

## **Effectiveness of Animal-assisted Interventions (AAIs) in Treatment of Adults with Depressive Symptoms: A Systematic Review**

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Animal-assisted interventions (AAIs) have become widespread, with programs targeting various populations and mental health conditions. Despite its popularity, AAI's operational definition and its efficacy are unclear. This systematic review aims to assess the utility of AAIs in decreasing depressive symptoms in adults based upon results of empirically validated depression assessment scales used by researchers. A systematic published literature search was conducted using Web of Science, PsychInfo, PubMed, ProQuest, SCOPUS, CINAHL, Social Work Abstracts, Web of Science, and Google Scholar. Peer-reviewed research articles on the effectiveness of AAIs on depressive symptoms in adults using empirically validated depression scales published from 2010 through October 2020 were chosen for this systematic review. Search results were filtered to include only quantitative, peer-reviewed articles for adults 18 and over; those were reviewed, and only journal articles using an empirically established depression evaluation tool were chosen. A total of 10 quantitative articles met these inclusion criteria. Overall, research design quality was low, but AAI had a statistically significant effect on outcomes in most studies. Results are moderately favorable but more thorough, standardized, and controlled research is needed.

*Keywords:* Animal-assisted Interventions, Adults, Depressive Symptoms.

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Depression is a psychiatric disorder defined by physical symptoms, mood instability, and cognitive deficits. It is a common illness that has affected more than 264 million people worldwide (Global Burden of Disease-Disease and Injury Incidence and Prevalence Collaborators, 2018). Depression is more intense and chronic than usual short-lived emotional responses and mood fluctuations to everyday life challenges and may become a severe health concern. This disorder can cause the afflicted person to suffer much and have difficulty functioning at home, work, and school (World Health Organization, 2020).

Trivedi (2004) asserted physical symptoms are also common in depression and may complicate medical treatment. Symptoms associated with depression include limb and joint pain, back pain, appetite changes, gastrointestinal problems, fatigue, and psychomotor activity changes. According to the World Health Organization (2020), more than 700,000 people of all ages die by taking their own lives yearly. The Institute of Health Metrics and Evaluation (n.d.) found depression affects approximately 3.8% of the general population, including 5% of adults 18 to 59 years old and 5.7% of those aged 60 and over. Brody, Pratt & Hughes (2018) postulated 10.4% of adult women in the general population were approximately twice as likely to have suffered from depression as men, who have a 5.5% likelihood of depression. About 8.1% of American adults aged 20 and over had depression in a given two-week period. In men and women, non-Hispanic black adults (9.2%) have the highest level of depression.

Depression and depressive symptoms are associated with more dysfunctional societal costs than many other chronic diseases (Mohit, 2018). Approximately 80% of depressed adults disclosed difficulty with social activities, home life, and work responsibilities. Also, as family income decreased, depression increased, with the highest prevalence being adult women with family incomes below the federal poverty level (19.8%) (Brody, Pratt & Hughes, 2018).

The current COVID-19 pandemic has been associated with increased mental health issues connected to the mortality and morbidity caused by the disease and the unintended consequences of stay-at-home orders and physical distancing. The Centers for Disease Control (n.d.) found that 24.4% of adults in the U.S. had symptoms of depression since the initial spread of COVID-19, with the prevalence being almost four times that reported in the second quarter of 2019 (from 6.5% to 24.4%) based on a May 2020 survey. As of the most recent results from the same CDC survey in October 2021, approximately 21.8% of adults in the U.S. suffer from depressive symptoms (Centers for Disease Control, n.d.).

It is imperative to find optimal treatment modalities for adults suffering from depressive symptoms and guide best treatment practices. Animal-assisted interventions (AAIs) are a relatively new therapeutic approach used in patients with many health conditions. Still, there is a lack of robust published empirical data to support their effectiveness. Additionally, there has been a lack of consistency in clearly defining and differentiating types of AAIs. This systematic review evaluated existing studies on animal-assisted interventions (AAIs) such as animal-assisted therapy (AAT) and animal-assisted activities (AAAs) that focused on depressive symptoms using empirically validated assessment tools. The primary goals of this review are to address the issue of clearly defining types of AAIs, identify how the current research can be improved in future studies, and differentiate relative strengths and outcomes of the various AAIs in the treatment of depression.

### **Defining animal-assisted interventions**

Human treatments incorporating animals have an extensive history. However, ongoing research focuses on describing and defining these interventions' nature and exploring their

effectiveness. Animal-Assisted Intervention International (n.d.) defined AAI as an interdisciplinary term encompassing goal-centered or unstructured individual and group activities for all ages and abilities that include animals in education, healthcare, human services, and other practice areas. Animal-assisted interventions (AAIs) is the umbrella term referring to the essential inclusion of animals into education, health, and human services such as social work (IAHAIO, 2019). Pet Partners USA defined the various types of animal-assisted interventions (AAIs) that incorporate animals (Human-Animal Interactions Ethics Workgroup, 2020). These definitions seem to be the most widely cited, differentiating unstructured interventions referred to as informal interventions such as animal-assisted activities (AAAs) to more formal interventions like animal-assisted therapy (AAT). Further work is underway to develop clear and concise operational definitions of types of AAIs to advance research of their efficacy and clinical utility (Fine et al., 2015; IAHAIO Conference Workshop 2021).

This systematic review is focused on AAIs that address depressive symptoms using symptom assessment through validated depression scales. Animal-assisted activities (AAAs) are a type of AAI that is goal-oriented and planned interactions provided by individuals with at least introductory training to participate in informal visitations that focus on improving a client's quality of life by providing therapeutic and educational growth opportunities. Another type of AAI is Animal-Assisted Therapy (AAT), which is a goal-oriented treatment intervention, and where an animal, such as a dog, cat, or horse, meets specific behavioral criteria as a primary part of the therapeutic process. AAT can be delivered by an individual certified with an organization such as Pet Partners USA or by a health service professional working with specialized expertise within their scope of practice (IAHAIO, 2019). Subgroups within AAT that must be provided by a therapeutic professional include, but are not limited to, nature and animal-assisted mindfulness training (NAMT), Animal-assisted therapy in counseling (AAT-C), and animal-assisted psychotherapy (AAP); they include a professional form of mental health therapy in combination with human-animal interaction.

Here is an example using NAMT. According to Schramm et al. (2015), nature and animal-assisted mindfulness training (NAMT) focuses on mindfulness techniques and nurturing the supportive-contemplative exchange of group practice experiences and psychoeducation regarding depressive symptoms and relapse. NAMT also integrates informal exercises such as mindfulness walking and breathing exercises.

The same constructs can be applied to Animal-assisted therapy in counseling (AAT-C). AAT-C involves “the incorporation of pets as therapeutic agents in a variety of techniques. This can be done in a variety of ways and by using a variety of techniques” (Chandler, 2017, p. 2). According to Stewart, Chang, & Rice (2013), AAT-C is a subgroup of AAT, but the delivery and application of the interventions can be diverse depending on the service provider's professional role (such as a nurse, physician, or mental health professional).

A similar example would include animal-assisted psychotherapy. Bachi & Parish-Plass (2016) describe animal-assisted psychotherapy (AAP) as “a clinical field based on accepted principles and goals of psychotherapy and that the integration of animals into the therapy setting, by a therapist who understands the opportunities provided by the human-animal bond, may expand these principles to further advance the therapy process” (p. 1). This integration provides opportunities to be mindful, physically and emotionally present, work on underlying relational patterns, identify internal models, process past relational issues, and offer adaptive alternatives.

NAMT, AAT-C & AAP represent evolving subgroups within AAT provided by mental health professionals such as clinical social workers, counselors, and psychologists. Currently, there is little published quantitative research assessing subgroups of AAT such as AAT-C, NAMT, or AAP and their effectiveness in decreasing depressive symptoms in adults using a validated assessment scale.

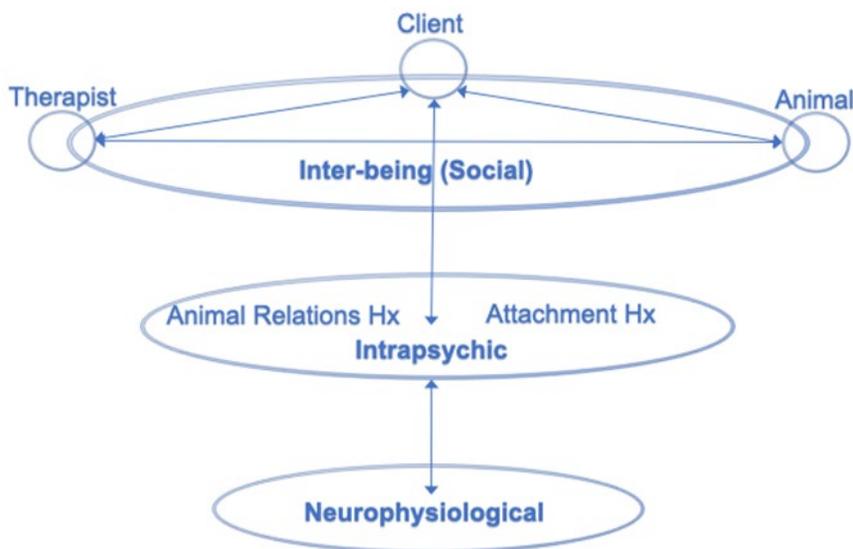
The purpose of this review of the literature is to analyze existing research regarding AAIs for adults with depressive symptoms using validated depression scales to assess intervention effectiveness. While the terms efficacy and effectiveness are sometimes used interchangeably, for this study, effectiveness is the operative term, denoting the capacity of an intervention utilized in standard clinical settings to produce measurable and meaningful effects.

### Theoretical Etiology of Human-Animal Interaction

AAIs attempt to integrate and nourish social inter-being relationships, intrapsychic well-being, and neurophysiological needs, all of which are important since a disconnection from others is a primary and profound experience of adults with depressive symptoms (Smith et al., 2020). This intervention may be understood as a multisystemic phenomenon that the available research suggests is a mutually reinforcing triadic relationship, nurturing exchange of actions and reactions through mutual affection and attention among the facilitator, client, and animal using various treatment modalities to decrease depressive symptoms (see Figure 1).

Figure 1: Multisystemic Phenomenon of AAIs.

*Inter-being Phenomenon between Humans and Animals: Social Support Theory*



Social support is the emotional, psychological, and physical comfort given to us by our friends, family, co-workers, and others in our lives (Beck, 2014). The term “inter-being” in Figure 1, was coined by the Buddhist teacher Thich Nhat Hanh (2017) to refer to the profound and deep interconnection of all phenomena and the recognition that nothing exists independently, including sentient beings. Inter-being denotes the triadic, interconnected social-emotional relationship that may emerge in AAI. Guruge et al. (2015) postulated that social support acts as a buffer of protection from certain life stressors and for individuals’ physical and mental health.

Fine & Weaver (2018) suggested social support from animals occurs through the development of connections from the companionship with a pet. Pets provide emotional support to assist with life and family stress, and adults and children alike tend to consider their pets an integral part of their social network (Staats, Wallace, & Anderson, 2008). Some of the social behaviors involving interactions with animals also bring comfort between people. (Beck, 2002; Chandler, 2017; Fine, 2006; Levinson, 1969). Brooks et al. (2016) conducted semi-structured interviews focused on ‘ego’ network mapping with participants diagnosed with a chronic mental health diagnosis. Interviews explored pets' role as part of a persons’ social network while managing a long-term mental health problem. Results indicated that routine and sense of security of caring for pets provided increased emotional and social support.

### **Intrapsychic Phenomenon between Humans and Animals: Attachment theory**

John Bowlby (1958) developed attachment theory to explain the emotional relationship between the mother or caregiver and the infant, examining the pleasure, exchange of care, and comfort associated with the exchange. According to Beck and Madresh (2008), psychological scales currently used to assess the human-animal relationship were based on human attachment theory, and Rockett, B. & Carr, S. (2014) proposed that “animals are able to satisfy human attachment needs, reflecting attachment figures in their own right” (p. 1). The concept of attachment between humans and animals seems to be a valid phenomenon since humans often view pets as being more relationally secure than bonds with people (Cromer & Barlow, 2013). A human being’s ability to develop a connection with animals can increase secure attachment behaviors and occur in many environments (Geist, 2011). Rockett and Carr (2014) stated that animals incorporated in AAIs might assist with the development of a secure attachment between client and clinician.

Archer (1997) described anthropomorphism as the tendency of humans to place human mental and physical attributes onto pets. Wan & Chen (2021) found that anthropomorphism addressed people’s object attachment needs in three facets: comfort and pleasantness, a sense of self-efficacy, and self-identity (i.e., individual self, relational self, collective self). Appearance, behavior and emotion, and characteristics such as affection and attention are what we tend to value and respond to in human children and animal companions (Archer, 1997).

Research has found that attachment and connection with animals decrease depressive and other mental health symptoms. Pereira and Fonte (2018) assessed the impact of adopting a pet by treatment-resistant patients currently medicated for major depressive disorder symptoms compared to the control group who did not adopt but continued their existing psychopharmacology regimen. These results showed the pet group had improved Global Assessment of Functioning (GAF) scores and higher assessment scores and remission rates than the control group. Hunt and Chizkov (2014) assessed the effect of a canine present during therapy sessions, which included discussing trauma narratives content, emotional arousal, and

cognitive change compared to the control group with no canine present during therapy sessions. The results suggested that a dog's presence improved long-term outcomes for some individuals in treatment and lowered acute distress without compromising therapeutic mechanisms or emotional processing.

AAIs utility and effectiveness may be attenuated or amplified dependent upon factors such as a patient's history of trauma or lack thereof associated with animals. According to Mason & Hagan (1999), clients who can overcome their fear of animals tend to nurture a sense of accomplishment that may transfer to other areas of their life. Evans and Gray (2012) discussed the possible issues of incorporating animals in treatment, including clients who are fearful of animals; it was asserted that if a client had previous negative interactions with animals, it is imperative to use clinical judgment regarding their therapeutic use in practice. Allen & Colbert (2016) recommended that therapists comprehensively process any AAI method with the client before incorporating the animal into the therapeutic relationship.

### **Neurophysiological Phenomenon between Human and Animals: Domestication**

Domestication is a morphological and physiological process that dually enhances bonding between owners and their pets; this process includes mutual physical benefits for humans and animals (Belyaev, 1979). According to Amiot et al. (2016), the mutual bond with humans improved mood, lowered heart rates, and reduced stress for animals. Much research regarding the human-animal bond focused on using pets to benefit humans' emotional well-being (Beck, 2002; Siegel et al., 1999). Animals incorporated into the therapeutic dynamic may also provide a genuine and dynamic foundation for the open expression of the clients' inner thoughts and feelings (Oren & Parish-Plass, 2013). Orlandi (2007) found that oncologic patients had decreased depressive symptoms when provided cancer treatment in an AAAs room compared to patients with no animal present in an adjoining treatment room.

There are also physiological processes that are triggered by the human-animal interaction. Barker et al. (2005) conducted a pilot study investigating stress and immune function in 20 healthcare workers following interaction with a therapy dog. They found that petting a dog prompts a release of several "feel good" hormones in humans, including prolactin, oxytocin, and serotonin. Furthermore, it decreased primary stress hormone cortisol levels, the adrenal chemical responsible for regulating appetite and cravings for carbohydrates. According to McCardle et al. (2011), a dog's presence can also moderate stress by reducing observable signs of anxiety, including heart rate and blood pressure.

It appears that AAIs may provide opportunities for the human-animal neurophysiological phenomenon that fosters the psychotherapeutic process. The following literature was examined for the study characteristics, quality, and outcomes of AAIs on depressive symptoms in adults.

### **Search Methodology**

A systematic published literature search was conducted using Web of Science, PsychInfo, PubMed, ProQuest, SCOPUS, CINAHL, Social Work Abstracts, Web of Science, and Google Scholar. Primary research articles were published from 2010 through October 2020 and related to the efficacy of AAI/AAT/AAT-C/AAP on depressive symptoms in adults. Inclusion criteria consisted of only quantitative peer-reviewed articles conducted in the USA and abroad for adults 18 and over; those articles were reviewed. Articles using an empirically valid and reliable depression evaluation tool were chosen. Search terms used for each database

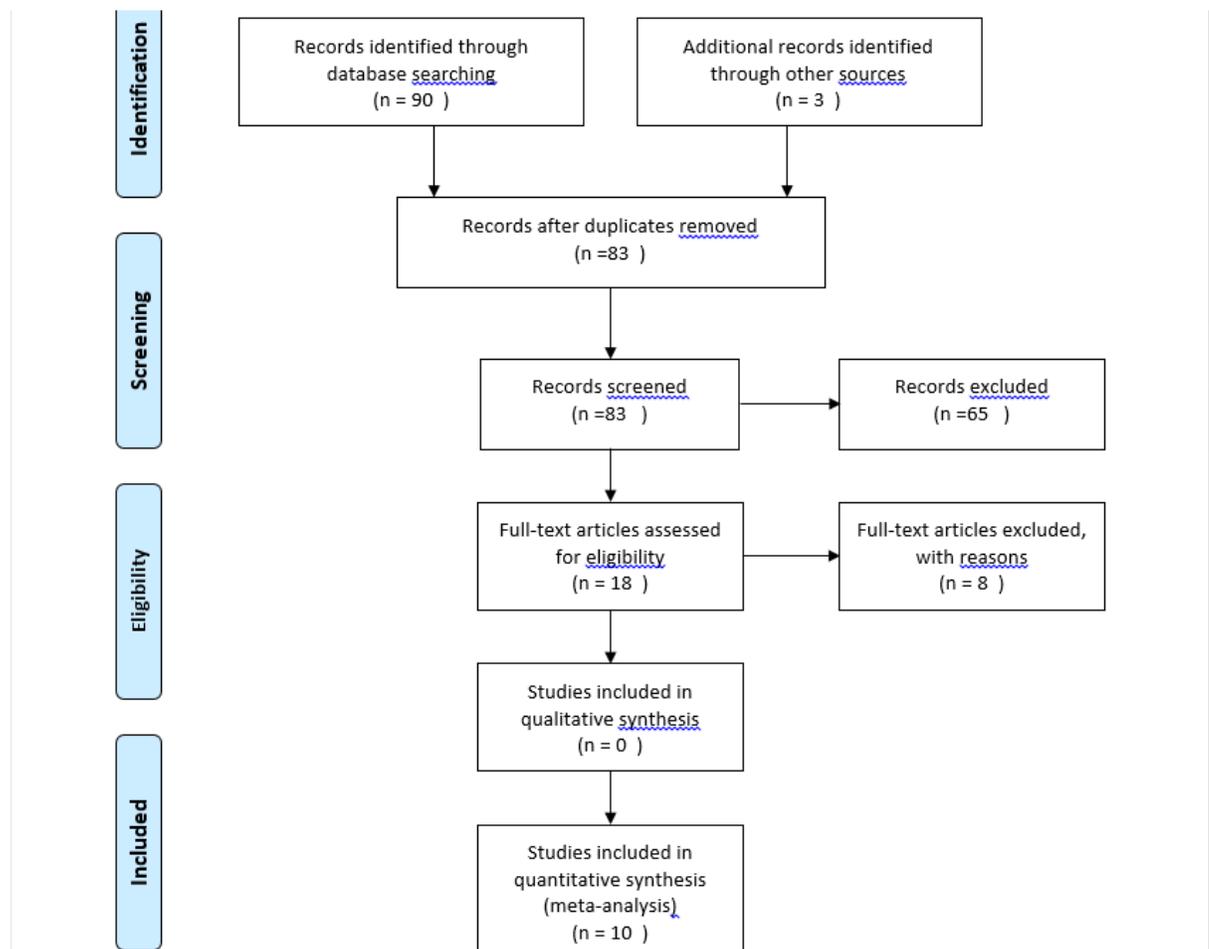
included "animal-assisted intervention" OR "animal-assisted therapy" OR "animal-assisted therapy in counseling" OR "animal-assisted psychotherapy" AND "major depressive disorder" OR "depression" OR "depressive symptoms."

With each database reviewed separately, the database search resulted in 93 articles, with a total of 10 duplicates removed, leaving a total of 83 primary research articles to analyze. Research articles were analyzed, and 65 were excluded due to not meeting the filter criteria of only peer-reviewed quantitative articles that were not dissertations. Out of the 18 remaining articles, 10 had an established and validated assessment tool for depression (Figure 2). Only articles with quantitative research designs were eligible, with a resultant 10 journal articles for inclusion in this review (Table 1).

### Data extraction

Quantitative studies were assessed by selected variables using the following categories: (a) first author/date of publication; (b) research design/setting; (c) sample size, mean age and standard deviation, and gender; (d) animal intervention description/animal involved/duration/intervention deliverer; (e) control condition, if any; (f) type of standardized depression outcome measure; and (g) results.

Figure 2:



## Effectiveness of Animal-assisted Interventions

*Table 1*  
*Study Characteristics*

First Author/Date	Design/Setting	Participants	Intervention	Control	Measure	Results
Ambrosi et al./ 2019	RCT/ Institutionalized elderly	$N = 31$ , m & f patients, age $M = 82.6$ , SD = 2.12.	AAT between elderly, dog & handler/30 min. sessions for 10 Weeks/ Conducted by Dog handler & Health provider.	Treatment as usual.	Geriatric Depression Scale $\alpha = 0.00357$	Significant decrease ( $p = .0007$ , $d = 1.58$ ) in depression scale scores in the treatment group.
Berget et al./ 2011	RCT/Inpatient & outpatient psychiatric patients.	$N = 90$ , m & f patients, age $M = 34.7$ , SD = 10.7.	AAT with farm animals/ 12 week Intervention & follow up At six months/ Conducted by farmers.	Treatment as usual.	Becks Depression Inventory $\alpha =$ not included in study.	Significantly lower depression ( $p =$ .002) at F/U as up compared to baseline in both groups, with no signif. group differences.
Earles et al./ 2015	Quasi- experimental/ Volunteers who suffered a traumatic event recruited through mental health providers.	$N = 16$ , m & f patients, age $M =$ , 51.25, SD = 9.99.	AAT with horses for six weekly two hour sessions/ Therapist	None	Nine-item health quest.- depression (authors cited from Kroeke et al, 2001; Spitzer et al., 1999; $\alpha = .91$ )	Significantly fewer symptoms of depression ( $p < .05$ , $d = 0.54$ )

*Table 1*  
*Study Characteristics*

<u>First Author/Date</u>	<u>Design/Setting</u>	<u>Participants</u>	<u>Intervention</u>	<u>Control</u>	<u>Measure</u>	<u>Results</u>
Majić, et al./ 2013 Germany	RCT/ Nursing home residents with moderate to severe dementia.	$N = 54$ , M & F patients, age $M =$ $81.9$ , $SD =$ $9.2$ .	Treatment as usual, combined with AAT with dog/10 weekly, 45 min. individual sessions/ Therapist.	Treatment as usual.	Dementia Mood Scale For Depression $\alpha =$ not included in study.	Depression remained constant ( $p <$ $0.001$ ) in AAT group but increased in control group.
Menna, et al./ 2015	Quasi- experimental/ Adult day care center with mild to moderate Alzheimers disease.	$N = 50$ , M & F patients, age $M = 75$ , $SD = 6.0$ .	AAT with dog using ROT protocol with dog 45 minutes one weekly for six months/ Therapist	1. ROT only. 2. Treatment as usual.	Geriatric Depression Scale $\alpha =$ not included in study.	Significant decrease in depressive symptoms in AAT & ROT only group ( $p = 0.000$ ).
Moretti, et al./ 2010 Northern Italy	Quasi- Experimental/ Nursing home residents,	$N = 21$ , primarily F (95.2%) & M, Age $M =$ $84.7$ , $SD =$ $9.9$ .	AAT with dog 90 min., once weekly, for six weeks/dog handlers & psychologist.	Treatment as usual.	Geriatric Depression Scale $\alpha =$ not included in Study.	Pet group depressive symptoms significantly decreased by 50 % ( $p = 0.013$ ).
Nepps, et al./ 2014	Quasi- Experimental/ Inpatient psychiatric hospital patients.	$N = 218$ , M & F, Age $M =$ $39.3$ , $SD =$ not included in study.	AAA with dog one hour per week until discharge/dog handler & staff.	Treatment as usual plus stress management group.	Burns Depression Checklist $\alpha =$ not included in study.	Significant decrease in depression in AAA group ( $p < .0001$ ) as compared to control group.

*Table 1*  
*Study Characteristics*

<u>First Author/Date</u>	<u>Design/Setting</u>	<u>Participants</u>	<u>Intervention</u>	<u>Control</u>	<u>Measure</u>	<u>Results</u>
Pederson et al./ 2011 Norway	Quasi-experimental/ Cattle farm/ Participants recruited through advertising, social services & health department.	$N = 14$ , M & W, age $M = 37.4$ , $SD =$ not included in study.	AAI with dairy cattle, twice weekly for 90 minutes to three hours per session for 12 weeks/ Farmer present and sessions videotaped.	None	Beck's Depression Inventory $\alpha =$ not included in study.	Depression significantly decreased in two tasks: milking ( $p = 0.02$ ) & moving animals ( $p = 0.03$ ).
Pederson, et al./ 2012 Norway	RCT/ Cattle farm/ Participants recruited through advertising, social services & health department.	$N = 29$ , M & F, age $M = 37.8$ , $SD = 8.7$ .	AAI with dairy cattle, twice weekly for 90 minutes to three hours per session for 12 weeks/ Farmer present and sessions videotaped.	Waiting list group	Beck's Depression Inventory $\alpha = 0.85$	Significant decrease in depression in the intervention group between recruitment & completion ( $p = 0.003$ ).
Schramm, et al./ 2015	Quasi-experimental/ Patients in outpatient psychiatric care.	$N = 6$ , gender not identified, age $M = 47.7$ years, $SD = 16.1$ .	AAT (NAMT) sheep/eight weekly group sessions lasting 2.5 hours each/ Psychotherapist	None	Beck's Depression Inventory II $\alpha =$ not included in study.	Decrease of depressive symptoms but not significant ( $p = .155$ ).

*Note.* ECF = AAT = Animal-assisted therapy; AAI = Animal-assisted intervention; AAA = Animal-assisted Activity; NAMT = Nature and animal-assisted mindfulness training; RCT = randomized controlled trial; ROT = reality orientation therapy.

## Literature Review

Ambrosi et al. (2019) conducted a randomized controlled trial on the institutionalized elderly. Patients resided in a National Health Service-accredited long-term care facility in northern Italy from March 2017 to September 2017 ( $N = 31$ , male and female patients, age  $M = 82.6$ ,  $SD = 2.12$ ). AAT with a dog, an animal handler from a fully registered non-profit pet therapy organization, and human health service workers provided the experimental group with 30-minute weekly sessions of structured interactions with dogs over 10 weeks. The control group was provided treatment as usual. Two professional dog handlers from a fully registered non-profit pet therapy organization and health service providers were present. The dogs were professionally trained and had passed therapy dog certification tests. The Geriatric Depression Scale ( $\alpha = 0.00357$ ) resulted in a large effect size and a significant decrease ( $p = .00007$ ,  $d = 1.58$ ) in depression scale scores in the treatment group.

The JBI Critical Checklist (2017) for randomized controlled trials was conducted.

There were significant issues of generalizability of findings due to the samples selected from a single long-term nursing care facility. However, the authors noted patients were from a broad sociodemographic and clinical population. Furthermore, subjects with severe cognitive deterioration in comorbidity with depression were excluded since the Mini-Mental State Examination cut-off score was 19 for patients included in the study.

Berget et al. (2011) conducted a randomized controlled trial in Norway on inpatient and outpatient psychiatric patients with a combination of different severe psychiatric diagnoses ( $N = 90$ , male & female patients,  $M = 34.7$ ,  $SD = 10.7$ ). According to the researchers, animal-assisted therapy (AAT) was provided where patients cared for various farm animals for three hours, twice weekly for 12 weeks, with a farmer's supervision; a health professional accompanied each patient for the first visit only. The animals were not specially trained or certified for temperament or behavior. The control group was provided with psychiatric treatment as usual. The researchers also conducted a follow-up at six months. The Beck's Depression Inventory ( $\alpha =$  not included in the study) results measured no significant differences between the groups. However, BDI results were significantly lower at follow-up ( $p = .002$ ) than baseline for both groups.

The JBI Critical Checklist (2017) for randomized controlled trials was conducted. First, the study asserted AAT as their study type, but the intervention was AAA due to a farmer guiding the participants to assist with animal care. Therefore, the intervention was not clearly operationally defined. Although each patient had a contact person that was a college-educated employee from the health authority that accompanied patients from the health authority for their initial visit to the farm, the farmers supervised the animals' ongoing contact during the intervention periods. Due to the varying differences of those in the intervention group (inpatient and outpatient subjects with various diagnoses), limited sample size, and lack of specificity of intervention, the positive effect on depression seemed challenging to ascertain.

Earles et al. (2015) conducted a quasi-experimental study on volunteers recruited through outpatient mental health providers who suffered a traumatic event ( $N = 16$ , male and female, Age  $M = 51.25$ ,  $SD = 9.99$  years). AAT with equines was provided by human health providers to subjects for two-hour sessions of structured interactions for six weeks, with no control group. The study did not specify if the equines were trained or certified. Nine-item Patient Health Questionnaire measuring depression (from Spitzer, Kroenke, & Williams, 1999; Kroenke, Spitzer & Williams, 2001;  $\alpha = .91$ ) resulted in significantly fewer symptoms of depression, ( $p < .05$ ,  $d = 0.54$ ) when pre and post-test findings were compared.

The JBI Critical Checklist (2017) for quasi-experimental studies was conducted. Participants were adult volunteers who continued their current treatment regimen, possibly accounting for the positive change in depression. Due to the research lacking a control group, it was impossible to prove that the change in depression scores was due to equine-assisted therapy or another variable. There was also no ability to assess the intervention's long-term effects since the researcher did not conduct follow-up data on the participants.

Majić et al. (2013) conducted a randomized controlled trial on nursing home residents in Germany with moderate to severe dementia, including depressive symptoms ( $N = 54$  male and female patients, Age  $M = 81.9$ ,  $SD = 9.2$ ). The intervention group was provided Animal-assisted Therapy (AAT) via initiating client interactions with a dog for 45-min individual sessions for 10 weeks, provided by a mental health therapist. The control group was provided with treatment as usual. The Dementia Mood Scale for Depression ( $\alpha =$  not included in the study) resulted in depression scores remaining constant in the AAT group ( $p < 0.001$ ) but increased in the control group.

The JBI Critical Checklist (2017) for randomized controlled trials was conducted. Due to the varying cognitive functioning of those in the intervention group, limited sample size, and lack of specificity of intervention, there are questions regarding the significance of results. The researchers did not specify if participants had a previous or current strong connection with an animal, which may have contributed to the depression scores remaining constant.

Menna et al. (201) conducted a quasi-experimental study with adult daycare center patients with mild to moderate Alzheimer's disease and depressive symptoms ( $N = 50$  male and female, Age  $M = 75$ ,  $SD = 6.0$ ). Participants were provided AAT with a dog and therapist through structured interactions while using Reality Orientation Therapy (ROT) protocol for 45 minutes once weekly for six months by a therapist. The dog was specially trained and certified for temperament and behavior. A second group was provided ROT only, and the third group was provided with treatment as usual. The results of the Geriatric Depression Scale ( $\alpha =$  not included in the study) showed a significant decrease in depressive symptoms for the AAT and ROT group ( $p = 0.000$ ). Bonferroni-Dunn test resulted in statistically significant differences between the AAT group and the other two ( $p < 0.001$ ).

The JBI Critical Checklist (2017) for quasi-experimental studies was conducted.

This study's validity and reliability were in question due to the lack of a randomized or double-blinded sample, and the sample size was small. It could not be determined whether improvement in depression was persistent over time since the authors carried out a short-term evaluation (six months). It is also uncertain whether the therapeutic effect or differential impact of AAT was due to the animal or the therapist's relationship with the sample population.

Moretti et al. (2010) conducted a quasi-experimental study on nursing home residents in Northern Italy ( $N = 21$ ; primarily female (95.2%) and male, age  $M = 84.7$  &  $SD = 9.9$ ). AAT with a dog through structured interactions was provided 90 minutes weekly for six weeks by three dog handlers & a psychologist, while the control group was provided with treatment as usual. The dogs were specially trained and certified by a veterinarian. The Geriatric Depression Scale ( $\alpha =$  not included) was conducted. Within the intervention group, depressive symptoms significantly decreased by 50% ( $p = 0.013$ ).

The JBI Critical Checklist (2017) for quasi-experimental studies was conducted. The sample size was small, and the study design was not double-blinded or randomized. The generalizability is limited because all but one participant were women with a limited educational

background. Any improvement in depressive symptoms could not be proven persistent over time due to the short-term intervention and lack of follow-up studies.

Nepps et al. (2014) conducted a quasi-experimental study on participants in an inpatient psychiatric hospital with psychological and physiological variables, including depressive symptoms ( $N = 218$ , males and females, Age  $M = 39.3$ ,  $SD =$  not included in the study). According to the researchers, the experimental group was provided animal-assisted activities (AAAs), such as initiating interaction with a dog one hour per week until discharge and delivered by a volunteer handler/dog duo approved by the hospital and health care providers. The control group was provided treatment as usual plus a Stress Management Group. The Burns Depression Checklist Brief Version, Revised ( $\alpha =$  not included in the study), showed a significant decrease in depression ( $p < .0001$ ) after the AAA program, comparable to the stress management group.

The JBI Critical Checklist (2017) for quasi-experimental studies was conducted. The large sample size was used to appropriately power the study and increase the probability of detecting real differences. However, participants freely selected which treatment they would receive, therefore not randomly assigned to any group. It was also impossible to ascertain if the therapist or the dog was the therapeutic factor. Although the researchers noted the modality as an AAA, it was explicitly an Animal-assisted Activity (AAT). Due to hospital staff variations, the experience could not be entirely identical for different participants throughout the study.

Pederson et al. (2011) conducted a quasi-experimental study on a cattle farm in Norway ( $N = 14$ , men and women, Age  $M = 37.4$  years,  $SD =$  not included). Participants with clinical depression were recruited through advertising, the Norwegian Labor and Welfare Service, and contact with health personnel. The inclusion criterion was a minimum score of 14 on the Beck Depression Inventory-First Amended (BDI-IA) (Beck & Steer, 1987). According to the researchers, Animal-assisted Interventions (AAIs) via work with dairy cattle, twice a week for 1.5 to 3 hours each for 12 weeks. The animals were not specially trained or certified for temperament or behavior. A farmer was present, and sessions were videotaped. There was no control group. Beck's Depression Inventory ( $\alpha =$  not included in the study) results showed depression significantly decreased in two of the tasks: milking procedures ( $p = 0.02$ ) and moving animals ( $p = 0.03$ ). For the behaviors of inactivity, grooming, physical and visual animal contact, and mucking (removing manure from the animal area), the relationships with depression were opposed to one another. The result indicates a negative association between a change in depressive symptoms and high levels of these behaviors. There was a close to significant association between depression and animal contact ( $r = 0.50$ ,  $p = 0.07$ ).

The JBI Critical Checklist (2017) for quasi-experimental studies was conducted. Although the researchers noted the modality as an AAI, it was explicitly an Animal-assisted Activity (AAA). Since the study provided no control group data, the significant change in depressive symptoms cannot solely be attributed to the intervention. Video recordings were made early and late in the intervention at certain time frames. Therefore, it is difficult to conclude an accurate assessment of differing behaviors of the participants over a specific time frame. Also, observed correlations between mental health measures and work duties do not reveal any causal relations.

Pederson et al (2012) conducted a randomized controlled trial on a cattle farm in Norway ( $N = 29$ , male and female, Age  $M = 37.8$ ,  $SD = 8.7$ , intervention group ( $n = 16$ ) or a wait-list control group ( $N = 13$ ). Participants with clinical depression were recruited through advertising, the Norwegian Labor and Welfare Service, or health personnel. The inclusion criterion was a score of a minimum of 14 on the Beck Depression Inventory-First Amended (BDI-IA) (Beck & Steer, 1987). According to the researchers, Animal-assisted Intervention (AAI) consisting of contact and

work with dairy cattle was provided twice a week for 1.5 to 3 hours each for 12-weeks. The animals were not specially trained or certified for temperament or behavior. A farmer was present, and sessions were videotaped. The control group was on a waiting list. Beck's Depression Inventory ( $\alpha = 0.85$ ) resulted in a significant decrease in depression ( $p = 0.003$ ) in the intervention group between the beginning and end of the intervention.

The JBI Critical Checklist (2017) for randomized controlled trials was conducted. Although the researchers noted the modality as an AAI, it was explicitly an Animal-assisted Activity (AAA). The small sample size contributed to low power, which made it possible that not all clinically significant differences between groups could be detected. A follow-up assessment was not conducted, which does not assess the long-term effects of the intervention. The intervention attendance and content could have influenced the intervention group's outcomes because the intervention was not standardized. Possible confounding factors were probably due to differences between groups in background variables such as concurrent treatment and years lived with depression.

Schramm et al (2015) conducted a quasi-experimental study on patients in outpatient psychiatric care ( $N = 6$ , gender not identified, age  $M = 47.7$  years,  $SD = 16.1$ ). AAT, specifically Nature and animal-assisted mindfulness training (NAMT) with sheep familiar with human interaction and trained in leash walking through structured interactions, was provided for 2.5 hours weekly for eight weeks, conducted by a psychotherapist. There was no control group. Beck's Depression Inventory-II ( $\alpha =$  not included in the study) showed decreased depressive symptoms but did not yield statistically significant results ( $p = .155$ ).

The JBI Critical Checklist (2017) for quasi-experimental studies was conducted. Due to a small sample, there was low power and effect size. The lack of a control group made it impossible to assess what part of the intervention (the caring for cattle or the farmer) was successful. A follow-up was not conducted, which does not allow for evaluating the long-term effects of the intervention.

### **Synthesis of Findings**

The results of this review suggest that AAIs may play a positive role in enhancing the benefits of conventional therapy for depression. Even with the chosen studies using different animal species, a decrease in depressive symptoms was seen in all instances. However, the quantitative studies have been relatively low quality due to small sample size, weak effect sizes, and limited clinical heterogeneity of the sampled populations. The heterogeneity issue could have to do with the limited sample sizes and lack of a truly randomized sample due to the respective populations being from specific locations or facilities. Also, there was a lack of clarity and population choice to ensure cultural and racial diversity. One could postulate that the direct effects of AAIs could result in an improvement in depressive symptoms. However, confounding factors were probable in all the studies due to differences in background variables of participants such as concurrent treatment, years lived with depression, and other co-occurring mental illnesses.

Since the interventions were not standardized in the studies herein, the intervention group's outcomes could have been influenced by the intervention content and attendance. For example, AAIs effect could depend on reciprocal contact with the animal, therapist, or handler. In other words, we cannot distinguish between the differential impact of the therapist or handler and the dog on those participating in the study. Therapeutic centers specializing in AAI could not ethically randomly assign clients to therapy without an animal since that is the reason they seek out this

specific treatment modality. It is difficult for researchers working in animal-assisted interventions to find feasible and appropriate conventional research methods in health care settings.

The studies reviewed suffer from insufficient control and variable evidence of the benefits while not showing any detrimental result from incorporating some form of AAI for adults dealing with depressive symptoms. Further, the roles of the animals and handler/therapist in the interventions were not clearly defined in many of the studies. Still, the potential clinical benefits call for better research designs to help provide evidence for the treatment using AAIs. Organizations and businesses could consider hiring a trained animal therapist on staff or find trained volunteers to bring behaviorally appropriate, healthy, and vaccinated animals for scheduled visits to interact with patients and staff. Patients could self-select to have contact with the animal, ensuring that only patients who like animals could benefit from animal interactions. AAI may not be appropriate for all adults with depressive symptoms, but the evidence suggests some experience a socially stimulating activity with statistically significant results. Employees could also benefit from AAI in their organization by decreasing unwanted behaviors in patients; this could lead to increased staff retention and job satisfaction, which should be considered for future study.

### **Recommendations for Future Research**

Results analyzed in this review could not be generalized to patients not in psychiatric care or those diverse in age, race, or culture. Future research with a non-treatment control group could clarify whether changes in both groups were intervention treatment effects or placebo. Controlled studies would assist with defining the therapist's perspective of the participant's symptoms. The function of AAIs for research participants needs a more accurate operational definition and increased clarification of the training and certification of the animals used in the interventions. Future research should consider using a control group design, analyze the influence of expectancy effects and group dynamics on treatment results, and examine the treatment's long-term effects with follow-up research. Additional research is needed to determine longer-term effects past the end of the intervention. However, long-term effects might be difficult to measure due to cognitive or psychiatric decline in some subjects.

Efforts should consider incorporating another modality of measurement of psychosocial symptoms, such as an interview with a clinician, to corroborate self-report data. There are also ethical concerns that must be addressed in future experimental studies, such as threats to internal validity, including maturation (due to studies that are a single group design), attrition (due to clients dropping out of treatment prematurely), and history (inability to control what happens to clients between pre and post-tests). Without a control group, it is impossible to control for maturation and history, and attrition is an issue in any type of study. Incorporating qualitative research methods may also fill in the gaps that quantitative studies can't due to these inherent ethical issues.

This systematic review was intended to analyze existing research regarding AAI for adults with depressive symptoms. Studies have shown that this intervention may effectively add to established treatment modalities. The limited publication of conducted randomized controlled trials (RCTs), small sample sizes, and multiple study designs cause ongoing concerns with the ability to justify practice implementation. Various areas for continued intervention clarification and continued research have been identified. It is the hope that AAIs will continue to be researched as an addition to current established therapeutic modalities to reduce depressive symptoms in adults.

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