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The Effects of Tactile and Indirect Contact with Dogs in a College Population

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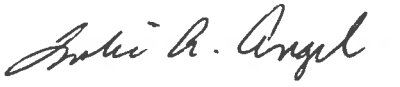

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Acknowledgements

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Table of Contents

Abstract

To assess how physiological stress response is affected by human-canine interactions, one hundred-thirty (n=130) Carroll College students in Helena, Montana participated in trials designed to measure blood pressure, respiratory rate, heart rate, and galvanic skin response (GSR) in low- and high-stress environments. Perceptual response to stress was also measured. Participants completed trials either without a dog, with a dog present but without physical or verbal interaction, or while maintaining contact with a dog. It was hypothesized that participants with direct physical contact with the dog would experience the least physiological change related to stress response. A multivariate analysis of variance (MANOVA) revealed that while physiological responses were similar in all groups, there was a statistically significant decrease in the perception of stress in the tactile contact group when compared to the group with no dog present ($p = .02$). Though results did not support the hypothesis, further review of the literature reveals indications that human-canine interactions may affect psychological stress management in similar ways as physical exercise does.

The Effects of Tactile and Indirect Contact with Dogs in a College Population

Interactions between humans and dogs are certainly nothing new. Animal visitation programs have grown in popularity over the past decade, and companion and therapy dogs have increasingly been seen as legitimate interventions for clients and patients in a variety of settings. Research in recent years has even suggested that there are direct health benefits to those who regularly spend time with a canine companion. Research has also shown in several cases that those who own a pet are more likely to have fewer day-to-day health problems than those who do not own a pet and have lower overall blood pressure and heart rate than their non-pet owning counterparts (Allen, Blascovitch, & Mendes, 2002; Allen, Shykoff, & Izzo, 2001; Anderson, Jennings, & Reid, 1992). Moreover, several studies have revealed that patients who have undergone heart surgeries have a higher chance of survival when they own a pet than when they don't (e.g. Friedman, Honori, Lynch, & Thomas, 1980). It has even been shown that psychiatric patients demonstrate a lowered anxiety response when participating in therapy sessions where an animal is present (Barker & Dawson, 1998). Some suggest, however, that it is merely an environmental change that causes these physiological differences and not the actual interaction with the animal (e.g. Moore & Wright, 1982). The goals of the current study were to contribute to the understanding of the mechanisms that may lead to positive effects of human-canine interactions and to provide support for the theory that it is the canine interaction, and not merely environmental similarities, that causes physiological change in humans.

The primary goal of this study was to assess whether direct physical interaction with a dog is required to have beneficial outcomes or if proximity alone is sufficient to see physiological changes in humans. This question was asked in a study completed in 1988 by John Grossberg and Julia Vormbrock, which did show a difference in human response based on the type of canine interaction. Grossberg and Vormbrock's study included 30 female and 30 male college students and measured their blood pressure and heart rate in six different situations. Participants were each asked to take part in six conditions: to sit quietly in a room, to interact verbally with a dog without physical interaction, to pet a dog without verbal interaction, to both pet and talk to the dog, and to be interviewed by a researcher both while a dog was present and without a dog. Grossberg and Vorbrock's study revealed that physical interaction with a canine yielded lower blood pressure than that yielded by verbal interaction alone, but that lower BP levels were not maintained with physical interaction and verbalization. Only two of the six conditions involved physical interaction, and environmental differences among conditions leaves answers unclear about how essential touch was in creating physiological changes. The current study sought to replicate Grossberg and Vormbrock's findings, ensuring that those participants physically interacting with a dog would do so in in both low- and high-stress environments.

Another aim of the current study, again in response to Grossberg and Vormbrock's (1988) study, was whether physiological responses would be maintained at higher levels of human stress, or if it is merely the environment in which people tend to interact with dogs that causes lower heart rates and decreased blood pressure. Results of the 1988 study demonstrated that blood pressure (BP) for subjects was higher during the

interview situations than any other condition and were lowest when non-verbally petting a dog and during rest periods. They also found that heart rate was significantly lower during rest periods than during any other activity in the study, even when subjects were quietly petting the dog (Grossberg & Vormbrock, 1988). From the results, Grossberg and Vormbrock reached the conclusions that canine interactions could indeed cause physiological changes, but only in relation to the human subjects' activity level and their ability to focus on the dog itself. The current study aimed to replicate the results of Grossberg and Vormbrock's research using a larger sample size and addressing possible confounds that may have influenced results in the original study. For instance, while participants talking to a dog did have lower blood pressure (BP) than those talking to a researcher, this difference may have been caused by the inherent stress increase of conversation that is less self-driven and focuses on daily life stressors. The fact that having a dog in the interview session caused no change in physiological response may indicate that differences in BP may in fact be due to environmental differences. By ensuring that the only difference between participant groups was the degree of canine interaction, the current study attempted to test the theory that it is the human-animal interaction itself that causes physiological changes in humans. It was hypothesized that there would be significant differences between the groups at the low-stress level, primarily that those who had direct physical contact with the dogs would have the lowest blood pressure and heart rates. However, it was also hypothesized that this effect would begin to taper as the level of stress increased and participants would no longer be able to focus on the dog or their ability to interact with them.

Method

Participants

One hundred thirty (n=130) Carroll College students from the general psychology course as well as upper-level psychology classes took part in trials. Participants (males= 25, females= 105) ranged in age from 17 to 31. All participants were offered an extra credit incentive for their overall class grade for taking part in the study.

Materials

Each trial took take place in the Simperman Hall 316A research lab, which contained two personal computers, each of which ran on a Windows operating system. One computer operated a BIOPAC® MP35 program (BIOPAC systems, Goleta, CA, USA) to measure heart rate, respiratory rate, and galvanic skin response. The other presented a two-part, analogy-based exam that was created and presented on Microsoft Powerpoint 2010. A Microlife Digital Advanced Automatic blood pressure monitor was used to record participants' blood pressure at the end of each trial. A single three-year-old Golden Retriever dog was presented to each participant in Conditions One and Two. A waiver was signed by all participants ensuring they had no allergies to dogs nor a phobia that would cause them to have negative psychological side effects as a result of participation. A post-exam questionnaire, which included perceived levels of stress for each exam portion, age, and sex, was administered at the end of the two-part exam (see Appendix A). A debriefing form and confidentiality agreement was also presented to each participant upon completion of the experiment.

Procedure

Students in a general psychology class as well as students from upper-level psychology classes were informed of the option to take part in a one-time study for extra

credit shortly after they had taken their first exam of the semester. Students were told they would be taking part in a study designed to measure any effects of having dogs in a classroom setting because of Carroll College's Anthrozoology program, which allows upper-level students to bring service dogs-in-training into classes. Students who were interested in taking part in the study were allowed to select the time and date from a list of available participation times. To ensure higher participation rates, students were offered multiple opportunities throughout the semester in which they could sign-up for trials, although each student was only permitted to participate once in the study. Trials ran from September 2011 through December 2011. Each participant was reminded via email of his or her scheduled appointment one day prior to the trial's completion.

Upon arriving for trials, participants were asked to sit in a small lab room facing a computer screen, where they were asked to read a waiver carefully and sign it, ensuring that they had no allergies or fear of dogs. Because it was essential that participants who would not have canine interaction did not see the dog before the study, time slots for each trial were assigned to one of three conditions using pseudo-random assignment prior to participant arrival. Those in Condition One did not see or interact with a dog during the trial. In Condition Two, a golden retriever was placed on the opposite side of the lab, but participants were asked not to interact with him verbally or physically. In Condition Three, the golden retriever sat directly next to the participant and participants were asked to maintain some kind of physical contact with the dog throughout the trial. The extent of physical interaction with the dog was self-driven, allowing participants to choose whether they actively pet the dog or rested a hand on the dog's head or back.

Once the waiver had been signed and the condition had been established, the blood pressure cuff as well as all BIOPAC equipment was attached to participants. While equipment was calibrating, participants were asked to read through an instructive slide for Exam One. Participants were told that they were taking a practice exam that would allow them to become familiarized with the test and enable the researcher to be sure the equipment was running properly. Instructions for Exam One read as follows:

> In the following slides you are going to be presented with a series of analogy problems. There will be a related pair of words followed by five lettered pairs of words. These pairs will be presented for 20 seconds. After the 20 seconds has elapsed the question will be removed and you will choose the one pair that best expresses a relationship similar to that expressed in the original pair. Once you provide your answer you will be informed if you were correct or incorrect. Do you have any questions?

Once Participants had completed the instructional slide, they were given one more set of verbal instructions to ensure their understanding of the procedure. These instructions informed participants that the exam would be set up similar to other standardized tests, and an example was provided (bird is to tree as fish is to water). Participants were also told that if they did not know the answer, they could either guess or respond with "I don't know" at the appropriate time. Those participants in Condition Three were reminded that physical contact with the dog must be maintained throughout the trial. If the participant did not have any questions, the trial began and the measurement of physiological responses started. Heart rate, respiratory rate, and galvanic skin response were measured continuously throughout the trials. Blood pressure readings

began after the participant provided an answer to the third question in the series. Problems in this series were intended to be relatively easy for participants to answer in order to provide a low-stress setting that would allow each participant to remain aware of the interactions they were having with the dog. For both exams, each analogy question was presented on the screen for a total of 20 seconds before being presented with a blank screen for five seconds in which participants were required to respond, resulting in a total exam time of two minutes. Once Exam One had been completed, the researcher had participants read the instructional slide for exam two immediately. Instructions for this portion read as follows:

> Once again, in the following slides you are going to be presented with a series of analogy problems. The methods will be exactly the same as the practice trials. Because your attention and commitment to the task are essential to the experiment, extra-credit for your classes will be awarded based on the number of correct responses during this trial.
>
> - 0 – 1 correct = 1 point
> - 2 – 3 correct = 3 points
> - 4 – 5 correct = 5 points

After the participant verified that he/she understood the procedure, the exam started. Each question in this section was selected to ensure that it would be harder to answer to increase the amount of stress experienced. In addition to the level of difficulty in question type, participants were also deceived about whether or not they answered each question correctly. Participants were told they answered the first question correctly

and that all subsequent answers were incorrect. This deception was also a measure to increase the amount of physiological stress experienced.

Once Exam Two was complete, participants were immediately asked to fill out a questionnaire that asked how stressful they perceived each exam on a 10-point scale with zero representing "less stress" and ten representing "more stress." The questionnaire also asked about participants' current and previous pet ownership as well as the participant's age (see Appendix 1). After completing the questionnaire participants were debriefed about the true goals of the experiment and were told that they would receive full extra credit regardless of performance. Participants were allowed to leave after signing a confidentiality agreement stating that they would not reveal the purpose of the study to other students who had yet to take part in trials.

Results

Upon completion of the study, 58 participants were excluded from analysis due to anomalous recordings and/or instrument error. The criteria for these exclusions were observable fluctuations in instrument measurement, which exceeded two standard deviations from the average for the recorded period. A Multivariate Analysis of Variance (MANOVA) was run for the remaining 72 participants on the physiological measurements of heart rate, blood pressure, galvanic skin response, and respiration for each of the three conditions in both low and high stress environments. Results failed to demonstrate significant differences in the physiological indicators of stress between groups (all p's $> .05$). However, post hoc comparisons did indicate a significant decrease in perceived stress as measured by self-report in condition three (tactile contact) when compared to condition one (no dog present) ($p = .02$).

Discussion

Results did not support either element of the original hypothesis. Analysis revealed that physiological responses among participants were similar in both low- and high-stress environments, regardless of canine interaction. Unexpectedly, perceived stress levels were significantly lower when comparing the group with no canine interaction with the group that maintained physical contact. Those who pet the dog throughout the exams reported feeling less overall stress from the experience than those who did not have any interaction with the dog.

Although results of the physiological variables seem initially to indicate a lack of stress mitigation, further review of physiological stress response reveals similar results in studies involving stress responses related to exercise. Steptoe, Moss, Edwards and Matthews (1993) conducted a study on physiological responses to stress in relation to aerobic exercise in which participants showed significant improvement in perceived ability to cope with mental stressors, although physiological responses were fairly consistent with those prior to training. Although it appears physiological response to acute stressors remains consistent, it has been demonstrated that exercise, paired with stress management, does have long-term health benefits (Blumenthal et al., 2005). Human-canine interaction may act much in the same way as physical exercise, which may help further explain the benefits of these types of interactions, especially for hospital visitation programs, where patients have limited capacity for physical activity.

As in any study, it is important to note that potential confounds may have impacted results. Because participants had to be attached to several pieces of equipment, it was impossible to get an accurate baseline level of stress. It is possible that students

were at a high enough level of stress because of the study itself that their responses were skewed. It is also possible that participants were aware at some level that the second exam was meant to be more stressful and answered questions accordingly on the questionnaire. One additional factor to take into consideration when interpreting the results of this study is the amount of time participants interacted with the dog. While a lack of results could show a lack of physiological interaction with the human being and the dog, it could simply mean that there needs to me a more consistent, long-term interaction in order to see significant results. This too, however, has implications for the way in which we view canine-related visitation programs in hospitals and nursing homes.

Results of this study do not mitigate the need for more research in this area, which is necessary in order to come to any firm conclusions regarding canine-human interactions. One possible approach, which may help establish a more appropriate baseline and which could be performed on participants in a lab setting as well as in home or familiar setting, would be to utilize film as a means to induce emotional response. Clips could be shown involving various types of situations, making it easier to induce a wide range of stress responses. Additionally, as film traditionally places people in an empathetic state, these emotional responses may be more valid and would be harder to influence even with any prior knowledge of study goals.

Despite the fact that the hypothesis was not supported, results of this study contribute to the growing knowledge base surrounding human-canine interactions. Understanding the potential discrepancy in physiological arousal and perceptual response as a result of these interactions may demonstrate that a human-animal bond yields benefits similar to other stress-mitigation techniques or that research variables may need

to be changed to measure the mechanisms of long-term health benefits. Undoubtedly, much research is still needed to achieve a more thorough understanding of such complex interactions as those between dogs and human beings.

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Figure 1
Mean blood pressure for Conditions One, Two and Three in both low- and high-stress environments, which showed no statistical differences.

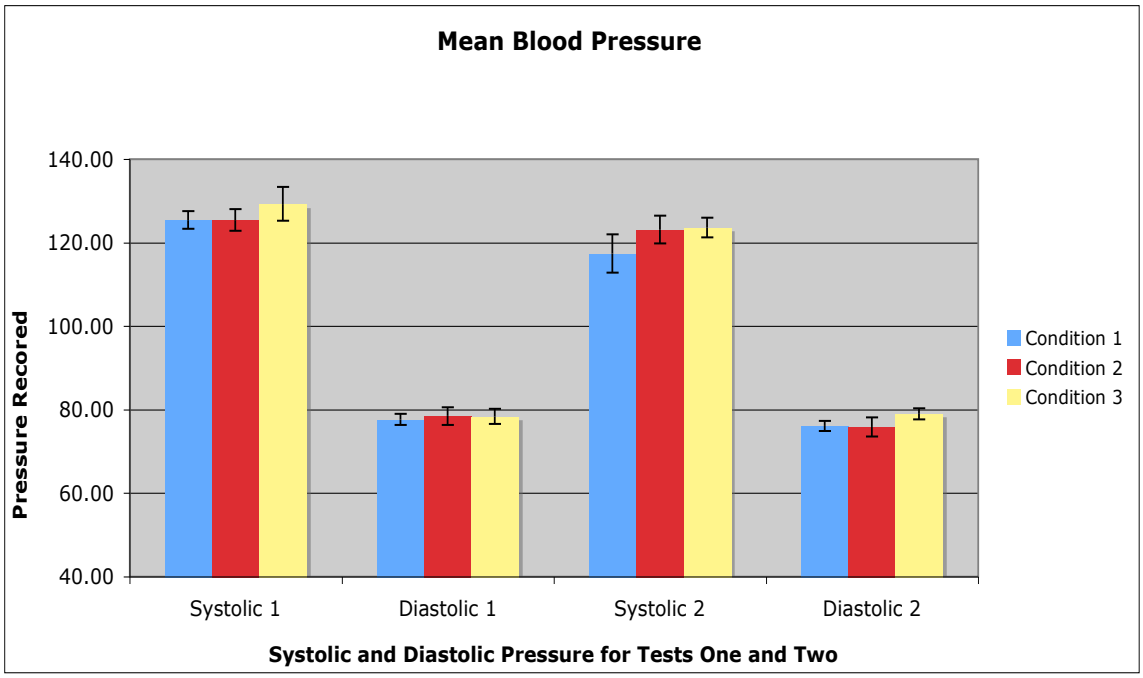


Figure 2
Mean heart rate recordings for Conditions One, Two and Three in both low- and high-stress environments, which showed no statistical differences.

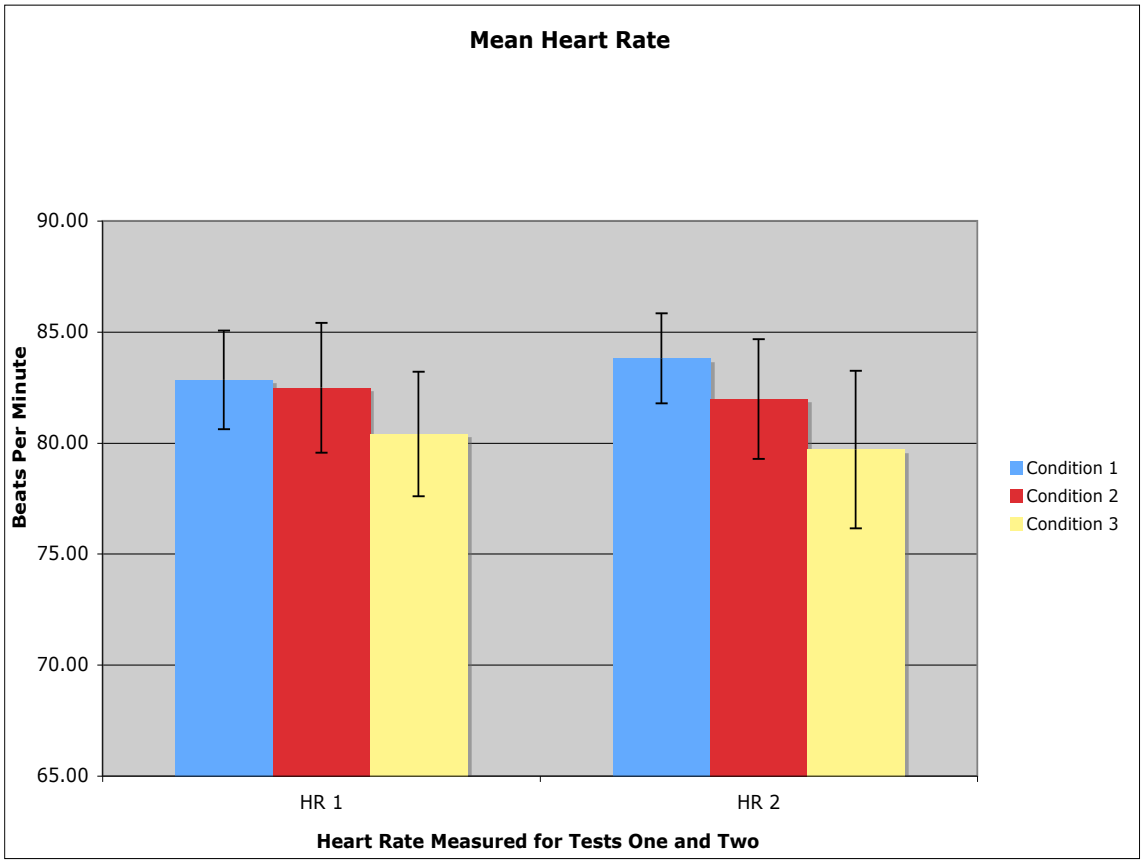


Figure 3
Mean galvanic skin response (GSR) recordings for Conditions One, Two and Three in both low- and high-stress environments, which showed no statistical differences.

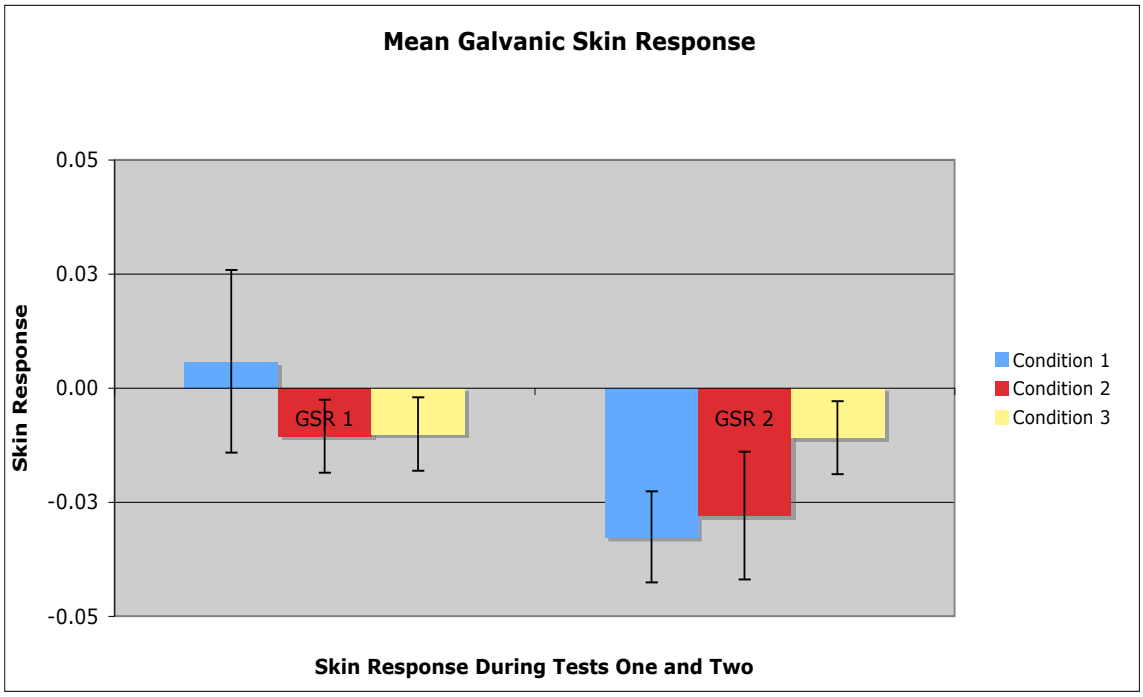


Figure 4
Mean respiratory rate recordings for Conditions One, Two and Three in both low- and high-stress environments, which showed no statistical differences.

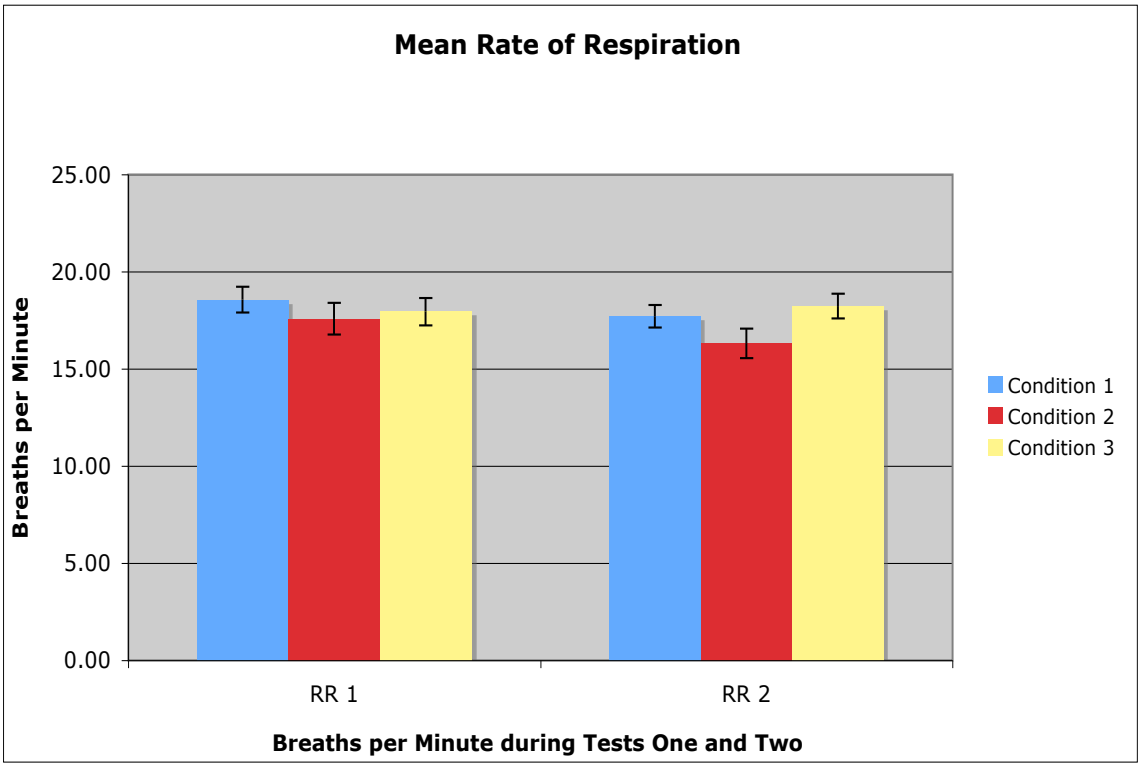
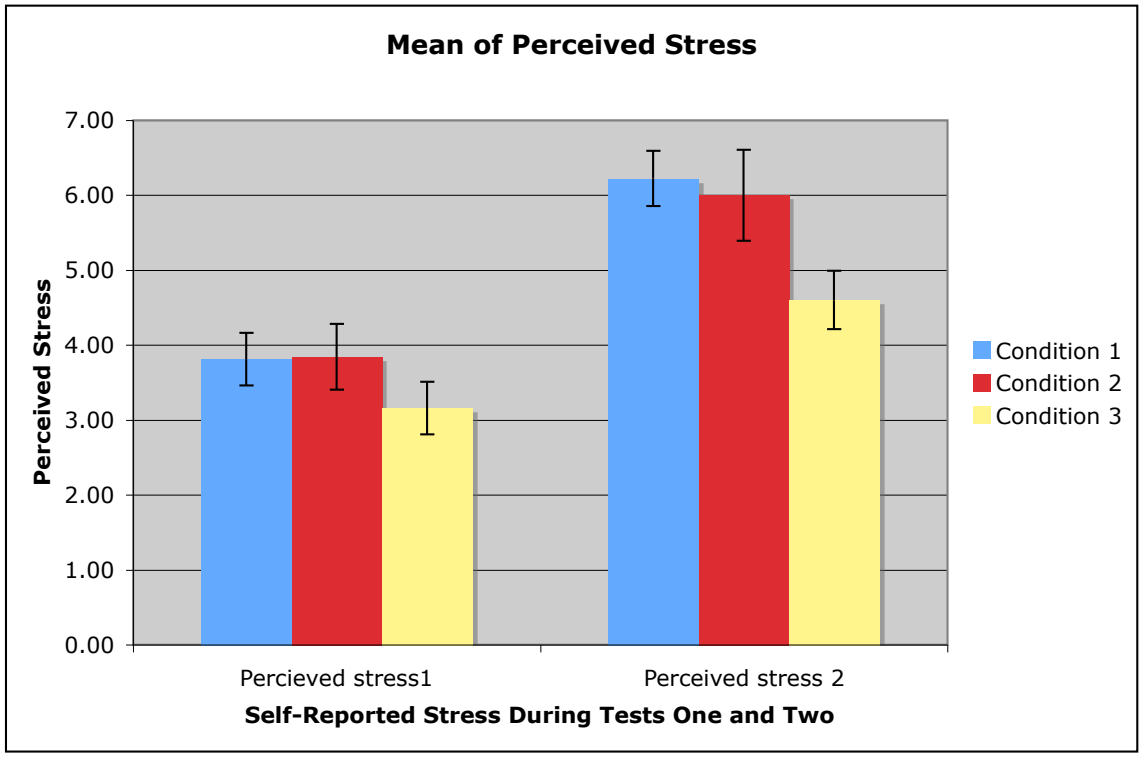


Figure 5
Perceived levels of stress showed significant differences when comparing Condition Three (physical contact with dog) to Condition One (No dog present).



Appendix A

Post Exam Questionnaire

1. What level of stress did you experience while completing the practice trials?

Less stress 1 2 3 4 5 6 7 8 9 10 More stress

2. What level of stress did you experience while completing the experimental trials?

Less stress 1 2 3 4 5 6 7 8 9 10 More stress

3. Do you or your family currently own a pet?

Yes ☐ No ☐

4. Have you or your family ever owned a pet?

Yes ☐ No ☐

Participant age:_____