



## EFFECT OF ANIMAL-ASSISTED THERAPY ON DEPRESSION, MEMORY, ATTENTION, AND EMOTION REGULATION

*Original scientific paper*

Unnati G Hunjan<sup>1</sup>, Dr K Jayasankara Reddy<sup>2</sup>

<sup>1,2</sup> Department of Psychology, Christ University, Bangalore, India

Received: 2022/05/12

Accepted: 2023/01/25

### ABSTRACT

*Introduction:* The mere presence of a dog in a therapeutic setup is known to bring about more positive outcomes when incorporated in therapy, dogs can bring about multifarious benefits which are not entirely tapped upon.

*Aim:* This research aimed to study the effect of animal-assisted therapy (AAT), with therapy dogs, on depressive symptoms, emotional regulation, memory and attention of individuals.

*Method:* A pretest-posttest quasi-experimental research design was used. Psychology Experiment Building Language (PEBL) for memory and attention, Difficulty in Emotion Regulation Scale (DERS) and Hamilton Depression Rating Scale (HDRS) were used for pre and post-testing 1 week before and post the intervention.

*Results:* The findings reveal a positive impact of AAT on the given domains of memory, attention, emotion regulation and depressive symptoms, in the experimental group. No significant changes were obtained for the control group.

*Discussion:* The results help validate the module of AAT to improve an individual's cognitive functioning and alleviate depressive and emotional dysregulations. Further implications are discussed.

**Keywords:** animal-assisted therapy, attention, depression, emotion regulation, memory, therapy dog

### INTRODUCTION

An increase in awareness about mental health in India has given rise to a large number of prevalent cases of psychiatric disorders coming to light. India and China, as compared to the rest of the world, were reported to have the highest prevalence of depression (World Health Organization, 2017). Depression has affected over 322 million people all over the world, out of which about half are reported to prevail in South-Eastern Asia and the Western Pacific region (World Health Organization, 2017). A person suffering from major depressive disorder must have five or more of the following symptoms,

showing a variation from their previous state of functioning: repeated death-related thoughts, reduction in concentration and thinking ability, guilt feelings, psychomotor deficits, sleep disturbances, loss of weight, and at least one of these symptoms must be depressed mood or loss of interest (American Psychiatric Association, 2013). These clinically significant symptoms that are not caused by other ailments, must last for 2 weeks or more to get diagnosed according to the DSM 5. Depression has a long course and recurrent relapses (Sadock, Sadock, & Ruiz, 2015). This disorder impacts the

**Correspondence to:** Unnati G Hunjan, Department of Psychology, Christ University, Bangalore, India  
Email: unnatihunjan5@gmail.com

life of the person suffering from it in various ways other than the stated symptoms. The current study will focus on depressive symptoms while the disorder is in the mild stage, along with the strain on cognitive functioning and emotion regulation. Various ailments, including physiological, psychological or neurological are alleviated with the help of animal-assisted therapy. However, an inquiry into this field started only about five decades ago and most of the literature available is grounded in western culture. In the west, multiple benefits of interaction with animals have been found, including improvement in depressive symptoms. In the United Kingdom, for example, a study found that the national health program saved about 600 million pounds as a result of pet ownership (Phillips, 2002).

#### A. Animal Assisted Therapy

Animal Assisted Therapy (AAT) employs animals as a modality for therapeutic purposes while enabling patients, suffering from acute or chronic disorders, to heal and rehabilitate them. The animal can be included in the therapeutic process for a variety of purposes ranging from diagnosis to treatment. This entails having goal-oriented activities decided before the sessions, in conjunction with the clients. It helps improve a person's emotional and societal skills and mental and physical functioning. It can be used with individuals or groups and in a myriad of settings, including but not limited to nursing homes, hospitals, jails, and many more (Fine, 2015). The animal is chosen based on the nature and type of therapy that will be used for the client and that animal might serve many purposes throughout the process (Nimer & Lundahl, 2007).

#### B. Human-Animal Bond

Humans have a special bond with animals, as evidenced by the domestication of various species of animals as well as the peaceful cohabitation of humans with animals in today's day and age. The same can be observed from times in memorial, wherein a myriad of pre-historic carvings, scriptures and artwork have portrayed this special bond. In this animal-human bond, the noteworthy one is bonding with dogs. Rightly called a man's best friend, there have been uncountable anecdotes, books, stories, movies and write-ups about the unconditional love they have provided man with. Therapy dogs are innately capable of establishing a much-needed rapport with the clients and help perceive the therapy environment as safe enough to disclose experiences that are very personal to them. The cheerful way in which they greet every

client that enters the therapeutic setting seeks the client's attention and provides warmth and affection while easing the tension (Fine, 2006). The bond between the therapy dog and the therapist also portrays how compassionate and benevolent the therapist is and can be, thus making the client more comfortable (Kruger & Serpell, 2010). These dogs act as "social lubricants" or "ice breakers" in a therapeutic setting (Corson et al., 1977; Arkow, 2015). Being one of the largest organizations that work towards animal-assisted therapy, some of the advantages listed by The Delta Society are improved social skills, reduced absenteeism with an increased amount of involvement, the betterment of peer relationships, improved eye contact, tone of voice and communication skills (Why Pet Therapy?, 2018).

#### C. Neurophysiological Underpinnings of Human-Animal Interactions

When 69 original studies were reviewed, it was found that human and animal interaction has a myriad of benefits, which are deep-rooted in human physiology. These benefits include altering blood pressure (Odendaal, 2000), cortisol levels as well as heart rate to help reduce stress. It also helped with cardiovascular diseases, and mental and physical health (Beetz, Uvnäs-Moberg, Julius, & Kotrschal, 2012). Through these studies, it is also evidenced that this human-animal interaction improves trust, empathy, social skills, attention, interpersonal relationships, and affect. It decreases stress-related neurotransmitters epinephrine and norepinephrine (Beetz, Uvnäs-Moberg, Julius, & Kotrschal, 2012). It also helps to lessen aggression and enhance learning. The most important finding indicated the activation of the oxytocin system due to human-animal interaction (Odendaal & Meintjes, 2003). It also helps to manage pain and perceived pain through a reduction in catecholamine and an increment in levels of endorphins (Marcus, 2013; Odendaal & Meintjes, 2003),  $\beta$ -phenylethylamine, prolactin and dopamine (Odendaal & Meintjes, 2003). This further impacts depressive symptoms. As given by the scores on Beck Depression Inventory, which were found to reduce after implementing animal-assisted therapy (Folse, Minder, Aycok, & Santana, 1994; Berget, Ekeberg, Pedersen, & Braastad, 2011). Speech, communication and vocabulary improvement, and cognitive development are known to take place with the therapy animal as a catalyst (Poresky, 2015). Through therapy, clients can be taught self-control as animals cannot be manipulated or bullied easily, it requires a certain

amount of time and works to gain the animal's trust so that it follows commands. It also provides them with a sense of empowerment when these commands are followed and teaches them assertiveness (McIntosh, 2002). Clients with abusive tendencies often gain from positive interactions with animals and observe the kindness and compassion shown by them, thus acting as role models (Nebbe, 1994). It helps to reduce their anger, abusive behaviours, and manipulation, increasing their cooperation, positivity and finding appropriate outlets for venting (Anderson & Urichuk, 2008). AAT, by the modest action of patting the animal or touching it, has proven to lessen anxiety and is extremely effective with anxiety spectrum disorders (Mason & Hagan, 1999). In depressive disorders, it helps to elevate mood and affect, improves the perception of self-control while reducing effects of learned helplessness, alleviates feelings of isolation, boredom and worthlessness, helps to address loss or guilt and lessens risky and suicidal behaviours. It also helps induce positive attitude and mood, reality testing, assertion, attention, decision making, social activity, interest, concentration, memory, reality orientation and reduce self-talk and improves sleep and appetite (Anderson & Urichuk, 2008). Animals are often used for generating stories and metaphors, observational learning can take place too as the clients learn by modelling the desired behaviours (Fine, 2015). When bonding takes place between the client and the animal, an increase in the neuroendocrine chemicals responsible for their affection and an elevated mood is found (Odendaal, 2000).

#### D. Animals as a Catalyst for Emotions

Person-centred theory suggests three main conditions that have to be met by the therapist and all three are fulfilled by a therapy dog, namely, genuineness, unconditional positive regard and empathy (McIntosh, 2002). When clients suffer from the inability to express their emotions suitably or have been suppressing them or have been made to believe that their emotions are not important, they may face inappropriate guilt and stress. Therapy animals then provide them with a haven to emote, to feel a variety of emotions (Cousins, 1989) and to experience behaviours like touching, in a suitable way which are shunned from our daily interactions (Fine, 2015; Thompson et al., 2014). They are also known to be "emotional regulators" in therapeutic settings (Fine, 2015). Thus, they can help improve verbal and non-verbal communication and learn about their own and others' emotions along with the appropriate way to emote

(Anderson & Urichuk, 2008). In AAT, the animals help the clients understand empathy, in ways that are more practical and not easily accomplished by other human interactions (Nebbe, 1994). It helps to improve their patience and understanding. With the unconditional positive regard provided by animals along with their non-judgmental and non-discriminatory nature, they help to build the client's self-esteem, and self-confidence and provide them with a sense of purpose (Jorgenson Jennifer, 2007). Through various experiences in life, many clients may develop difficulty in trusting others or getting attached. These attachment difficulties have also been explored through AAT wherein, clients found it easy to trust an animal and have been known to disclose their troubles to them (Covert, Whiren, Keith, & Nelson, 1985). Dogs are known for their unconditional love and for being completely non-judgmental. Animals can be used to establish a therapeutic relationship between the client and the therapist as they act as an adjunct (Mallon, 1994). Therapy dogs can facilitate positive communication and interactions with others, bonding with them, learning about personal space and suitable physical touch, increasing nurturance, and trust and providing a distraction from distress.

#### E. Research Objective

The main objective of this research is to study the role of animal-assisted therapy incorporating therapy dogs, on the improvement of emotion regulation, memory, attention and depressive symptoms.

#### F. Rationale and Significance

In India there has been a rampant increase in the rate of depression which is twice as prevalent in the urban population, affecting between 1.7 to 74 people per thousand. It is also predicted that if the current trend continues at the same pace, by the year 2020 depression will be the second-highest cause of disability-adjusted life years (DALYs). The World Health Organization reports have evidenced that nearly 56 million people in India are affected by depression. About one in twenty Indians suffer from depression (Grover, Dutt, & Avasthi, 2010). It has been found that the mere presence of an animal in a therapeutic setting has proven to be beneficial for patients (Anderson & Urichuk, 2008), so the therapeutic effects of these animals, if worked on effectively can be multifarious. The multiple benefits of AAT include improved emotion regulation, self and cognitive development, attachment, motivation, reduced anxiety, depressive symptoms, isolation and guilt feelings will prove to be greatly advantageous to patients with depression. However, a large

majority of the studies available on AAT have been conducted in the west, there are negligible studies concerning the effects of AAT in an Indian context. Given the vast disparity in their outlooks towards animals, specifically dogs, in various cultural communities, the studies performed in the west are not directly applicable and their interventions cannot be directly implemented. Research including an Indian population is negligible, and this indicates the need for the current study given the sharp rise in depression. Although dogs are the most commonly kept pet (Gray & Young, 2011), and some cross-cultural differences in attitudes toward dogs exist (Knobel, Laurenson, Kazwala & Cleaveland, 2008; Miura, Bradshaw, & Tanida, 2000), no research has examined whether animal-assisted therapy that employs dogs is differentially effective in the eastern cultures. Moreover, most of the literature available on AAT is anecdotal or involves basic animal-human interaction instead of therapy. This is a relatively new field of inquiry wherein the exploration in this field started in the late 1960s. It was also found that the few experimental studies published lacked a significant sample size which further limited its statistical power and application to the general population. Thus, a dire need for scientific studies is present in the dearth of appropriate literature concerning AAT (Anderson & Urichuk, 2008). The present study will help to establish the effectiveness of AAT in regulating emotions, depressive symptoms, memory and attention.

## METHOD

### A. Sample

The sample consisted of 30 participants with mild to moderate depression within the age group of 20-30 years. Purposive sampling technique was used to select the participants that match the criteria. The inclusion criteria for this study were consenting individuals within the age group of 20-30 years, who can read, write and speak English and have a score between 8-18 points on the Hamilton Depression Rating Scale. The exclusion criteria were individuals with a history of psychiatric, neurological or neurosurgical conditions and any other co-morbidity, with a score higher than 19 points on the Hamilton Depression Rating Scale, an allergy to dogs and/or individuals with pets.

### B. Instruments

Hamilton Depression Rating Scale (HDRS) assesses the severity of symptoms over time with a set of 21 symptoms that the participant has to rate on a scale from 1 to 4 or 1 to 2 based on a

2-item or 4-item symptom questions. This scale is generally given pre and post-intervention to select the study population and observe the changes over time. Scores from 0-7 are defined as normal, from 8 to 13 as mild depression, from 14 to 18 as moderate, from 19 to 22 as severe, and above 23 patients will be diagnosed with very severe depression (Hamilton, 1960). Difficulties in Emotion Regulation Scale (DERS) is a 36-item scale on which the participants rate themselves on a 5-point scale, from almost never to almost always. Some items are reverse scored and a sum of the score on all statements gives the total score, where a high score indicates greater problems with emotion regulation (Gratz & Roemer, 2004). Psychology Experiment Building Language (PEBL) includes a battery of tests to measure the cognitive functioning of individuals. The tests used in this study included a free recall test, a four-choice test and CORSI to gauge memory and attention (PEBL Psychological Test Battery, 2019).

### C. Research Design

A pretest-posttest quasi-experimental research design was used. The participants were matched based on age, gender, educational qualification and HDRS scores and assigned to experimental and control groups. Both groups underwent pretesting, to gauge the severity of symptoms 1 week before the intervention and then a posttest 1 week after the intervention.

### D. Procedure

Participants were selected according to availability and stated criteria. They were matched based on age, gender and educational qualification, and HDRS scores and divided into experimental and control groups. Informed consent was obtained, introduction to the study and procedure was given. The participants were pretested in relatively uniform conditions. HDRS, selected tests on PEBL and DERS were administered. The control group was engaged in activities, like playing games and structured conversations, for 45 minutes once a week over three months. The experimental group was engaged in animal-assisted therapy for the same duration. The therapeutic procedure involved various goal-directed activities performed by an animal-assisted therapist and mediated by a therapy dog. Some of the activities involved include stroking the dog, teaching it tricks, effectively commanding it, playing, grooming, talking, remembering about the dog and making use of the therapy dog either directly through tasks or as a metaphor to achieve goals. A total of 12 sessions were held over the span of three months. One week after the intervention

period, all the participants underwent post-testing under relatively standardised conditions. All participants were debriefed about the experiment and their questions were addressed. At the end of the study, the waitlisted control group was offered animal-assisted therapy and provided a list of alternatives if they chose to not participate.

#### E. Ethical Considerations

Ethical clearance was obtained from the Department of Psychology, Christ University, Bangalore, India prior to conduction of the study. Participant protection. Detailed informed consent was provided to the participants and only those willingly participating were selected. The freedom to withdraw from the study at any point in time was communicated clearly. The participants were safeguarded from any mishaps with the therapy dog. If they were uncomfortable with the dog or if indicated by the therapist, the session would be terminated to protect the participant, however, such a situation did not arise in the study. All required safety measures were taken, like keeping a list of doctors ready for any emergencies. No physical or psychological harm was intended to the participants. A debriefing session was provided at the end of the study. Animal protection. The therapy dog was protected from being roughly handled by guiding the participants in the right way to handle the dog. All hazardous materials were cleared from the therapy site, overfeeding of treats was forbidden and the safety of the dog was ensured. As heat can affect the temperament of the dog, measures were taken to make sure the therapy does not take place if a very hot environment. It was protected from any form of danger and abuse and was given frequent breaks so that it can resume

normal behaviour. Medical attention would be given if the dog was ill, injured or stressed, based on the judgment of the dog handler, however, such a situation did not arise in the study. Scientific integrity. None of the data was fabricated, and proper authorship and credit were given where it is due. The experiment was conducted ethically following the guidelines that are given by APA for conducting such experiments. All the data collected has been kept confidential.

#### RESULTS

Animal-assisted therapy has been clinically employed to manage and treat various psychological, social and psychiatric ailments. Not many studies have been conducted to explore its role in improving depressive symptoms, memory and emotion regulation. This study was conducted to measure the difference in memory, attention, emotion regulation and depressive symptoms before and after animal-assisted therapy incorporating a therapy dog. The experimental group had 3 dropouts and the control group had 4. The participants were considered a dropout if they missed more than one intervention session. The reasons for missing the sessions included the inability to travel to the intervention venue, ill health or other commitments. The dropped-out participants have been excluded from the analysis. In the experimental group, the Shapiro-Wilk test for normality was conducted for all the domains. The scores for attention, emotion regulation, working memory, and spatial working memory span were normally distributed as shown in Table 1. For depressive symptoms, the post-test scores and for spatial working memory block span, both pre and post-test scores were skewed.

Table 1. Experimental Group Shapiro Wilk Test of Normality

Domain	Statistic	df	Sig.
Post_Attention	.959	11	.757
Post_Depressive Symptom	.823	11	.019
Post_Spatial Working Memory (Block Span)	.803	11	.010
Pre_Emotion Regulation	.914	11	.272
Pre_Depressive Symptom	.906	11	.219
Pre_Spatial Working Memory (Memory Span)	.851	11	.053
Pre_Working Memory (accuracy)	.911	11	.254
Pre_Working Memory (response time)	.920	11	.315
Pre_Attention	.936	11	.473
Post_Emotion Regulation	.948	11	.623
Post_Spatial Working Memory (Memory Span)	.905	11	.212
Post_Working Memory (accuracy)	.918	11	.303
Post_Working Memory (response time)	.894	11	.157
Pre_Spatial Working Memory (Block Span)	.850	11	.043

Paired sample t-tests were carried out for the normally distributed domains of the experimental group, as seen in Table 2. All the mean differences reported below are posttest – pretest scores of the participants. The emotion regulation had improved post-intervention, seen by a drop in the mean score. A higher score on the DERS denotes higher issues with emotion regulation. There was a mean difference of -14.083 significant at .000. The spatial working memory (memory span) had improved with a higher post-intervention score,

with a mean difference of 1.375 significant at .000. For working memory (based on the accuracy of responses), improvement with a mean difference of .12 was found after the intervention, significant at .000. Based on the response time, an improvement with the mean difference of -2.20, significant at .006 was observed post-intervention. The attention scores improved as well. A mean difference of -0.67, significant at .004 is reported. A lower posttest score indicates an improvement, as the lower the score, the higher the attention.

Table 2. Experimental Group Paired Sample t-test

Domain	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Post Emotion Regulation - Pre Emotion Regulation	-14.083	5.089	9.586	11	.000
Post Spatial Working Memory (Memory Span) - Pre Spatial Working Memory (Memory Span)	1.3750	.5276	9.027	11	.000
Post Working Memory (accuracy) - Pre Working Memory (accuracy)	.12000	.08485	4.899	11	.000
Post Working Memory (response time) - Pre Working Memory (response time)	-2.20083	2.22319	3.429	11	.006
Post Attention – Pre Attention	-.06731	.06321	3.689	11	.004

Wilcoxon signed-rank test was carried out for depressive symptoms and spatial working memory (block span) as seen in Table 3. There was a significant difference between the pre and post-conditions for depressive symptoms and spatial working memory (block span), significant

at .002 for both. A lower mean score for depressive symptoms indicates a reduction in symptoms, and a higher mean score for spatial working memory indicates an improvement. These results indicate that AAT improved emotion regulation, memory and attention and reduces depressive symptoms.

Table 3. Experimental Group Wilcoxon Signed Rank Test

Null Hypothesis	Sig.	Decision
The median of difference between Post_Depressive Symptoms and Pre_Depressive Symptoms equals 0	.002	Reject the null hypothesis
The median of difference between Post_Spatial Working Memory (Block Span) and Pre_Spatial Working Memory (Block Span) equals 0	.002	Reject the null hypothesis

For the control group as well, the Shapiro-Wilk test of normality was carried out for all the scores, pre and post-intervention.

Data from all the domains were normally distributed except for posttest scores of spatial working memory (block span) as seen in Table 4.

Table 4. Control Group Shapiro Wilk Test for Normality

Domain	Statistic	df	Sig.
Pre_Emotion Regulation	.928	11	.391
Pre_Depressive Symptom	.883	11	.114
Pre_Spatial Working Memory (Block Span)	.866	11	.069
Pre_Spatial Working Memory (Memory Span)	.902	11	.194
Pre_Working Memory (accuracy)	.930	11	.414
Pre_WorkingMemory (response time)	.949	11	.629
Pre_Attention	.940	11	.518
Post_Emotion Regulation	.976	11	.939
Post_Depressive Symptom	.964	11	.824
Post_Spatial Working Memory (Block Span)	.689	11	.000
Post_Spatial Working Memory (Memory Span)	.885	11	.119
Post_Working Memory (accuracy)	.858	11	.055
Post_Working Memory (response time)	.935	11	.462
Post_Attention	.949	11	.637

Paired sample t-test was carried out for the normally distributed domains as seen in Table 5. There were no significant differences found between the pre and post-test scores, despite a mean difference (MD) on all domains except spatial working memory (memory span) where the MD was .636 ( $p=.035$ ), indicating a significant improvement.

For emotion regulation, the MD was .273 ( $p=.821$ ), for depressive symptoms the MD was .273 ( $p=.706$ ), for working memory based on accuracy the MD is .016 ( $p=.457$ ), based on response time the MD was .425 ( $p=.299$ ) and for the scores of attention the MD was -.003 (.941).

Table 5. Control Group Paired Sample t-test

Domain	Mean	Std. Deviation	t	df	Sig.
Post_Emotion Regulation - Pre_Emotion Regulation	.273	3.901	.232	10	.821
Post_Depressive Symptom - Pre_Depressive Symptom	.273	2.328	.389	10	.706
Post_Spatial Working Memory (Memory Span) - Pre_Spatial Working Memory (Memory Span)	.6364	.8686	2.430	10	.035
Post_Working Memory (accuracy) - Pre_Working Memory (accuracy)	.01636	.07018	.773	10	.457
Post_Working Memory (response time) - Pre_Working Memory (response time)	.42455	1.28528	1.096	10	.299
Post_Attention - Pre_Attention	-.00273	.11967	.076	10	.941

Wilcoxon signed-rank test was conducted for the spatial working memory as seen in Table 6. There was no significant difference between the pre and post-intervention scores and the null hypothesis was retained ( $p=.317$ ).

Thus, indicates that even though slight improvements were seen in the control group, the changes were not significant, whereas the intervention with the therapy dog was more effective.

Table 6. Control group Wilcoxon Signed Rank Test

Null Hypothesis	Sig.	Decision
The median of difference between Post_ Spatial Working Memory (Block Span) and Pre_ Spatial Working Memory (Block Span) equals 0	.317	Retain the null hypothesis

## DISCUSSION

Structured interventions with therapy dogs have been shown to bring about positive outcomes and improvements in individuals who participate. Very few Indian studies have incorporated an intervention targeted towards improving memory, attention, emotion regulation and alleviating depressive symptoms. This research has shown a positive outcome and attempts to set the ground for many such studies in the future.

### A. Animal-Assisted Therapy and Depressive Symptoms

Depressed individuals suffer from loss of concentration, forgetfulness and impaired thinking. They have a lowered volume and rate of speech and disordered thought including thought blocking and poverty of content (Sadock, Sadock, & Ruiz, 2015). The decision-making skills (Tracy, 2018), executive function, attention and memory are found to be affected in patients suffering from depression (Dalal & Sivakumar, 2010). Structured interactions and activities with therapy dogs have been found to reduce depressive symptoms while inducing positive emotions. This has been found in studies done in psychiatric hospitals as well as nursing homes (Souter & Miller, 2007). Over time the participants form an encouraging and optimistic perception of the dog they have been interacting with, which further helps them to bond and reduce loneliness, sadness and depression (O'Haire et al., 2015). As observed in the current study these participants further engage more with other participants, giving them opportunities for and experience positive interactions (Wood et al., 2005). Conversations with an increased amount of smiling and laughter are also observed (O'Haire, 2013) as the participants bond further and start to observe the eccentricities of the dog indulging in fun activities with the others. At a physiological level, endorphins are released when a participant touches and physically interacts with a therapy dog. This enables a reduction in feelings of loneliness, depressive symptoms and pain (Mims & Waddell, 2016). Positive physical contact, one where both the

participant and the dog desire interaction further releases oxytocin in both of them. This helps them feel bonded, gives them a feeling of being loved and builds trust. It also helps them relax and reduces their stress which enables better use of their social skills (Odendaal & Meintjes, 2003). A reduction in cortisol levels takes place when participants are enjoying their interactions with the dog and other participants. This leads to reduced stress, better handling of stressful situations (Shin, 2006), lowers anxiety, creates better rapport and enhances social relationships (Bleiberg et al., 2005).

### B. Animal-Assisted Therapy for Memory, Attention and Emotion Regulation

The participants that underwent the animal-assisted intervention showed improvements in their memory, attention and emotion regulation after the intervention period. Participating in AAT and engaging with the therapy dog, reduces levels of cortisol in the body. This can aid memory, learning, and decision-making in individuals (Shin, 2006) and overall improvement in cognitive functioning too (Thompson et al., 2014). It reduces the negative impact of cortisol on memory functioning and the creation of cognitive disturbances (Brunner et al., 2006). Processing emotions becomes easier and further reduces depressive symptoms, it also provides long-term benefits (Hunt & Chizkov, 2014). Regulation of the heart rate, blood pressure, focus, attention, memory storage and attention takes place through changes in the levels of norepinephrine (O'Donnell et al., 2012) that take place during the intervention. Skin is the largest organ of our body and while physically interacting with the therapy dogs, a neurotransmitter that is impacted greatly is oxytocin. It is released in both humans and animals alike (Miller et al., 2009). This enhances empathy, emotional health self-perception, and social skills, lowers depression and improves memory and attachment formation (Cardoso et al., 2012; Jonas et al., 2008). Furthermore, it reduces stress and aggression while promoting bonding (Beetz et al., 2012). Animals help individuals feel safe and provide a sense of companionship. Structured interactions with them help develop emotional and cognitive skills, especially in



the face of traumatic events (Myers, 2006). On a concluding note, depression is on the rise in India and surrounding countries. It is predicted to pose a heavy social and financial burden on families with suffering individuals as well as the Indian economy. As this study shows, the challenges faced due to depression can be addressed through animal-assisted therapy sessions. These sessions, when provided at an early stage of mild depression may help alleviate depressive symptoms and improve the cognitive functioning and emotion regulation of the individuals. However, studying the same in an Indian context is important to gauge the impact of AAT with individuals having varying outlooks towards dogs, that differ from western cultures.

## REFERENCES

- American Psychiatric Association (Ed.). (2013). Diagnostic and statistical manual of mental disorders: DSM-5 (5th ed). Washington, D.C: *American Psychiatric Association*.
- Anderson, D., & Urichuk, L. (2008). Paws on purpose: implementing an animal-assisted therapy program for children and youth, including those with FASD and developmental disabilities. Edmonton: Chimo Project.
- Arkow, P. (2015). Chapter 5 - Animal Therapy on the Community Level: The Impact of Pets on Social Capital. In A. H. Fine (Ed.), *Handbook on Animal-Assisted Therapy (Fourth Edition)* (pp. 43–51). *Academic Press*. <https://doi.org/10.1016/B978-0-12-801292-5.00005-5>
- Beetz, A., Uvnäs-Moberg, K., Julius, H., & Kotrschal, K. (2012). Psychosocial and Psychophysiological Effects of Human-Animal Interactions: The Possible Role of Oxytocin. *Frontiers in Psychology*, 3. <https://doi.org/10.3389/fpsyg.2012.00234>
- Berget, B., Ekeberg, Ø., Pedersen, I., & Braastad, B. O. (2011). Animal-Assisted Therapy with Farm Animals for Persons with Psychiatric Disorders: Effects on Anxiety and Depression, a Randomized Controlled Trial. *Occupational Therapy in Mental Health*, 27(1), 50–64. <https://doi.org/10.1080/0164212X.2011.543641>
- Bleiberg, J., Prout, M., Debiak, D., Lefkowitz, C., & Paharia, I. (2005). Animal-Assisted Prolonged Exposure: A Treatment for Survivors of Sexual Assault Suffering Posttraumatic Stress Disorder. *Society & Animals*, 13(4), 275–296. <https://doi.org/10.1163/156853005774653654>
- Brunner, R., Schaefer, D., Hess, K., Parzer, P., Resch, F., & Schwab, S. (2006). Effect of High-Dose Cortisol on Memory Functions. *Annals of the New York Academy of Sciences*, 1071(1), 434–437. <https://doi.org/10.1196/annals.1364.037>
- Cardoso, C., Ellenbogen, M. A., & Linnen, A.-M. (2012). Acute intranasal oxytocin improves positive self-perceptions of personality. *Psychopharmacology*, 220(4), 741–749. <https://doi.org/10.1007/s00213-011-2527-6>
- Corson, S. A., Arnold, L. E., Gwynne, P. H., & Corson, E. O. (1977). Pet dogs as nonverbal communication links in hospital psychiatry. *Comprehensive Psychiatry*, 18(1), 61–72. [https://doi.org/10.1016/S0010-440X\(77\)80008-4](https://doi.org/10.1016/S0010-440X(77)80008-4)
- Cousins, N. (1989). Head First: The Biology of Hope. Retrieved May 2, 2018, from <https://repository.library.georgetown.edu/handle/10822/828245>
- Covert, A. ., Whiren, A. ., Keith, J., & Nelson, C. (1985). Pets, Early Adolescents, and Families: Marriage & Family Review: Vol 8, No 3-4. Retrieved May 2, 2018, from [https://www.tandfonline.com/doi/abs/10.1300/J002v08n03\\_08](https://www.tandfonline.com/doi/abs/10.1300/J002v08n03_08)
- Dalal, P. K., & Sivakumar, T. (2010). Cognitive psychiatry in India. *Indian Journal of Psychiatry*, 52(Suppl1), S128–S135. <https://doi.org/10.4103/0019-5545.69224>
- Fine, A., Garcia, R. M., Johnson, R., Winkle, M., & Yamazaki, K. (2013). IAHAIO WHITE PAPER.
- Fine, A. H. (2006). Chapter 9 - Animals and Therapists: Incorporating Animals in Outpatient Psychotherapy. In *Handbook on Animal-Assisted Therapy (Second Edition)* (pp. 179–211). Burlington: Academic Press. <https://doi.org/10.1016/B978-012369484-3/50012-8>
- Fine, A. H. (Ed.). (2015). *Handbook on animal-assisted therapy: Foundations and guidelines for animal-assisted interventions (Fourth edition)*. Elsevier Academic Press.
- Folse, E. B., Minder, C. C., Aycocock, M. J., & Santana, R. T. (1994). Animal-Assisted Therapy and Depression in Adult College Students. *Anthrozoös*, 7(3), 188–194. <https://doi.org/10.2752/089279394787001880>
- Gratz, K. L., & Roemer, L. (2004). Multidimensional Assessment of Emotion Regulation and Dysregulation: Development, Factor Structure, and Initial Validation of the Difficulties in Emotion Regulation Scale. Retrieved May 4, 2018, from <https://link.springer.com/article/10.1023/b:joba.0000007455.08539.94>
- Gray, P. B., & Young, S. M. (2011). Human–Pet Dynamics in Cross-Cultural Perspective. *Anthrozoös*, 24(1), 17–30. <https://doi.org/10.2752/175303711X12923300467285>
- Grover, S., Dutt, A., & Avasthi, A. (2010). An overview of Indian research in depression. *Indian Journal of Psychiatry*, 52(Suppl1), S178–S188. <https://doi.org/10.4103/0019-5545.69231>
- Hamilton, M. (1960). A RATING SCALE FOR DEPRESSION. *Journal of Neurology, Neurosurgery, and Psychiatry*, 23(1), 56–62.

- Hunt, M. G., & Chizkov, R. R. (2014). Are Therapy Dogs Like Xanax? Does Animal-Assisted Therapy Impact Processes Relevant to Cognitive Behavioral Psychotherapy? *Anthrozoös*, 27(3), 457–469. <https://doi.org/10.2752/175303714X14023922797959>
- Jonas, W., Nissen, E., Ransjö-Arvidson, A. B., Matthiesen, A. S., & Uvnäs-Moberg, K. (2008). Influence of oxytocin or epidural analgesia on personality profile in breastfeeding women: A comparative study. *Archives of Women's Mental Health*, 11(5), 335–345. <https://doi.org/10.1007/s00737-008-0027-4>
- Jorgenson Jennifer. (2007). Therapeutic Use of Companion Animals in Health Care. Image: *The Journal of Nursing Scholarship*, 29(3), 249–254. <https://doi.org/10.1111/j.1547-5069.1997.tb00993.x>
- Knobel, D. L., Laurenson, K. M., Kazwala, R. R., & Cleaveland, S. (2008). Development of an Item Scale to Assess Attitudes towards Domestic Dogs in the United Republic of Tanzania. *Anthrozoös*, 21(3), 285–295. <https://doi.org/10.2752/175303708X332080>
- Kruger, K. A., & Serpell, J. A. (2010). Animal-assisted interventions in mental health: definitions and theoretical foundations. In A. H. Fine (Ed.), *Handbook on Animal-Assisted Therapy* (Third edition) (pp. 33–48). San Diego: Academic Press. <https://doi.org/10.1016/B978-0-12-381453-1.10003-0>
- Mallon, G. P. (1994). Cow as co-therapist: Utilization of farm animals as therapeutic aides with children in residential treatment. *Child and Adolescent Social Work Journal*, 11(6), 455–474. <https://doi.org/10.1007/BF01876570>
- Marcus, D. A. (2013). The Science Behind Animal-Assisted Therapy. *Current Pain and Headache Reports*, 17(4), 322. <https://doi.org/10.1007/s11916-013-0322-2>
- Mason, M. S., & Hagan, C. B. (1999). Pet-Assisted Psychotherapy. Retrieved May 2, 2018, from <http://journals.sagepub.com/doi/abs/10.2466/pr0.1999.84.3c.1235>
- McIntosh, S. (2002). *An Introduction to equine-facilitated counselling*. Self-published, Cremona, Alberta, Canada.
- Miller, S. C., Kennedy, C. C., DeVoe, D. C., Hickey, M., Nelson, T., & Kogan, L. (2009). An Examination of Changes in Oxytocin Levels in Men and Women Before and After Interaction With a Bonded Dog. *Anthrozoös*, 22(1), 31–42. <https://doi.org/10.2752/175303708X390455>
- Mims, D., & Waddell, R. (2016). Animal Assisted Therapy and Trauma Survivors. *Journal of Evidence-Informed Social Work*, 13(5), 452–457. <https://doi.org/10.1080/23761407.2016.1166841>
- Miura, A., Bradshaw, J. W. S., & Tanida, H. (2000). Attitudes Towards Dogs: A Study of University Students in Japan and the UK. *Anthrozoös*, 13(2), 80–88. <https://doi.org/10.2752/089279300786999860>
- Myers, O. G. (2006). *The Significance of Children and Animals: Social Development and Our* (2nd ed.). Purdue University Press. [https://books.google.co.in/books?hl=en&lr=&id=Dm5Y83vkC-gC&oi=fnd&pg=PR7&dq=Myers,+G.+\(2006\).+The+Significances+of+Children+and+Animals:+Social+Development+and+Our+Connections+to+Other+Species+\(2nd+ed.,+revised\).+Lafayette,+IN:+Purdue+University+Press&ots=WzLFATHbLE&sig=a\\_T22WeEvj9165i-jBBQZ9h2-Hw&redir\\_esc=y#v=onepage&q&f=false](https://books.google.co.in/books?hl=en&lr=&id=Dm5Y83vkC-gC&oi=fnd&pg=PR7&dq=Myers,+G.+(2006).+The+Significances+of+Children+and+Animals:+Social+Development+and+Our+Connections+to+Other+Species+(2nd+ed.,+revised).+Lafayette,+IN:+Purdue+University+Press&ots=WzLFATHbLE&sig=a_T22WeEvj9165i-jBBQZ9h2-Hw&redir_esc=y#v=onepage&q&f=false)
- Nebbe, L. (1994). Animal-assisted activities/therapy as an animal and human welfare project. Humane Innovations and Alternatives (USA). Retrieved from <http://agris.fao.org/agris-search/search.do?recordID=US9605551>
- Nimer, J., & Lundahl, B. (2007). Animal-Assisted Therapy: A Meta-Analysis. *Anthrozoös*, 20(3), 225–238. <https://doi.org/10.2752/089279307X224773>
- Odendaal, J. S. J. (2000). Animal-assisted therapy — magic or medicine? *Journal of Psychosomatic Research*, 49(4), 275–280. [https://doi.org/10.1016/S0022-3999\(00\)00183-5](https://doi.org/10.1016/S0022-3999(00)00183-5)
- Odendaal, J. S. J., & Meintjes, R. A. (2003). Neurophysiological Correlates of Affiliative Behaviour between Humans and Dogs. *The Veterinary Journal*, 165(3), 296–301. [https://doi.org/10.1016/S1090-0233\(02\)00237-X](https://doi.org/10.1016/S1090-0233(02)00237-X)
- O'Donnell, J., Zeppenfeld, D., McConnell, E., Pena, S., & Nedergaard, M. (2012). Norepinephrine: A Neuromodulator That Boosts the Function of Multiple Cell Types to Optimize CNS Performance. *Neurochemical Research*, 37(11), 2496–2512. <https://doi.org/10.1007/s11064-012-0818-x>
- O'Haire, M. E. (2013). Animal-Assisted Intervention for Autism Spectrum Disorder: A Systematic Literature Review. *Journal of Autism and Developmental Disorders*, 43(7), 1606–1622. <https://doi.org/10.1007/s10803-012-1707-5>
- O'Haire, M. E., McKenzie, S. J., Beck, A. M., & Slaughter, V. (2015). Animals may act as social buffers: Skin conductance arousal in children with autism spectrum disorder in a social context. *Developmental Psychobiology*, 57(5), 584–595. <https://doi.org/10.1002/dev.21310>
- PEBL Psychological Test Battery. (2019). <https://pebl.sourceforge.net/battery.html>
- Poresky, R. (2015). Companion Animals and other Factors Affecting Young Children's Development: *Anthrozoös*: Vol 9, No 4. Retrieved May 2, 2018, from <https://www.tandfonline.com/doi/abs/10.2752/089279396787001437>

- Phillips, C. (2002). Does pet ownership reduce the number of GP consultations? what pets can do for patients. In Paper presented at Pets are good for people, a meeting of the comparative medicine section. London, UK: Royal Society of Medicine.
- Sadock, B. J., Sadock, V. A., & Ruiz, P. (2015). Kaplan & Sadock's synopsis of psychiatry: behavioral sciences/clinical psychiatry (Eleventh edition). Philadelphia: Wolters Kluwer.
- Shin, L. M. (2006). Amygdala, Medial Prefrontal Cortex, and Hippocampal Function in PTSD. *Annals of the New York Academy of Sciences*, 1071(1), 67–79. <https://doi.org/10.1196/annals.1364.007>
- Souter, M. A., & Miller, M. D. (2007). Do Animal-Assisted Activities Effectively Treat Depression? A Meta-Analysis. *Anthrozoös*, 20(2), 167–180. <https://doi.org/10.2752/175303707X207954>
- Thompson, K., Every, D., Rainbird, S., Cornell, V., Smith, B., & Trigg, J. (2014). No Pet or Their Person Left Behind: Increasing the Disaster Resilience of Vulnerable Groups through Animal Attachment. *Activities and Networks. Animals*, 4(2), 214–240. <https://doi.org/10.3390/ani4020214>
- Tracy, N. (2018). What are the Cognitive Symptoms (Deficits) in Depression? - Symptoms - Depression. Retrieved May 4, 2018, from <https://www.healthypplace.com/depression/symptoms/what-are-the-cognitive-symptoms-deficits-in-depression/>
- Why Pet Therapy? | Australia. (2018). Delta Society. Retrieved April 11, 2019, from <https://www.deltasociety.com.au/why-pet-therapy>
- Wood, L., Giles-Corti, B., & Bulsara, M. (2005). The pet connection: Pets as a conduit for social capital? *Social Science & Medicine*, 61(6), 1159–1173. <https://doi.org/10.1016/j.socscimed.2005.01.017>
- World Health Organization. (2017). Depression and other common mental disorders: global health estimates.