & et al., 2005; Stefanini, et al., 2015; Vrbanac, et al., 2013; Wesley, & et al., 2009), four as Animal Assisted Activities (AAA) (Chu, & et al., 2009; Menna, et al., 2012; Mossello, & et al., 2011; O'Haire, et al., 2013), three as Equine Assisted Activities (EAA) (Holmes, & et al., 2012; Kern, et al., 2011; Lanning, & Krenek, 2013), and one each Animal Assisted Intervention (AAI) (Barker, & et al., 2015), Equine Assisted Learning (EAL) (Dell, & et al., 2011), Equine Assisted Psychotherapy (EAP) (Pollack, 2009), Equine Facilitated Learning (EFL) (Ewing, & et al., 2007), and Hippotherapy (Ajzenman, & et al., 2013). Two studies defined their intervention as being AAI and green care (Pedersen, et al., 2012; Pedersen, et al., 2011). Finally, one study had three experimental groups with EAP, Canine Assisted Psychotherapy (CAP), and enhanced social skills psychotherapy, each applied to one group (Nurenberg, et al., 2015).

Fourteen of the studies included the use of a control (Balluerka, & et al., 2014; Barker, & et al., 2015; Berget, & et al., 2011; Chu, & et al., 2009; Ewing, & et al., 2007; Holmes, & et al., 2012; Jasperson, 2013; Marcus, et al., 2012; Mossello, & et al., 2011; Nathans---Barel, & et al., 2005; Nurenberg, et al., 2015; Pollack, 2009; Stefanini, et al., 2015; Wesley, & et al., 2009). Of these fourteen studies, three used control groups which included something other than standard treatment. One study incorporated the use of a model horse as their control to compare with the experimental group, which utilized a live horse for EAA (Holmes, & et al., 2012). Another study used a jigsaw puzzle as the control activity to compare it with the use of AAI for hospitalized children (Barker, & et al., 2015). The third study included two control groups, one with standard treatment, and one that included a plush toy instead of the live animal that was used in the experimental AAA group (Mossello, & et al., 2011).

Sixteen of the studies incorporated group treatment (Ajzenman, & et al., 2013; Balluerka, & et al., 2014; Chu, & et al., 2009; Dell, & et al., 2011; Ewing, & et al., 2007; Holmes, & et al., 2012; Jasperson, 2013; Menna, et al., Mossello, & et al., 2011; 2012; Nathans---Barel, & et al., 2005; Nurenberg, et al., 2015; O'Haire, et al., 2013; Pollack, 2009; Stefanini, et al., 2015; Vrbanac, et al., 2013; Wesley, & et al., 2009) and five were solely individual treatment (Barker, & et al., 2015; Engelman, 2013; Lanning, & Krenek, 2013; Macauley, 2006; Marcus, et al., 2012). One study had an option of individual treatment, or a group treatment which also included the guardians of the participant (Kemp, & et al., 2014). Three of the studies had treatments that took place on a farm and incorporated various farming activities but it is unclear whether any of these activities were group based (Berget, & et al., 2011; Pedersen, et al., 2012; Pedersen, et al., 2011). The final two studies do not clearly specify whether the treatment is individual or group based (De Rose, & et al., 2011; Kern, et al., 2011).

*Type of Animal Involved*

The most commonly used animal in the 27 studies were dogs, which were involved in fourteen of the interventions (Balluerka, & et al., 2014; Barker, & et al., 2015; Chu, & et al., 2009; Engelman, 2013; Jasperson, 2013; Macauley, 2006; Marcus, et al., 2012; Menna, et al., 2012; Mossello, & et al., 2011; Nathans---Barel, & et al., 2005; Nurenberg, et al., 2015; Stefanini, et al., 2015; Vrbanac, et al., 2013; Wesley, & et al., 2009). These interventions incorporated as many as four dogs (Vrbanac, et al., 2013). Horses were the second most commonly used, included in ten of the studies (Ajzenman, & et al., 2013; Balluerka, & et al., 2014; Dell, & et al., 2011; Ewing, & et al., 2007; Holmes, & et al., 2012; Kemp, & et al., 2014; Kern, et al., 2011; Lanning, & Krenek, 2013; Nurenberg, et al., 2015; Pollack, 2009). Two of the studies included both a dog and horses (Balluerka, & et al., 2014; Nurenberg, et al., 2015). Three of the studies were conducted on cow farms and included the cows as well as the other farm animals in the treatment (Berget, & et al., 2011; Pedersen, et al., 2012; Pedersen, et al., 2011). Lastly, there was one study using donkeys (De Rose, & et al., 2011) and one using guinea pigs (O'Haire, et al., 2013).

*Assessment Methods*

There is a variety of assessment methods used throughout each of these studies. Each study used one or many instruments to measure change specific to the challenges faced by each experimental population. While most of the studies used questionnaires and tests for evaluation, there were three other methods of assessment; observation, measurement of patient satisfaction, and interviews, which were common. Six of the studies used observation, typically conducted by the researcher, guardian of the participant, or involved health care professional, to assess changes in behavior and level of functioning in the participants (Engelman, 2013; Holmes, & et al., 2012; Mossello, & et al., 2011; Pollack, 2009; Stefanini, et al., 2015; Vrbanac, et al., 2013). Six other studies included some sort of measurement of patient satisfaction to assess the successfulness of AAI's (Chu, & et al., 2009; Kern, et al.,

2011; Lanning, & Krenek, 2013; Macauley, 2006; Marcus, et al., 2012; Pedersen, et al., 2011). Four studies also included qualitative interviews with participants or program facilitators (Dell, & et al., 2011; Nurenberg, et al., 2015; Pedersen, et al., 2012; Pollack, 2009).

Another important aspect of assessment methods that varied throughout the studies was the frequency of assessment. Most commonly, studies conducted assessments both pre--- and post--- intervention (Ajzenman, & et al., 2013; Balluerka, & et al., 2014; Barker, & et al., 2015; Berget, & et al., 2011; Chu, & et al., 2009; Ewing, & et al., 2007; Jasperson, 2013; Marcus, et al., 2012; Pedersen, et al., 2011; Pollack, 2009; Stefanini, et al., 2015; Vrbanac, et al., 2013). Among these studies, one included the first test at the time of recruitment (Pedersen, et al., 2011). Eight of the studies included midway testing in addition to the pre--- and post--- test (De Rose, & et al., 2011; Holmes, & et al., 2012; Kemp, & et al., 2014; Kern, et al., 2011; Lanning, & Krenek, 2013; Macauley, 2006; Nathans---Barel, & et al., 2005; Wesley, & et al., 2009). This includes a study that had a test at the time of recruitment (Kern, et al., 2011), as well as two that conducted a test after each of their sessions (Holmes, & et al., 2012; Wesley, & et al., 2009). The assessment frequencies that were less common included one study that did a pre and midway test (O'Haire, et al., 2013), one study which had a pre---test and a six month follow up (Menna, et al., 2012), one that had a midway and post---test (Mossello, & et al., 2011), two that had only post---test, one that had only a single test point at an unspecified time throughout the intervention period (Pedersen, et al., 2012), and one that included a test three months prior and three months post intervention (Nurenberg, et al., 2015).

## Findings

While each of the 27 studies presented a variety of findings, there were a number of themes which were consistently touched upon. These themes included; life skills, desire to

attend and participate in the intervention, level of sociability, level of self---esteem, the feeling of non---judgement and generation of trust within the therapeutic relationship, alleviated symptoms, effectiveness compared to alternatives, and the cost of treatment.

*Life Skills*

The discussion of gained life skills was included in a number of the studies with varying populations and intervention formats. In a study conducted on the effects of Hippotherapy on motor control, adaptive behaviors, and participation in children with Autism Spectrum Disorder, Ajzenman, Standeven, and Shurtleff (2013) found that the intervention also improved the level of communication in the participants. A number of studies conducted to study the effects of AAI's with various mental health and addictions populations also found that there were skills gained during the intervention that were translatable into other aspects of their life, such as one study that addressed solvent abuse in First Nations populations and found that the participants also learned patience, compassion, and leadership skills (Dell, & et al., 2011). A few of the studies that included work with horses, cows, and other farm animals found that participants also improved self---efficiency and felt they had a purpose when putting their new skills to use with the animals (Pedersen, et al., 2012; Pedersen, et al., 2011; Pollack, 2009). In a study involving a dog in AAT for youth with psychiatric diagnoses, Stefanini et al. (2015) found that the experimental group showed a significant improvement in global functioning. De Rose and Cantiello's (2011) study on a donkey assisted neuropsychological rehabilitation program found that the presence of the donkey improved the participant's physical expression. These various findings suggest that AAT programs may have unintended positive effects.

*Participant Attendance and Participation*

The second theme, and one of the most notable themes, is the level of participant attendance and willingness to participate. Thirteen studies included findings regarding this

theme, all reporting findings that suggest animal assisted interventions improve attendance, encourage participation, and motivate the participants more so than other interventions (Ajzenman, & et al., 2013; Chu, & et al., 2009; De Rose, & et al., 2011; Holmes, & et al., 2012; Kern, et al., 2011; Macauley, 2006; Marcus, et al., 2012; Nathans---Barel, & et al., 2005; O'Haire, et al., 2013; Pedersen, et al., 2012; Stefanini, et al., 2015; Vrbanac, et al., 2013; Wesley, & et al., 2009). A few of these studies further identified specific results regarding this theme. Three of these studies focused on children with Autism and found that the participants looked forward to the sessions (Kern, et al., 2011; O'Haire, et al., 2013) and the intervention encouraged participation in daily activities (Ajzenman, & et al., 2013). One of these studies involved guinea pigs and AAA conducted at the school, and the parents of the participants indicated an increase in their child's interest in attending school (O'Haire, et al., 2013). Similarly, in the Stefanini et al (2015) study, the intervention also increased the school attendance of participants of youth with psychiatric diagnoses.

Vrbanac et al (2013) found that participants in their animal assisted therapy program, which included four dogs, began coming early and staying late for the meetings in their geriatric nursing home to talk to one another and to reminisce about their old pets. Similarly, a study on the effects of having a dog visiting program in an outpatient pain management clinic found that participants would return to visit with the dog for a second time following their appointments at the clinic (Marcus, et al., 2012). A study assessing AAT with a dog for a substance dependence group found that the experimental group had higher retention rates and less frequent relapse than the control group (Wesley, & et al., 2009). These findings suggest that AAIs may be more enjoyable for participants than traditional interventions.

*Sociability*

Ten of the studies discussed the level of sociability among participants, but findings were inconsistent (Berget, & et al., 2011; Chu, & et al., 2009; De Rose, & et al., 2011;

Ewing, & et al., 2007; Jasperson, 2013; Lanning, & Krenek, 2013; O'Haire, et al., 2013; Pollack, 2009; Stefanini, et al., 2015; Vrbanac, et al., 2013). Studies which assess the impact of AAIs on veterans (Lanning, & Krenek, 2013), youth with psychiatric diagnoses (Stefanini, et al., 2015), female inmates (Jasperson, 2013), geriatric nursing home residents (Vrbanac, et al., 2013), and children with autism (O'Haire, et al., 2013) all indicated that the level of sociability in participants increased during and/or following this intervention. Three studies also indicate a change in level of sociability but further specify it as an increase in extroversion (Berget, & et al., 2011), improved relation to others (Pollack, 2009), and improved relational skills (De Rose, & et al., 2011). Two studies indicated findings that did not support improved sociability (Chu, & et al., 2009; Ewing, & et al., 2007). A study conducted on schizophrenic patients by Chu et al (2009) indicated that their findings did not show any differences in level of social support between the control and experimental group receiving AAA with two dogs. The second study, which addressed the uses of EFL for youth with severe emotional disorders, did not find improvement in the sociability of participants in the experimental group, however, they did find that the control group experienced a worsening in their level of social interaction (Ewing, & et al., 2007). Therefore, while the influence of AAIs on the participant's level of sociability is inconclusive, the majority of results in this sampling of studies suggests a positive correlation.

*Self-Esteem*

Similar to the theme of sociability, the changes in participant's self---esteem was not unanimous among the articles that touched on this theme. Seven articles focused on changes in self---esteem, six of which identified positive changes (Berget, & et al., 2011; Chu, & et al., 2009; Ewing, & et al., 2007; Pedersen, et al., 2012; Pedersen, et al., 2011; Pollack, 2009) and one of which did not (Holmes, & et al., 2012). One of the studies which included green care with cows and other farm animals as part of their AAI proposed that the experience of

mastery is important for the participants in regard to this theme, suggesting that skill development is positively correlated with self---esteem (Pedersen, et al., 2011). This idea can be supported by two other articles which both discuss participants having gained life skills, as well as experiencing improved self---esteem (Pedersen, et al., 2012; Pollack, 2009). However, the article by Holmes et al (2012) found that there was no significant difference in self---esteem scores among the youth with emotional, behavioral, and learning disabilities who participated in their equine assisted activities study.

Interestingly, both of the articles which did not find improved sociability, did find evidence supporting improved self---esteem among the participants in their AAI groups (Chu, & et al., 2009; Ewing, & et al., 2007). This writer would hypothesis that improved self---esteem would lead to improved sociability, a hypothesis which is not supported by these findings. Therefore, this may be an area for further study, or may require longer term follow up testing, as neither of these studies included a follow up assessment (Chu, & et al., 2009; Ewing, & et al., 2007).

*Non-Judgement and the Generation of Trust*

A number of articles also discussed the influence of the animal partner on feelings of trust and non---judgement for the participants in the therapeutic setting. In a study on the use of a dog partner for speech---therapy for individuals with aphasia from stroke, Macauley (2006) found that participants found speaking to the dog to be less stressful than speaking to the therapist, thus the presence of the dog resulted in more spontaneous communication. An EAL program for First Nations youth experiencing solvent abuse found that the participants developed a mutual trust with the horses and a trust with the facilitators as well (Dell, & et al., 2011). The authors noted that the participants felt good because the facilitators trusted them to help with the horses (Dell, & et al., 2011). A number of studies briefly noted an increase in trust between the client(s) and therapist(s) (Balluerka, & et al., 2014; Ewing, & et

al., 2007; Lanning, & Krenek, 2013), while others furtherer explained that they felt more comfortable sharing some things with the horse than with other people (Pollack, 2009), or that there was an "improved therapeutic alliance" while a dog was present (Wesley, & et al., 2009).

*Alleviated Symptoms*

Nearly all of the articles discuss some symptoms within the AAI participants. Two of the more commonly discussed symptom types were those resulting from depression and anxiety. Seven articles measured the depressive symptoms in their participant populations which included children who had been sexually abused (Kemp, & et al., 2014), individuals with dementia and depressive disorders (Menna, et al., 2012), veterans (Lanning, & Krenek, 2013), individuals with depression (Pedersen, et al., 2011), individuals with depression and anxiety (Berget, & et al., 2011), women with addictions (Pollack, 2009), and youth with severe emotional disorders (Ewing, & et al., 2007). Six of these articles findings supported a decrease in depressive symptoms (Berget, & et al., 2011; Kemp, & et al., 2014; Lanning, & Krenek, 2013; Menna, et al., 2012; Pedersen, et al., 2011). The seventh study, which assessed EFL with youth with severe emotional disorders did not find that their quantitative findings supported a reduction in depressive symptoms, however they did find that results from the qualitative measures did (Ewing, & et al., 2007).

Six of the studies assessed levels of anxiety in their participants (Barker, & et al., 2015; Berget, & et al., 2011; Holmes, & et al., 2012; Kemp, & et al., 2014; Mossello, & et al., 2011; Pedersen, et al., 2011). These studies included the populations of Alzheimer's patients in day care (Mossello, & et al., 2011), children who had experienced sexual abuse (Kemp, & et al., 2014), youth with emotion, behavioral, or learning disabilities (Holmes, & et al., 2012), individuals with depression (Pedersen, et al., 2011), individuals with depression and anxiety (Berget, & et al., 2011), and hospitalized children (Barker, & et al., 2015). Results from five

of these studies concluded that AAIs were successful in decreasing the symptoms of anxiety in participants (Barker, & et al., 2015; Berget, & et al., 2011; Holmes, & et al., 2012; Kemp, & et al., 2014; Mossello, & et al., 2011; Pedersen, et al., 2011). The final study assessed the effectiveness of a single visit dog AAI with hospitalized children and included a control group which did a jigsaw puzzle instead (Barker, & et al., 2015). The results from this study indicated that there was a reduction in anxiety symptoms for the experimental group, however it was no more significant than the reduction in the control group (Barker, & et al., 2015). The authors of this article did note that the children's anxiety levels were not high at baseline, and therefore a follow up study should be conducted with participants whose anxiety levels are higher at baseline (Barker, & et al., 2015).

A number of other changes in symptoms more specific to individual populations were indicated amongst the articles. These changes include improved postural stability in children with autism following Hippotherapy (Ajzenman, & et al., 2013), and other improved symptoms of autism, such as improved attention following EAA (Kern, et al., 2011). Two studies for the treatment of substance dependence found that AAT with a dog reduced stress and relapse rates (Wesley, & et al., 2009), and EAP improved addictive and impulsive behaviors (Pollack, 2009). Two studies also indicated that AAI's with a dog improved psychological symptoms in both geriatric nursing home residents (Vrbanac, et al., 2013) and schizophrenic patients (Chu, & et al., 2009). Another study found that AAI's with both horses and dogs was effective in reducing violence in schizophrenic patients, but indicated that AAI's with horses showed the most significant improvement (Nurenberg, et al., 2015). Two articles both discussed the influence of AAT in medical settings and found that it effectively reduces pain and distress in patients, but also lowers stress levels in staff (Engelman, 2013; Marcus, et al., 2012).

*Effectiveness Compared to Alternatives*

Some studies, particularly those that included a control, made specific conclusions regarding the effectiveness of the AAI. Macauley's (2006) study on AAT with individuals who had aphasia from stroke indicated that the AAT did not prove to be any more effective than the standard treatment, however, the participants indicated higher levels of satisfaction with this form of treatment. Similarly, a study on AAT for schizophrenic patients found that there was more voluntary attendance for the experimental group than for the control group (Nathans---Barel, & et al., 2005). One study noted that the experimental group did not improve their symptoms, but the control group worsened (Ewing, & et al., 2007). A study which incorporated cows and other farm animals in the AAI suggested that AAI's and green care should be included as a supplementary intervention with mental health care and rehabilitation to make treatment most effective (Pedersen, et al., 2012). A study conducted by Nurenberg et al (2015) included three different treatment groups, EAP, CAP, and enhanced social skills psychotherapy, as well as a control group receiving standard treatment. Conclusions drawn from this study suggested that the EAP was the most effective in the treatment of schizophrenic in---patients (Nurenberg, et al., 2015). Wesley, Minatrea, and Watson (2009) concluded that in their study of AAT for treatment of substance dependence that certain subgroups benefited more than others. The study found that the treatment was less effective in the treatment of individuals with dual---diagnosis, involvement with children's protective services, and alcohol dependence, than with other participants (Wesley, & et al., 2009).

Finally, two studies indicated that their findings did not support that AAI's were any more effective than other more standard forms of treatment (Barker, & et al., 2015; Jasperson, 2013). Jasperson's (2013) study assessed the effectiveness of using a dog---partner in a psycho---educational group with female inmates and found that it was no more effective than their control group. Barker et al (2015) also found no difference in the results from their

one time visits with hospitalized children with an experimental treatment of a dog visit, and a control group completing a jigsaw puzzle.

*Cost of Treatment*

While conclusions regarding the cost of treatment were only discussed in four articles, it is a notable theme. Two studies, one with two therapy dogs (Menna, et al., 2012) and one with four therapy dogs (Vrbanac, et al., 2013) noted their AAI programs to be low cost. Engelman's (2013) study on the use of AAT in palliative care indicated that the intervention was cost efficient, and since it also lowered pain in participants, could also reduce the cost of medication (Engelman, 2013). Nurenberg et al (2015) whose study concluded that EAP was highly effective, also concluded that it was a costly intervention. Therefore, while it appears that AAI's utilizing smaller animal partners are cost efficient, it also appears that AAI's with horses may not be.

## Limitations of the Literature

There were a number of limitations throughout all 27 studies that compromise the validity and reliability of the findings. There were six aspects in particular that were common concerns across the research. First, as mentioned only fourteen of the studies included a control measure (Balluerka, & et al., 2014; Barker, & et al., 2015; Berget, & et al., 2011; Chu, & et al., 2009; Ewing, & et al., 2007; Holmes, & et al., 2012; Jasperson, 2013; Marcus, et al., 2012; Mossello, & et al., 2011; Nathans---Barel, & et al., 2005; Nurenberg, et al., 2015; Pollack, 2009; Stefanini, et al., 2015; Wesley, & et al., 2009). Not having a control can limit the external validity of the findings as it is hard to prove that there is no other variable influencing the finding. For example, one of the other limitations is that eighteen of the studies include all or a portion of the AAI being conducted outside, which could be influential on the findings as exposure to nature may also have therapeutic benefits (Ajzenman, & et al., 2013; Balluerka, & et al., 2014; Berget, & et al., 2011; Chu, & et al.,

2009; Dell, & et al., 2011; De Rose, & et al., 2011; Ewing, & et al., 2007; Holmes, & et al., 2012; Kemp, & et al., 2014; Kern, et al., 2011; Lanning, & Krenek, 2013; Menna, et al., 2012; Pedersen, et al., 2012; Pedersen, et al., 2011; Pollack, 2009; Stefanini, et al., 2015; Vrbanac, et al., 2013). Similarly, lack of randomization also limits external validity, meaning the results cannot be generalized, which is also a concern as only seven of these studies are randomized (Barker, & et al., 2015; Chu, & et al., 2009; Jasperson, 2013; Nurenberg, et al., 2015; Pollack, 2009; Stefanini, et al., 2015; Wesley, & et al., 2009).

There is also concern regarding internal validity as only two of the studies are blinded (Chu, & et al., 2009; Stefanini, et al., 2015). Therefore, in the cases where observation is included as an assessment method, the majority may lack validity as the individuals assessing the participant may be bias for or against AAI's. There is also a concern regarding reliability as identified in nearly all of the studies, as the sample size in most are quite small (Ajzenman, & et al., 2013; Balluerka, & et al., 2014; Barker, & et al., 2015; Chu, & et al., 2009; Dell, & et al., 2011; De Rose, & et al., 2011; Engelman, 2013; Ewing, & et al., 2007; Holmes, & et al., 2012; Kemp, & et al., 2014; Kern, et al., 2011; Lanning, & Krenek, 2013; Macauley, 2006; Menna, et al., 2012; Mossello, & et al., 2011; Nathans---Barel, & et al., 2005; Pedersen, et al., 2012; Pedersen, et al., three participants (Macauley, 2006) to 391 (Marcus, et al., 2012), with a mean of 48.9 before the removal of outliers, and 17.8 after the removal of outliers. Lastly, eight of the articles also have some concerns regarding reliably of participant self---reporting as an assessment method, resulting from various circumstance (Berget, & et al., 2011; Chu, & et al., 2009; Dell, & et al., 2011; Ewing, & et al., 2007; Lanning, & Krenek, 2013; Nathans---Barel, & et al., 2005; Nurenberg, et al., 2015; Wesley, & et al., 2009).

## Implications for Further Research

There were a number of studies that identified further areas for research as well as aspects of intervention formats that may have been influential in the level of reliability of the

research produced. The most common concern regarding study format was the small sample sizes (Ajzenman, & et al., 2013; Balluerka, & et al., 2014; Barker, & et al., 2015; Chu, & et al., 2009; Dell, & et al., 2011; De Rose, & et al., 2011; Engelman, 2013; Ewing, & et al., 2007; Holmes, & et al., 2012; Kemp, & et al., 2014; Kern, et al., 2011; Lanning, & Krenek, 2013; Macauley, 2006; Menna, et al., 2012; Mossello, & et al., 2011; Nathans---Barel, & et al., 2005; Pedersen, et al., 2012; Pedersen, et al., 2011; Pollack, 2009; Stefanini, et al., 2015; Vrbanac, et al., 2013). For this reason, it is suggested that future studies be conducted with a larger number of participants. Two studies included questions for future research that were related to intervention structure. The first study was EAL for First Nations youth with solvent abuse concerns, and questioned how this treatment would affect the participants and their community's long term (Dell, & et al., 2011). As a result of this, and because only five of the twenty---seven studies included a follow---up assessment, a follow up assessment included in future studies would help to assess the long term and lasting effects of these interventions (Berget, & et al., 2011; Jasperson, 2013; Menna, et al., 2012; Nurenberg, et al., 2015; O'Haire, et al., 2013). Nathans---Barel et al (2005) included a dog---partner in the treatment of schizophrenic patients and upon conclusion of their study questioned whether longer term treatment would produce greater changes in participant's behavior. Therefore, it may be beneficial for studies to include multiple experimental groups with different lengths of treatment, or include additional test points throughout treatment to determine if longer treatments are more effective, or if there is an ideal length for AAI treatments.

Of the studies that identified areas for further research, six indicated that more research was needed in their area of focus in order to replicate their findings (Balluerka, & et al., 2014; Ewing, & et al., 2007; Holmes, & et al., 2012; Lanning, & Krenek, 2013; Menna, et al., 2012; Mossello, & et al., 2011). However, four studies also identified different questions that needed to be studied in order to be sure that AAI's are an effective treatment method,

and if so, how to maximize their effectiveness. Macauley (2006) questioned whether group or individual AAI treatments would be more effective and also whether the type of animal is influential. One of the studies in this literature review included multiple experimental groups including one with horses and one with dogs and found treatment with horses to be more effective for the population of schizophrenic patients (Nurenberg, et al., 2015). While this is a good example of how the influence of the type of animal on the effectiveness of AAI's can be studied, it is only one example and therefore, more studies addressing this question would be helpful.

Another study questioned how involvement in such interventions may affect the animal, and whether or not a live animal is needed for AAI's to be successful (Kemp, & et al., 2014). Two of the studies in this literature review included fake animals as a control, one a plush toy (Mossello, & et al., 2011) and one a model horse (Holmes, & et al., 2012), both of which found the live animal to be more effective. Stefanini et al (2015) questioned which population would benefit most from AAI's. Lastly, Jasperson (2013) conducted an assessment of AAT with a dog partner for incarcerated women and found that the AAT was no more successful than the control group, however, based on the findings, Jasperson questioned whether this intervention may be more successful for women who have experienced trauma. All of these questions, whether some studies have addressed them or not, could benefit from more investigation.

## Conclusion

As the visibility and recognition of AAI's increase, it is likely that the available literature will increase with it. The findings noted in this synthesis suggest AAI's help participants in developing life skills, improve their desire to attend and participate in the intervention, support feelings of non---judgement and the generation of trust within the therapeutic relationship, help to alleviate a variety of symptoms, and are typically cost

efficient. Findings also indicate the potential for AAI's to improve participants levels of sociability and self---esteem, however these findings were not consistent across studies. There is still a great deal to be learned about the applications and effectiveness of these interventions, and through consideration of previous studies, future studies can be developed which will increase reliability and validity of findings, and fill the holes that currently exist. This literature synthesis presents the available literature as a collective to support future research and the development of this field.

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