

**Animal Assisted Intervention and how it can Improve
Attention and Positive Emotion**

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Dedication

This thesis is dedicated to future me because past (and sometimes present) me did not think I would make it this far.

Acknowledgments

I want to thank both my reader, Dr. K. Lahikainen, and my chair Dr. B. Kelley for their endless patience and understanding during this process. I would also like to thank my parents and Meagan Sabo for their help and encouragement throughout this process. Without it, I do not think I would have been able to finish. I would also like to thank all of the participants who were willing to come out and participate safely during this pandemic. Special thanks go to Mrs. Abigail Schmidt, who allowed me to borrow her dogs, Dax and Macie, for this study, and thanks go to both Dax and Macie for being so well behaved.

Abstract

The purpose of this study is to determine if animal-assisted intervention, known as ATT, can improve a person's attention span and assist with a better emotional state. In this study, attention is being measured by a facial recognition attention task, and emotional state is being measured by a portion of the Watson and Clark (1994) Emotional State-Adult Protocol. Animals may not have words with which to communicate; however, they can, and do, respond to emotional distress when they have been correctly trained. There have been numerous studies in which this kind of therapy has successfully helped a client to improve in several ways. However, there has been little to no research on how it can affect attention and emotions. This study investigates the hypothesis that animal-assisted therapy and intervention can help a person with their attention and emotional state. This study will explore if animal-assisted therapy and intervention can bring about better awareness and more positive emotions in individuals. The current hypothesis is that that, while scores will vary, in the participants who did not receive intervention or had use of their phones the post-intervention scores will be equal to or less than the pre-intervention scores, excluding the stress scores. In the group where the participants were able to use their phone and received the intervention and the participants who received the intervention but were not allowed use of their phones, the hypothesis is that the post-intervention scores will be higher than the pre-intervention scores, and the negative emotional scores will be lower or the same after the animal intervention, with the exclusion of the stress scores; meaning that while the stress scores will vary, they will be more unpredictable.

Animal-assisted intervention is operationally defined as a "goal-oriented, planned and structured therapeutic intervention" that has a particular emphasis on "enhancing physical, cognitive, behavioral, and/or socio-emotional functioning of the human recipient" (International Association of Human-Animal Interaction Organizations, 2014; Elisabeth Schramm, Karin Hediger, & Undine E. Lang; 2015). Human beings have found numerous ways to self-soothe, and spending time with their choice of a domesticated animal is just one of them. Animal Assisted Intervention has been proven to increase attention, otherwise known or defined as mindfulness (Schramm et al., 2015). However, if animals are trained, or have a specialty, for example, anxiety, it could be possible that attention could be increased in people who have more trouble paying attention. The interaction between human and non-human animals differs from person to animal, and interaction to interaction. Because of this, behavior between animals and different individuals is often likely to change; simply meaning, a dog could act reserved around one person while being outgoing with another. The way human beings act or behave around animals, can reflect how they react towards us and vice versa. For example, acting calm and open will cause the animal to approach you in the same or in a similar way. "Domesticated animals display several behavioral alterations, including increased sociability and decreased fearfulness and aggression, when compared with their wild ancestors" (Wheat, Fitzpatrick, Tapper & Hans, 2018). While not all animals are meant to be domesticated, the ones that can be (domesticated) could be trained to help their caretakers by calming them, or bringing them from the edge, of a panic attack, or warn them of an oncoming anxiety attack.

There is a lot that can be learned from the interaction between humans and their non-human counterparts; for instance, by measuring the "left amygdala activation, heart rate, and facial muscle activity over the cheek region" as well as monitoring various physiological

markers, we can tell if a person is just mildly afraid of an animal or is terrified (Aue, Hoeppli & Piguet, 2012). Being in a controlled setting, a lab for example, could help lessen the fear of animals and any limitations that involve day-to-day living. There are numerous studies (Farber; Romer; Kim; Knodt; Elsayed et al., 2019 & Orem; Wheelock; Goodman; Harnett; Wood et al., 2019) that point to the left amygdala when studying fear action or fear learning responses, and because there are so many studies that do so, this is a good indicator of where to start rehabilitation in both humans and animals. Because fear stimuli are associated with what causes that fear, such as a snake or bee, that stimuli can be paired with something that causes the person to experience calm; therefore, lowering the fear reaction and fostering positive, and often safer, responses to that which causes fear.

It is possible that a person's fear response could cause an escalation in potential danger during an encounter with a feared stimulus (i.e., a snake or a bee). This would increase the risk of being struck or stung. In a study done by Aue and colleagues (2012), 36 participants who were spider phobic and had a low snake fear, compared to their fear of spiders, were brought into a lab to test their fear. By using heart rate, skin conductance, facial muscle activity, and many other measurable body functions, the authors measured their fear and the fear intensity towards snakes, spiders, and the neutral stimuli, birds. The authors found that the participants were more fearful of the pictures of the snakes and spiders. Their findings are significant because they give credence to their hypothesis that one must reach a certain fear threshold for that fear to be physically visible. It could also be said that these findings could help to create better interventions for people who are afraid of certain animals.

Fugazza, Pogány, and Mikló (2016) stated that dogs, like human babies, can "imitate human actions after a delay." The delay is a period of time where nothing is done in front of the

dog so that they know what action to mimic. This is a significant statement to make as it implies it is possible to teach animals how to behave in any situation and tie it to an action, i.e., a hand movement, to be carried out with ease. While this study was done on spatial generalization, it could be adapted to rehabilitate problem animals. An example of this could be taking a former bait dog, a dog that is used as bait to larger dogs in dog fights and training it out of its regular maladaptive habits. Since a bait dog would not be properly socialized with other people or animals, other than their abusers, human imitation, or rather mimicry, could teach them how to act outside of their natural instincts. For example, a former bait dog could be trained using a large stuffed animal that bigger dogs are not always, or supposed to, harm them. After some time, the stuffed animal would be changed to an actual dog, though smaller or the same size as the former bait dog. As the abused animal gets accustomed to the real dog, the animal will get bigger until the abused dog is content around other animals regardless of size. This could also be applied to other trainable animals, such as cats, birds, or even rats and mice. Teaching an animal how to behave and when to behave that way is an integral part of animal rehabilitation or just in bringing a new pet into a new home.

The idea of Animal-Assisted Therapy (AAT) and Intervention has been around for several years before it was even considered to be used professionally. AAT is most used on children or with people that have severe mental disabilities. According to research done by Elisabeth Schramm, Karin Hediger, and Undine E. Lang (2015), in patients with high trauma that had a former dropout experience from other therapies, such as Mindfulness-Based Cognitive Therapy, AAT is more likely to work for them. That is not suggesting that MBCT does not work on its own. However, when paired with AAT, mindfulness-based cognitive therapy works more effectively and there are fewer depressive symptoms in humans because of it.

In a study done in 2017, AAT, as opposed to other methods, worked better than cognitive behavioral therapy (CBT) alone as there were immediate beneficial effects within the first few AAT sessions. According to this research, long term AAT with these kinds of patients is an "effective alternative to pharmacological interventions for the reduction of neuropsychiatric symptoms" (Tournier, Vives & Postal, 2017). In a systematic review of the literature on equine therapy's effectiveness, and while the results varied, many studies indicated that equine therapy positively affected patients with chronic illnesses or other health challenges (Shelby & Smith-Osborne). These findings are significant because, while not every person will have access to or want equine therapy, it is a type of ATT that has been proven to better an individual's overall health and, therefore, can be altered to fit different patients' needs.

A study conducted in 2012 stated that "companion animals can serve as sources of love and attachment during times of stress. Stuffed animals, too, can provide comfort and stability" (Barlow, Cromer, Caron & Freyd). This information is useful for households that cannot have or do not want real pets. Stuffed animals are simpler to take care of as well as easy to obtain. They are also more acceptable in places real animals, apart from service animals or emotional support animals, are not usually allowed; such as grocery stores, hotels, or even some apartment homes. This study was looking into how companion and stuffed animals effected people who were diagnosed with DID, people were high dissociators and people who were low dissociators. In this study, seventy-two college participants were put into two groups, the low dissociation, and high dissociation groups. There was also a group of 11 confirmed cases of DID, Dissociative Identity Disorder, who were not, at the time, in any form of school (Barlow et al., 2012). Overall, the results found that attachment "to pets and attachment to stuffed animals showed a medium and statistically significant correlation". However, the DID group had a higher attachment to real

pets. Regarding stuffed animal attachment, high dissociators and the diagnosed DID group had more attachment than those with low dissociation. The proposed study could bring about more research in this area that could help more people with DID or DID symptoms by using the animal, stuffed or otherwise, to help create a safe space in which to treat them.

In a survey study done in 2017, human behaviorists and animal behaviorists were given surveys to determine if there was any crossover between them as one could not be an animal behaviorist and practice on humans and vice versa. This means that a person who was certified as a non-human behaviorist was not permitted to be a human behaviorist without the correct certification. It was found that even though these behaviorists were in two different professions, there was more in common than not (Gray & Diller). This could bring about more ways to help human beings and correct maladaptive animal behavior.

Non-human animals are essential to human life and have been for a very long time as they provide human beings with food, clothing, and as participants in studies that human beings could not participate in, make significant medical advances (Amion & Bastian, 2015). Even though this is the case, there is not much research on human-nonhuman animal interaction or its importance in human society. In the proposed study, the aim is to find how best humans and non-human animals interact and how to build that interaction in a positive way. There are many limitations, in which the main one is that not everyone likes or wants a dog and, therefore, this experiment should be done with a few different types of animals, not just what would be expected.

Attention is defined as mindfulness (Kabat-Zinn, 1990) and is very important in day-to-day living. However, several obstacles in the world vie to take hold of our attention, thus dividing it between multiple tasks. One such object is the personal cell/mobile phone.

Cell/mobile phones in this day and age have a number of functions that can cause attention to veer from one task to another. Using a cell/mobile phone today, you can check your email, receive a phone call, and check the weather at the same time. Not only is that bad by itself, but according to an article written by Cary Stothart and their colleagues, it is well documented that interacting with cell/mobile phones is connected with sub-par performances on tasks. This is because "limited attentional resources must be shared between tasks" (Stothart; Mitchum & Yehnert; 2015).

Stothart and their associates also found that notifications on a cell phone can be more distracting than most. This is because notification sounds, although short, can produce auditory or interactive alerts, such as a phone call, and these alone can distract a person from a task that they were doing. The authors theorize that this is because when the notification goes off, it can trigger task-irrelevant thoughts, "which has been shown to damage task performance" (Stothart et al., 2015). The authors found that cell/mobile phone notification tones alone could cause a person to perform lower in a task that they were completing beforehand. This implies that no interaction with the mobile/cell phone was needed to distract an individual.

Interacting with a cell phone is sometimes unavoidable, for example, receiving an important call from a relative or business partner. However, there are times when using a mobile/cell phone is highly frowned upon, for example, during a class or meeting. Stothart and their associates state that "interacting with a mobile phone is associated with poorer performance in concurrently performed tasks because limited attentional resources must be shared between tasks" (Stothart et al., 2015). Although many individuals claim to be an expert at multitasking, the above statement implies that, while possible, one of the tasks that are being performed will suffer due to inattention.

Cell phones have come a long way from what they originally were. This means that the device that was just used for answering calls has now upgraded to a device that can answer a call, send and receive emails, instant message a persons friends and family, as well as play music and watch videos, which classifies these new aged phones as "smartphones" (Duggan, 2013; Stothart et al., 2015). Because mobile/cell phones are able to do more than they used to, it stands to reason that they would be used more than they used to be. While most adults would be thought to have a more developed prefrontal cortex, they would understand when using a mobile/cell phone would be appropriate. Adolescent and adolescent adults "do not make judicious decisions about when it is safe and appropriate to use a mobile device" (Stothart et al., 2015; National Highway Traffic Safety Administration, 2012, 2013).

In some studies, multitasking was found to "decrease productivity" (Susannah C. Otto; Katie R. Wahl; Christophe C. Lefort & Wyatt H.P. Frei, 2012); while in others, the reverse was true. However, a driving and office simulation found, "multitasking led to reduced performance and increased levels of subjective strain" (Hiltraut M. Paridon & Marlen Kaufmann, 2010). Therefore, while multitasking has some positive results, it frequently does not. These findings are significant because it could be implied that one could multitask while using a phone; however, as stated above, one, or all, of the tasks being done will likely suffer due to multitasking.

In a study done in 2014, it was found that just the presence of a cell phone "and what it might represent (i.e., social connections)" could cause inattention and have a negative influence on an actual "social interaction" ((Bill Thornton; Alyson Faires; Maiga Robbins, & Eric Rollins; 2014). In the two studies they performed, they also found that just the presence of a cell phone was enough to "sufficiently distracting to produce diminished attention and deficits in task-

performance, especially for tasks with greater attentional and cognitive demands" (Thornton et al., 2014). While it would be reasonable for a person to be on their phone in some situations, the findings above imply that if a person is not in a position where a cell phone use would not be questioned, just having a cell phone nearby could cause enough of a distraction to impair cognitive and attentional ability.

In 2017 it was found that it was possible to impair an eyewitness of a staged crime if the participant was engaged in some form of a phone call, in this case, a "meaningful halfalogue" (John E. Marsh; Krupali Patel; Katherine Labonté; Emma Threadgold; Faye C. Skelton et al.). The final results of this study propose that "an everyday distraction, even when presented in a different modality to target information, can impair the long-term memory of an eyewitness" (Marsh et al., 2017). The authors hypothesize that this is because of the "unpredictability of the meaningful content of the halfalogue," the participant was more distracted than participants in other groups.

While having a phone can cause personal distraction, it can also cause surrounding individuals to become distracted. These days having a smartphone makes a lot of things in our lives a lot more convenient; for example, you can pay bills, shop online, and take pictures with one device. However, because of the convenience, there is much room for distraction, for others and self. In a study done in 2014, participants were asked to list sound that they found annoying. 73% of the participants "believed that the ringing of a cell phone falls into this category" (Jan Röer; Raoul Bell; & Axel Buchner).

The authors found that unlike other sounds that participants listed, the sound of a cell phone is frequently encountered in everyday life; this reason alone implies that this is why it is more annoying than hearing a "baby cry" or a "dentist drill" (Röer et al.,.). Unless a person works

with/around babies or has one; or is a dentist or works in a dentists' office, it is unlikely that one would encounter these sounds on a regular basis. The authors also state that one reason cell phones got so many negative mentions is that "the ringtone of a cell phone fulfills the sole purpose to capture attention and draw it away from ongoing activities" (Röer et al., 2014). This implies that almost any sound that comes from a cell phone, i.e., notification tone or ring tone, can draw attention away from a more critical tasks, such as driving.

Mark B. Neider and their collaborators performed a study on attention in older and younger adults regarding crossing the street while either using a cell phone to talk to someone, listening to music, or crossing a simulated street undistracted (Mark B Neider; John G. Gaspar; Jason S. McCarley; James A. Crowell; Henry Kaczmarek et al. 2011). What they found was that, overall, older adults were "more vulnerable to dual-task impairments than younger adults when the crossing task was difficult" (Neider et al., 2011). While mobile/cell phones have gotten smaller, their uses have become a more significant part to everyday living and, because of this, it is easier for people to become more distracted by them than it used to be. This study seeks to find out if animal-assisted intervention can bring about better awareness and more positive emotions in individuals. The current hypothesis is that that, while scores will vary, in the participants who did not receive intervention or had use of their phones the post-intervention scores will be equal to or less than the pre-intervention scores, excluding the stress scores. In the group where the participants were able to use their phone and received the intervention and the participants who received the intervention but were not allowed use of their phones, the hypothesis is that the post-intervention scores will be higher than the pre-intervention scores, and the negative emotional scores will be lower or the same after the animal intervention, with the

exclusion of the stress scores; meaning that while the stress scores will vary, they will be more unpredictable.

Method and Participants

Participants were 18 years old and above and were recruited using an advertisement for the study on the Liberty University Psychology Activity page. There were 17 (65% female) participants in total. All participants received a psych activity credit for participating in the study. A psychology activity credit is a class credit needed by undergraduate students who are enrolled in psychology classes in order to pass said class.

Participants were assigned to one of three groups by pulling a group name and number from a bag. The groups were identified by participants that were able to use their cell phones and received animal intervention, participants that received the animal intervention and no phone use, and participants that were not allowed to use their phones and received no animal intervention. After participants had been sorted, a day and time were selected that worked for each group.

Before each participant began, all participants took a stress scan via a phone app called StressScan. This took 1 minute and 46 seconds. After taking the StressScan, participants were given a portion of the Emotional State-Adult Protocol (Watson and Clark 1994) to fill out in order to get a baseline of positive and negative emotion. After, they were directed to textmybrain.org to complete an attention task called Famous Faces which tests' facial recognition in the participants. This took 8 to 10 minutes. When that was complete, they wrote down, on a separate sheet of paper, their scores on the attention task, the average score, and how many people they scored above or below.

When the attention task was finished, the intervention and phone use group were permitted to interact with the dogs while having access to their phone, the intervention and no phone use group were allowed to interact with the dogs without use of their phones, and the non-

intervention and no phone use group were left to sit in the testing room without their phones or interaction with the dogs. This lasted for 15 minutes.

After the interaction, or non-interaction, time was up; the participants completed the attention task, Famous Faces, again, which took another 8 to 10 minutes. After the participants completed the attention task a second time, they wrote down their new and final, scores the average score, and how many people they scored or below. After the attention task and the recording of the post-intervention/non-intervention scores were complete, the participants filled out the altered version of the Emotional State Adult Protocol Inventory (Watson & Clark 1994) once more; this took no more than 5 to 7 minutes. After the participants had completed their surveys, they took one final StressScan, which determines stress by reading the pulse, and color change, in the participants fingertip by way of smart phone camera, took another 1 minute and 46 seconds. Afterward, they were free to leave or, in just two cases, allowed to interact with the dogs.

This experiment was approved by the Liberty University Institutional Review Board (IRB).

Results

Preliminary Analyses

Prior to conducting parametric analyses to test the hypotheses, the normality assumption was assessed for the study measures using z -scores formed by dividing skewness by the standard error of skewness. A z -score within ± 3.29 is indicative of a normal distribution (West, Finch, & Curran, 1995). The results are presented in Table 1. Both the pre- and posttest Emotional Survey – Negative distributions exhibited moderate skewness. A logarithm was applied to each of these variables to normalize the distributions according to recommendations provided by Tabachnick and Fidell (2013). The normalized variables were used in all subsequent analyses.

Table 1
Summary statistics for study measures

	<i>Mean</i>	<i>SD</i>	<i>Skewness</i>	<i>SE</i>	<i>z</i>	
<u>Pretests</u>						
Stress Scan	54.06	21.12	-1.06	0.55	-1.92	
Emotional Survey – Positive	37.29	7.34	-0.13	0.55	-0.23	
Emotional Survey – Negative	21.41	9.28	2.00	0.55	3.63	*
Attention Task	28.65	6.26	0.10	0.55	0.19	
Number Scored Above	4.18	3.41	0.16	0.55	0.29	
<u>Posttests</u>						
Stress Scan	49.47	21.31	-0.75	0.55	-1.35	
Emotional Survey – Positive	38.12	7.09	0.37	0.55	0.68	
Emotional Survey – Negative	18.35	7.86	2.58	0.55	4.69	*
Attention Task	31.24	3.91	-0.34	0.55	-0.61	
Number Scored Above	5.59	2.27	-0.62	0.55	-1.13	
<u>Normalized Variables (logarithms)</u>						
Emotional Survey – Negative Pretest			1.36	0.55	2.47	
Emotional Survey – Negative Posttest			1.74	0.55	3.17	

* Skewed Distributions

A preliminary step was taken to determine if the two Intervention groups could be collapsed to maximize the sample size that would be compared to the Control group, since the

proposed study hypotheses did not distinguish different intervention outcomes depending on use of mobile phones. A series of t-tests was conducted on all the dependent variables to determine if there were any significant differences between those who participated in the Animal + Phone Intervention and those who experienced Animal Intervention only. The results are presented in Table 2. As shown, the two groups differed significantly on only one measure, the Post Stress Scan. Consequently, the hypotheses were tested using group (all Intervention vs. Control) by repeated measures (pre- vs. post-intervention) analyses of variance. An additional analysis of variance was conducted on the Stress Scans using all three groups (Animal + Phone Intervention, Animal Intervention, and Control).

Table 2

T-tests comparing the two intervention groups on the study measures

	Animal + Phone Intervention (n = 5)		Animal Intervention (n = 4)		<i>t</i>	<i>df</i>	<i>p</i>
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>			
<u>Pretests</u>							
Stress Scan	59.00	18.39	72.25	7.46	-1.34	7	0.222
Emotional Survey - Positive	33.60	4.83	39.00	8.08	-1.25	7	0.251
Emotional Survey - Negative	19.20	4.66	18.00	3.56	0.36	7	0.730
Attention Task	24.60	6.03	30.50	5.92	-1.47	7	0.185
Number Scored Above	2.00	3.39	5.00	3.56	-1.29	7	0.238
<u>Posttests</u>							
Stress Scan	50.20	12.81	71.25	6.45	-2.97	7	0.021
Emotional Survey - Positive	39.40	5.46	44.75	4.27	-1.60	7	0.154
Emotional Survey - Negative	16.00	3.67	16.25	2.63	-0.19	7	0.854
Attention Task	29.80	3.70	30.50	2.65	-0.32	7	0.760
Number Scored Above	4.80	2.17	5.25	1.71	-0.34	7	0.745

Note. logarithms of the Emotional Survey – Negative scores were used in the comparisons, while original means and standard deviations are shown for clarity

Hypothesis Testing

The hypotheses stated that scores would increase for the intervention groups from pre- to post-intervention, while the Control group scores would remain the same. For the Negative Emotional Survey, the scores were hypothesized to decrease in the Intervention groups from pre- to post-intervention. The interaction effects from the group by repeated measures analyses of variance were used as the direct tests of these hypotheses.

The results of the analyses of variance are summarized in Table 3. Significant increases were found in the attention and number scored above measures from pre- to post-intervention, and a significant decrease was found for the emotional survey – negative measure for both intervention and control groups combined, but there were no differences between groups for these variables. In contrast, the ANOVA on the Emotional Survey – Positive scale indicated a significant interaction effect wherein the scores decreased in the Control group and increased in the Intervention group ($F(1,15) = 8.14, p = .012$). This result supports acceptance of the alternative hypothesis proposed in the study and is further illustrated in Figure 1. All other pre- and post-intervention scores can be seen in figures 2 through 5.

Table 3
Group (Intervention vs. Control) by repeated measures (pre- vs. post-intervention) ANOVAs on all study measures

Dependent Variable	Group	N	Pre- Intervention		Post- Intervention		Group		Time		Interaction	
			Mean	SD	Mean	SD	F	p	F	p	F	p
Stress Scan	Ctrl	8	41.88	20.65	38.13	22.53	6.78	0.020	2.72	0.120	0.08	0.778
	Interv	9	64.89	15.45	59.56	14.86						
Emotional Survey - Positive	Ctrl	8	38.75	8.24	34.00	6.66	0.85	0.371	0.08	0.784	8.14	0.012
	Interv	9	36.00	6.65	41.78	5.45						
Emotional Survey - Negative	Ctrl	8	24.50	12.57	20.88	10.80	1.39	0.257	24.77	< .001	0.03	0.860
	Interv	9	18.67	4.00	16.11	3.06						
Attention Task	Ctrl	8	30.25	6.11	32.50	4.54	1.36	0.262	6.75	0.020	0.10	0.751
	Interv	9	27.22	6.40	30.11	3.10						
	Ctrl	8	5.13	3.14	6.25	2.61	1.42	0.252	5.97	0.027	0.23	0.642

Number Scored

Above Interv 9 3.33 3.61 5.00 1.87

Note: Ctrl = Control; Interv = Intervention; Group = Intervention vs. Control; Time = Pretest vs. Posttest; logarithms of the Emotional Survey – Negative scores were used in the comparisons, while original means and standard deviations are shown for clarity.

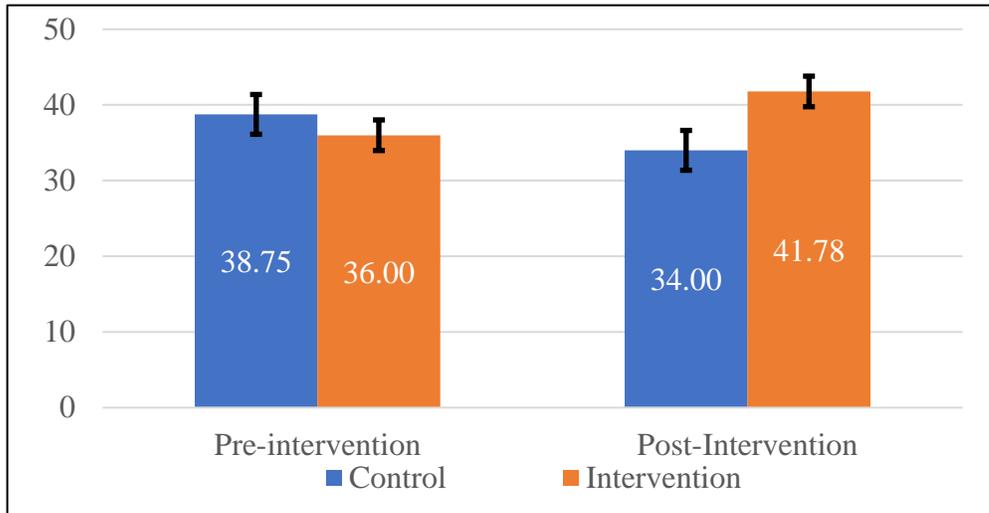


Figure 1. Pre- and post-intervention Positive Emotional Survey scores in the Control and Intervention groups

One additional significant effect was found in the ANOVAs shown in Table 3. A significant difference was found between the Intervention and Control groups in the Stress Scans, averaging across the Pre- and Post-intervention tests. An additional ANOVA was conducted to compare all three study groups (Animal + Phone Intervention, Animal Intervention, and Control) on the pre- and post-intervention Stress Scans. The results are summarized in Table 4. The analysis again showed a group difference in the Stress Scans ($F(1,15) = 4.84, p = .025$). Post hoc pairwise comparisons between the three groups revealed only one significant difference ($p < .025$) between Controls and the Animal Intervention group with no phone use.

Table 4

Group (Animal + Phone Intervention, Animal Intervention, and Control) by repeated measures (pre- vs. post-intervention) ANOVA on Stress Scans

Group	N	Pre-Intervention		Post-Intervention		Group		Time		Interaction	
		Mean	SD	Mean	SD	F	p	F	p	F	p

Control	8	41.88	20.65	38.13	22.53	4.84	0.025	2.50	0.136	0.57	0.578
Animal + Phone Intervention	5	59.00	18.39	50.20	12.81						
Animal Intervention	4	72.25	7.46	71.25	6.45						

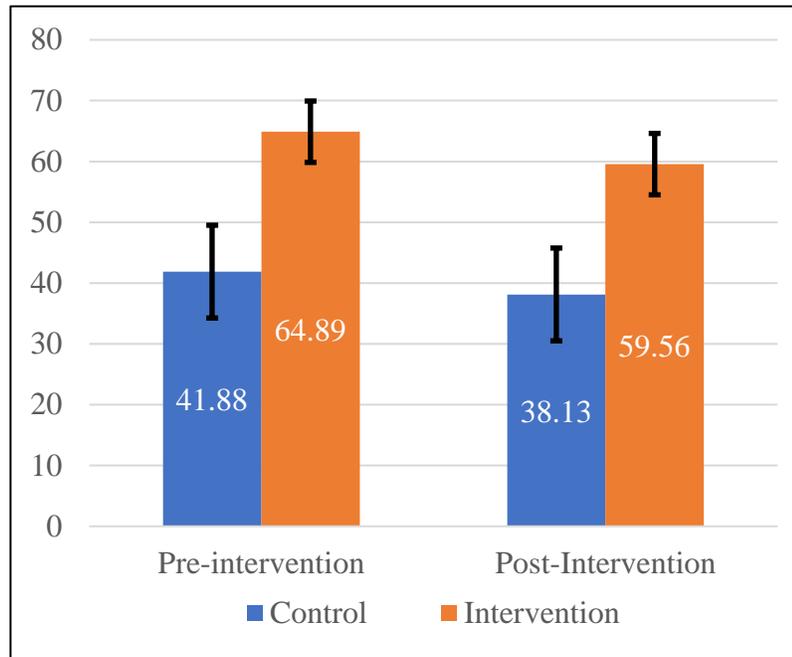


Figure 2. Pre- and post-intervention Stress Scan scores in the Control and Intervention groups

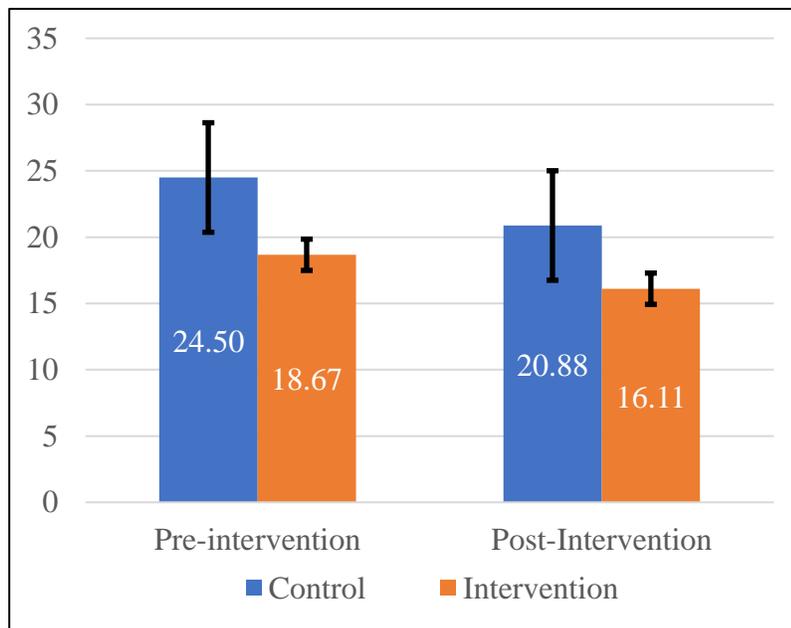


Figure 3. Pre- and post-intervention Negative Emotional Survey scores in the Control and Intervention groups

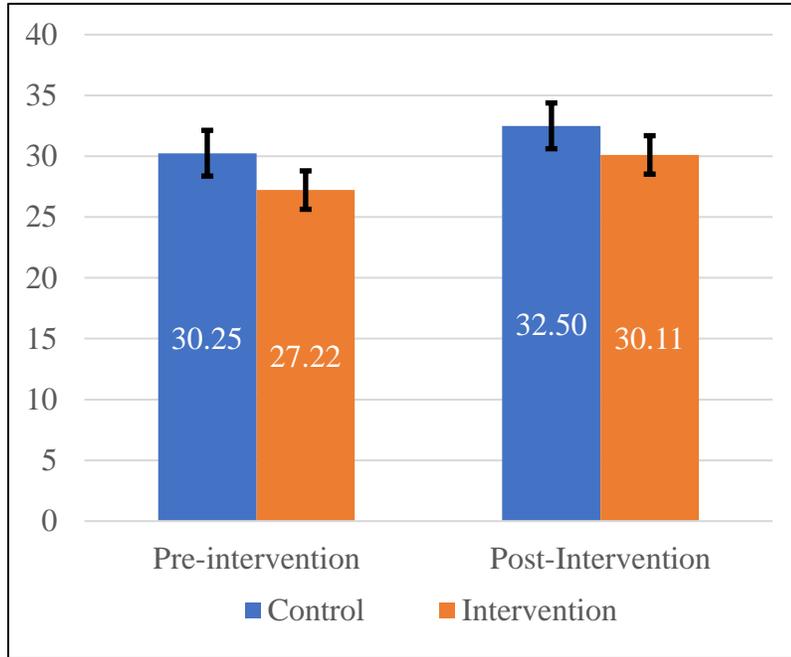


Figure 4. Pre- and post-intervention Attention Task scores in the Control and Intervention groups

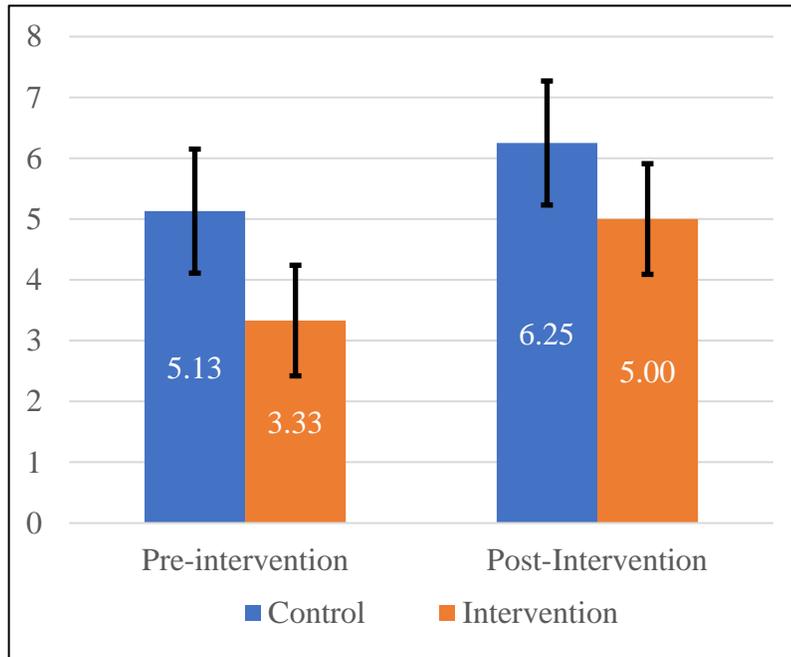


Figure 5. Pre- and post-intervention Scored Above scores in the Control and Intervention groups

Discussion

When the results were analyzed it was found that the alternative hypothesis proposed in the study was accepted. While not all the hypotheses' were accepted, this could be due to a lack of participants that were available and volunteered for this study. However, this study proves that animal assisted intervention does help increase positive emotions. While studies show that animals can be a distraction (Gocheva et al., 2018) they also reportedly can help with attention.

Limitations

There are numerous limitations in this study, one being the StressScan app that was used. While it works well compared to other apps, the way it identifies a stress score can easily be misinterpreted. The StressScan app measures the stress score by reading the change in color of the fingertip pressed against the phone's camera in use. The app used the color change to measure heartbeat and the variance between each heartbeat in order to calculate an individual's stress index (StressScan app). Because of this, it is easy to get a higher heart rate, and therefore stress index, due to distress or excitement. Not all stress is the same and this stress scan cannot tell the difference between the two.

When taking the StressScan of the participants, it was assumed that the heart rate would settle into a more regular heart rate during the second attention task and emotional survey, which, for the most part, it did. However, in one case, the participant's stress score was the same before and after the animal intervention at a stress index of 72 in the group where participants were allowed use of their phones and received animal intervention. In contrast, in the non-intervention and no phone use group, one participant's stress score stayed at a stress index of 1.

Another limitation of this study is that some people are afraid of or allergic to dogs or animals that have fur. A study was done in 2018 found that 10%-20% of the worldwide

population have allergies to both cats and dogs (Sanny K. Chan & Donald Y. M Leung). In future research, various animals can be chosen to fit the people who have these kinds of allergies. Another limitation is the attention task itself. On testmybrain.org, there are a number of attention tasks; however, the tasks are often removed or replaced. The attention task used in this study was Famous Faces, which measured facial recognition in people that are considered famous worldwide. With the Famous Faces attention task, even with the intervention or non-intervention, when taking the attention task for the second time, participants reported remembering which of the choices was the correct Famous Face and which was the look-a-like. This was part of the reason why some attention task scores went up after the intervention or non-intervention. There also was no variation to which famous face was next in during the second taking of the attention task.

An additional limitation is the self-reporting aspect of this study. While participants were encouraged to fill out the emotional survey honestly, there is a possibility that they did not. Another limitation is that in some studies, the animal is always in the room with the participant (Gocheva et al., 2018) while in this study that was not the case for the animal intervention groups.

Implications

One significant implication of this study was the time in which it was done. The United States, and most of the world, are currently going through a major pandemic known as Covid19 which causes the novel Corona Virus. Because the virus is so easily spread and has numerous negative health connotations; many people would rather stay home safe than participate in a study; even with safety measures in place. This is understandable because there are people who have family members that are at high risk. This means if they were get Covid-19, there is a

chance that they will not recover from it. This implication means that with fewer participants, there is less likely to be significant results that come from this study.

Future Research and Conclusion

There are several ways that the research can be expanded on. One way is that this research can be developed by using different animals. As mentioned before, many people are allergic to dogs, which was the animal used in this study. It would be interesting to see if a bird or a turtle had the same effect on positive and negative emotions as a dog would. This research could be taken to another level by completing this research on individuals who live with mental or physical disabilities. As it stands, only one participant in the study fit part of that criteria, and they were not sorted into an animal intervention group. However, they did interact with the dogs after the study and verbally stated that they felt a lot better because of it. There are several ways Animal Assisted Intervention can help foster positive emotions and better attention (mindfulness), it has been studied for several years, and over time it will continue to be refined and tailored to fit any patient who wishes to participate in this kind of therapy.

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APPENDIX A: Informed Consent

Consent

Title of the Project: How Animal Assisted Intervention can Affect Attention and Emotions

Principal Investigator: Alexis McIntosh, Master's Student, Liberty University

Invitation to be Part of a Research Study

You are invited to participate in a research study. In order to participate, you must be 18 years or older. Taking part in this research project is voluntary.

Please take time to read this entire form and ask questions before deciding whether to take part in this research project.

What is the study about and why is it being done?

The purpose of the study is to find out how animal intervention affects a person's attention and emotional state.

What will happen if you take part in this study?

If you agree to be in this study, I would ask you to do the following things:

1. You will be randomly be assigned to one of three groups by picking a group number from a hat, box, or bag.
2. After you have been assigned to a group, a date, time, and place will be set up in order for you to complete your part in this experiment.
3. All participants will take a stress scan before they begin the experiment and

after the experiment is complete.

Group A1: Participants will have to complete an attention task on testmybrain.org, which will take 10 minutes. When this is complete, they will write down, on a separate sheet of paper, their scores on the attention task, the average score, and the number of people they scored above and below. Next, they will be given permission to interact with dogs while having access to their phones. This will be for 15 minutes. After the interaction, they will be asked to complete the attention task again. When this is complete, they will write down, on a separate sheet of paper, their scores on the attention task, the average score, and the number of people they scored above and below. After this, they will be given an altered version of the Emotional State Adult Protocol Inventory to complete.

Group A2: Participants will have to complete an attention task on testmybrain.org, which will take 10 minutes. When this is complete, they will write down, on a separate sheet of paper, their scores on the attention task, the average score, and the number of people they scored above and below. Next, they will be given permission to interact with dogs; however, they will not have access to their phones. This will be for 15 minutes. After the interaction, they will be asked to complete the attention task again. When this is complete, they will write down, on a separate sheet of paper, their scores on the attention task, the average score, and the number of people they scored above and below. After this, they will be given an altered version of the Emotional State Adult Protocol Inventory to complete.

Group NA: Participants will have to complete an attention task on testmybrain.org, which will take 10 minutes. When this is complete, they will write down, on a separate sheet of paper, their scores on the attention task, the average score, and the number of people they scored above and below. Next, they will be told to sit in a room without access to either the dogs or their phones. This will be for 15 minutes. After the non-interaction, they will be asked to complete the attention task again. When this is complete, they will write down, on a separate sheet of paper, their scores on the attention task, the average score, and the number of people they scored above and below. After this, they will be given an altered version of the Emotional State Adult Protocol Inventory to complete

Each group's procedures should not take more than approximately 1 hour.

How could you or others benefit from this study?

The participants should not expect to receive a direct benefit.

Benefits to society include a different approach to interventions for people who have tried cognitive behavioral therapy (CBT) interventions or therapies and have not been helped much by them.

What risks might you experience from being in this study?

The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

How will personal information be protected?

The records of this study will be kept private. Research records will be stored securely, and only

the researcher will have access to the records. Data collected from you may be shared for use in future research studies or with other researchers. If data collected from you is shared, any information that could identify you, if applicable, will be removed before the data is shared.

- Participant responses will be anonymous, and data will only include each participant's group name.
- Data will be stored on a password-locked computer, and hard copies will be kept in a binder only I will have access to and may be used in future presentations. After three years, all electronic records will be deleted.

How will you be compensated for being part of the study?

Participants will be compensated for participating in this study. You will be compensation in the form of Psych activity credits.

Is study participation voluntary?

Participation in this study is voluntary. Your decision whether to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

What should you do if you decide to withdraw from the study?

If you choose to withdraw from the study, please inform the researcher that you wish to discontinue your participation, and do not submit your study materials. Your responses will not be recorded or included in the study.

Whom do you contact if you have questions or concerns about the study?

The researcher conducting this study is Alexis McIntosh. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at ***You may also contact the researcher's faculty sponsor, Brian Kelly.

Whom do you contact if you have questions about your rights as a research participant?

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA 24515 or email at irb@liberty.edu.

APPENDIX B: Data Collection Instruments

What was your StressScan score before you started this experiment? _____

What was your StressScan score after you finished this experiment? _____

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This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Use the following scale to record your answers.

Gender: M/F **Group Number:** _____

1- Very slightly or Not at all

2- A little

3- Moderately

4- Quite a bit

5- Extremely

____ Cheerful ____ Sad ____ Nervous ____ Interested

____ Disgusted ____ Calm ____ Excited ____ Energetic

____ Attentive ____ Afraid ____ Hostile ____ Lively

____ Surprised ____ Happy ____ Scornful ____ Alert

____ Scared ____ Relaxed ____ Upset ____ Drowsy ____ Irritable ____ Angry

____ Distressed ____ Delighted ____ Blue ____ Joyful

Portion used of the Emotional State-Adult Protocol, Watson and Clark 1994

Please fill out this questionnaire to the best of your ability.

What were your scores in the attention task? _____

What was the average score (if one was given)? _____

How many people did you score above or below? (Please indicate if you scored above or below)

Please fill out this questionnaire to the best of your ability.

What were your scores in the attention task? _____

What was the average score (if one was given)? _____

How many people did you score above or below? (Please indicate if you scored above or below)

Did interacting with the dogs or negative emotions? _____

Index

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Use the following scale to record your answers.

Gender: M/F **Group Number:** _____

Were you allowed the use of your cell phone? _____

Did you Interact with a puppy/dog before taking this inventory? _____

1- Very slightly or Not at all

2- A little

3- Moderately

4- Quite a bit

5- Extremely

____ Cheerful ____ Sad ____ Nervous ____ Interested

____ Disgusted ____ Calm ____ Excited ____ Energetic

____ Attentive ____ Afraid ____ Hostile ____ Lively

____ Surprised ____ Happy ____ Scornful ____ Alert

____ Scared ____ Relaxed ____ Upset ____ Drowsy ____ Irritable ____ Angry

____ Distressed ____ Delighted ____ Blue ____ Joyful

Portion used of the Emotional State-Adult Protocol, Watson and Clark 1994

APPENDIX C: Method Flow Chart

Group 1: Animal Intervention Group with use of their phones.

Group 2: Animal Intervention Group with no use of their phones.

Group 3: Non-Intervention Group with no use of their phones.

Step 1: Participants will be assigned to one of three groups by pulling a group name and number from a bag.

Step 2: After participants have been sorted into their groups, a date and time will be chosen for the study to take place.

Step 3: Before the study begins, each participant will take a stress scan via phone app called StressScan.

Step 4: After the stress scan they will be given a portion of the Emotional State Adult Protocol to fill out to get a baseline of positive and negative emotions.

Step 5: After filling out the Emotional Adult Protocol they will be given an attention task on testmybrain.org called Famous Faces. When this is complete they will write their scores, the average score and how many people they scored above/below down on a separate

Step 6: After the attention task is done Group 1 and Group two will be allowed interaction with the dogs. However, group 2 will not be allowed to use their phones. Group 3 will remain in the testing room without use of their phones. The intervention and non-intervention will last for 15 minutes.

Step 7: After the interaction or non-interaction, the participants will complete the attention task, Famous Faces, again as well as writing down their new scores.

Step 8: After the second attention task they will be asked to fill out the altered Emotional State Adult Protocol again.

Step 9: After the Emotional Protocol is completed the participants will be asked to complete one final StressScan. Afterwards, they would be free to go.