

**EXPLORING THE EFFECTS OF COMPANION ANIMAL OWNERSHIP ON THE PERCEIVED
STRESS OF COLLEGE STUDENTS**

By

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Abstract

The mental health of college students is of increasing importance because many students are experiencing significant levels of stress which can lead to further health problems such as high blood pressure, fatigue, and depression. Studies have shown that human-animal interaction (HAI) is effective in lowering stress levels, leading to improved overall health both mentally and physically. The aim of this study was to explore whether owning a companion animal, which has shown to reduce stress levels and increase overall health and well-being, would help mitigate the high stress levels that students are experiencing today. For the purposes of this study, companion animal ownership is defined as living with a companion animal five or more days a week. It was hypothesized that students who owned companion animals would have lower perceived stress scores than students who did not own a companion animal. A survey-type study was conducted on a sample of 241 undergraduate students from the University of Arizona. The Perceived Stress Scale (PSS-10), along with additional survey questions were used to measure the perceived stress levels of survey participants. Respondents self-reported very high levels of perceived stress, in general, in addition to very high stress levels during academic activities. Approximately 76% of respondents also reported feeling some increase in stress due to the current COVID-19 pandemic. There was no difference in perceived stress scores between companion animal owners and non-companion animal owners overall. This result is likely due to the perceived stress scores being extremely high. However, when comparing dog-only owners' PSS scores with the remaining companion animal (cats, avian, equid, small mammal, reptile/amphibian, fish, exotic, rabbit) owners' scores, there was a significant difference ($p=.004$) with dog owners having lower PSS scores, suggesting that dog interaction may be more effective in facilitating the benefits of HAI. This study suggests that undergraduate students are experiencing extreme levels of perceived stress, making the possible benefits of owning a companion animal ineffective.

Chapter I. Introduction

Over three quarters of adults report experiencing both physical and emotional symptoms of stress such as headaches, fatigue, and changes in sleeping patterns at some point in their lives (American Psychological Association, 2019). The Global Organization for Stress states that 75% of Americans have reported experiencing moderate to high levels of stress in the past month (The Global Organization for Stress, 2021). This makes the study of stress important at a broad level because it causes a wide variety of impacts mentally, physically, and socially, causing things like irritability, exhaustion, and reduced communication, all of which decrease overall academic and workplace performance (Bryant & Malone, 2015). Because of these impacts, it is important to find strategies to help combat the effects of stress in our everyday lives. One way to do this is through human-animal interaction (HAI). Human-animal interaction is defined as any relationship or interaction between a person and a non-human animal (Kirkham & The OHAIRE Group, 2020). Although humans have lived alongside animals for thousands of years, in-depth research on the subject of human-animal interaction has only just begun within the last two decades and has increased with time due to the mutual benefits that humans and animals share from it (Wood et al., 2015). Because the therapeutic use of HAI has increased so rapidly, researchers have not specifically looked into the effects of it on more specific groups, like college students, which creates the problem of utilizing HAI without knowing its full capabilities (Crossman, M.K., 2017).

Interacting with companion animals lowers stress levels as well as high blood pressure which leads to more positive health outcomes such as better sleep and overall physical fitness (Orlandi, et al., 2007). One group that could greatly benefit from these interspecies interactions is college students. This is because college students have been shown to have higher perceived stress levels than the general population (Adlaf et al., 2001) as they are experiencing academic and social demands all while preparing for professional careers (Bayram & Bigel, 2008).

Studying college students specifically is important to this field because according to the National Center for Education Statistics approximately 17 million students are attending a college or university this school year (2018). The mental health of college students is of importance because many students experience significant stress levels, which can lead to further, more serious health problems (Dachew, 2015). Finding ways to cope with stress, such as owning a companion animal, may help to mitigate this problem, which would benefit students greatly. For the purposes of this study, companion animal ownership is defined as living with a companion animal five or more days a week. The goal of this study is to determine whether there is a correlation between owning a companion animal and lower perceived stress score in undergraduate students due to the stress reducing effects that companion animals have shown to have on people. It was hypothesized that owning a companion animal would help to lower perceived stress in college students.

Chapter II. Review of the Literature

The study of stress is important at a broad level because of the wide variety of impacts that it causes mentally, physically, and socially. One way to mitigate these effects is through human-animal interaction (HAI), which has been shown to lower stress levels which can lead to better overall health mentally and physically (Orlandi, et al., 2007). Because College students are a population that have shown higher perceived stress levels (Adlaf et al., 2001), the need for intervention techniques like HAI may greatly benefit them as they experience both academic and social demands (Bayram & Bigel, 2008).

The following sections introduce current information regarding stress, companion animals, human-animal interaction, and how these affect one another. More specifically, there will be in-depth discussion regarding stress and how it can be measured using the Perceived Stress Scale, college students and stress, stress during a pandemic, and how companion animals can affect these.

Stress

Stress is defined as the body's reaction to any change that requires adjustment or response. Even though stress is generally thought of as being a negative thing, this isn't always the case. There is distress, the negative type of stress which has undesirable and detrimental outcomes, and eustress, the type of stress that has positive outcomes. In vertebrates, the distress response has a negative effect on the immune system (Adamo, 2014). Some of these negative immune effects include weakening of the immune system, causing more infections (McEwen & Sapolsky, 2007). Overall brain function is also affected by stress, because stress hormones impair brain function, increasing cortisol levels, promoting further impairment (McEwen, 2007). The stress reaction also causes high blood pressure and depression and it is now widely accepted that most people who develop major depression do so following major life

stress (Monroe & Reid, 2009). The sympathetic nervous system reacts to stress by causing the kidneys to retain salt, which upsets blood pressure regulation (Ayada et al., 2015).

According to Hans Selye, not all stress reactions are equivalent and in fact, stress cannot and should not be avoided. This is because although stress has negative impacts on animals in many ways, it can also stimulate the brain in a positive way leading to more productivity (O'Sullivan, 2011). This positive type of stress is known as eustress, which is the type of stress that yields beneficial or good outcomes. It is because of these differences in types of stress that individuals vary in their ability to experience and cope with stressful situations based on overall health, along with genetics and life experience.

Within the broad definition of stress however, there are different types of stress including physical and psychological stress. Physical stress includes things like physical trauma, illness, fatigue, and hormonal imbalances (Friedman, n.d.) while psychological stress stems from experiences or situations that are emotionally or psychologically challenging (McEwen, 2007), and includes mental and social stress. Perceived stress involves how a person feels in regard to stressors in their life (Zhang et al., 2015). Both physical and psychological stress can cause the cortisol stress response involving the increase of stress hormones like cortisol and corticosterone, which alters brain function and correlates to overall health (Romero, 2004). Organisms respond physically to stress through a process called "allostasis", which regulates the body. People and animals alike have a "fight-or-flight" response to stress, which is triggered by the release of the stress hormones cortisol and adrenaline (McEwen, 2007). Perceived stress contributes to both mental and cortisol response stress reactions and is an important factor in causing depression (Zhang et al., 2015).

Measuring Stress

Due to the different types of stress, attempting to measure it in a consistent manner across studies has been hard to accomplish as well as find in the current literature. For

example, researchers have measured the stress response via cortisol levels which have supported the evidence that higher cortisol levels can contribute to diseases like cardiovascular disease and obesity (Manenschijn et al., 2011). Studies like these are important because they show the physical effects of stress on the body. However, because they are only measuring the stress response in this case, it does not take into consideration the fact that people respond to stress in a variety of ways (McEwen, 2013). With this in mind, it is important to be able to measure stress in a consistent and accurate manner to ensure quality results. As mentioned above, researchers can analyze cortisol levels as a way to measure stress, however this may not be accurate as not every experience that triggers cortisol release is perceived as stressful by the individual (Crosswell & Lockwood, 2020). Another way researchers attempt to measure stress is to look for stress-related biomarkers, which act as mediators in finding the causal between a stressor and a health outcome; this however is not consistent either due to the fact that in order to choose a biomarker to use, it depends on the desired outcome and design of the study, making it less objective (Crosswell & Lockwood, 2020). Perceived stress involves how a person feels regarding stressors in their life and contributes to both mental and physical stress reactions; it is also an important factor in causing depression (Zhang et al., 2015). Measuring perceived stress may be a good option because it does consider the fact that individuals respond to stress in a variety of ways (McEwen, 2013).

There are different tests in which we can measure perceived stress. These include the Ardell Wellness Stress Test, the Stress Coping Resources Inventory, and the Perceived Stress Scale (PSS). The Ardell Stress Test uses a holistic approach to measuring perceived stress and incorporates spirituality (Matherny & McCarthy, 2000), which is defined as something attached or sensitivity to religious values (Merriam-Webster, n.d.). According to Integrated Health Specialists (2021), the Ardell Stress Test is an instrument designed to raise personal insights, like how a person might respond to a stress trigger. The Stress Coping Resources Inventory (SCRI) predicts how well people are able to cope with stress, making it less relevant in

measuring perceived stress itself (Matheny et al., 1993). The SCRI is also used in predicting illness and personality type, as well as life-satisfaction (Matheny et al., 2003). Unlike the PSS, neither of these options attempt to specifically measure current perceived stress that a person may be feeling.

In this study, the Perceived Stress Scale (PSS) was chosen to measure perceived stress. The PSS is one of the most widely used techniques to measure stress perceptions (Chan & La Greca, 2013). The questions in this assessment ask about thoughts and feelings the person has had over the past month, where the person is then asked to rank how often they have felt regarding certain things like an uncontrollable situation (Lee, 2012). There are two main versions of the PSS, a 14-item version as well as a 10-item version, both of which have good psychometric properties (Chan & La Greca, 2013). Recent research supports the use of the PSS-10 for measuring stress in college students due to the addition of perceived helpfulness and self-efficacy questions, which measure how confident a person feels in their ability to handle a personal problem (Roberti et al., 2006).

College Students and Stress

College students are a unique population in that they experience more stress than the general population (Brougham et al., 2009). The American College Health Association states that college students are reporting increasing levels of anxiety, stress, and depression each year they have completed the study (2018). Forty percent of university students experience high levels of stress, which impacts their overall mental health (Dachew et al., 2015). Higher depression, anxiety, and stress levels were found in 27.2, 47.1, and 27% of respondents respectively (Bayram & Bigel, 2008). It is interesting to note that depression and stress levels were both reported around 27% while anxiety levels were reported at a much higher level, showing a correlation between stress and depression (Bayram & Bigel, 2008). This percentage is also similar to the number reported by Dachew, which shows consistency in terms of results

across studies. The period of time where students experience the transition to adulthood and professional life is considered high risk for onset depression and stress (Bayram & Bigel, 2008).

College students are important because they are the next group of people to enter the workforce, which can affect overall workplace productivity due to the detrimental impacts of stress on performance and workload (Hancock & Szalma, 2008). Because of this growing problem, it is vital to find coping mechanisms to help alleviate these higher stress levels.

Social Stress during a Pandemic and its Relevance Today

Most people have been evolutionarily programmed to need social networks (Singer, 2018). Humans are naturally social creatures, and therefore rely on others for general well-being (Cacioppo et al., 2011). Social isolation affects multiple mechanisms such as neural, hormonal, cellular processes (Cacioppo et al., 2011), showing how detrimental it can be to evolutionary social beings. Worse mental health outcomes like depression, anxiety, and stress were associated with higher levels of social isolation (Smith et al., 2020). Social isolation and loneliness can also cause increased risk of stroke as well as obesity (Singer, 2018).

Due to the reasons above, it is important to discuss the relevance of how the current COVID-19 pandemic affects stress levels in humans. The COVID-19 pandemic has created stressors such as the need for physical distancing in order to slow the spread of the virus. Because of the increased use of physical distancing, many are currently experiencing the negative effects of social isolation, such as loneliness and depression. Social isolation that has occurred as a result of the COVID-19 pandemic is likely to have negative effects psychologically, especially in high-risk individuals (Razai et al., 2020). Quarantine associated social isolation can be the trigger for acute stress disorders, emotional distress, mood disorders, and insomnia (Usher et al., 2020). Because of these impacts, people today may be experiencing higher stress levels than usual.

The mental health of students in particular has shown to be worsening due to the current pandemic having detrimental effects on education. Students are experiencing more negative mental health outcomes since the pandemic began due to lack of interaction, physical isolation, and less social and academic support (Elmer et al., 2020). Since the pandemic, students have shown to be experiencing high perceived stress, mild anxiety disorder, and low life satisfaction (Aslan et al., 2020).

Companion Animals

According to the ASPCA, a companion animal is a domestic or domestic-bred animal whose needs can be readily met in the home as a companion, or in a close relationship with a human (2021). Companion animals are defined as any animal that provides companionship. Companionship is defined as the state of spending time with another human or animal for mutual benefit. Humans have been accompanied by animals for thousands of years, which inevitably creates a bond between species (Amiot et al., 2016). There are numerous reasons why people choose to own companion animals, including improved physical health, mental health, security, and happiness (Wong et al., 2019). More than any other species, humans have relied on companionship for success (Kandel, 2018). This has led to the current human-animal relationship that we have in our society today. For many people, their companion animal is often considered a member of the family and it is typical to speak to them as if they are human (Beck & Meyers, 1996). This human-companion animal relationship is important because of the physical and psychological benefits it provides humans (Overgaauw et al., 2020).

It is crucial to note that current research demonstrates a bias for dogs and cats, as they are one of the most commonly owned companion animals (Clancy & Rowan, 2003). In comparing pet owners versus non-pet owners, 72% of the participants owned dogs (Wong et al., 2019), showing this bias in information currently known about companion animals. In a community of older adults, 24% of the residents owned pets, 14% being dogs, 12% being cats,

and just 3% being other companion animals (Friedmann et al., 2020). This bias towards dogs and cats is important to keep in mind as the current literature is analyzed regarding the effects companion animals have on humans, as this information may not apply to all types of pets.

Effects of Companion Animals

Physical Health Effects

One of the most obvious benefits for humans owning companion animals, specifically dogs, is physical health. Owning a dog, for example, leads to walking that dog relatively often. To show this, focus groups were assembled to find out whether or not owning a dog can provide enough physical health benefits to help ease health services designed for older people (Knight & Edwards, 2008). Researchers wanted to find a preventative measure to keep adults healthier for longer. They found that all participants agreed that having a dog was good for their health (Knight & Edwards, 2008). Participants also agreed that dogs felt like companions and that they enhance their lives overall. Some participants stated that owning a dog gives them a stronger sense of purpose. Another notable conclusion of this study is that participants felt that their dogs gave them a sense of protection when out walking as well, which could lead to more walking on average than a person without a dog.

Owning a dog is associated with a lower risk of cardiovascular disease overall (Levine et al., 2013). Cardiovascular health and pet ownership is a subject that has been focused on. Pet owners generally respond better physically to stressful situations, experiencing lower heart rate and blood pressure, as well as faster recovery from stress triggers (Allen et al., 2001). Interactions with companion animals positively influence physical states, leading to increased overall morale (Beck & Meyers, 1996). Pet owners report higher overall life satisfaction than non-pet owners (O'Haire, 2010). Despite the fact that these studies have not been conducted

with college students specifically, college students are a large demographic that may benefit from these same effects. The current literature does not suggest any negative effects of owning companion animals on physical health.

Mental Health Effects

Mental health is emerging as researchers are discovering the role it plays in overall health and well-being (Slade, 2010). Because of their therapeutic effects, companion animals may contribute to improved mental state. Companion animals play a role in the mental health of people, as pets are a major part of owners' lives (Knight & Edwards, 2008). Owning pets provides a sense of ontological security, which equates to a more stable and secure lifestyle and routine (Brooks et al., 2019). Forty-four percent of people get their pet because they believed that it would make them happy (Overgaauw et al., 2020). People who perceive less social support from other humans, have shown higher levels of separation anxiety when away from their pets, showing that for some people, pets can act as "people substitutes" (Dowsett et al., 2020). These findings also include that the type of pet may play a role in this, for example, a dog may provide more support than a bird. This is important because it shows that for some people, certain pets may act as family members in terms of support in times of high stress or need. In situations of high stress such as a patient undergoing chemotherapy, researchers found that when there was a therapy dog present during treatments, patients experienced a decrease in anxiety, depression, and aggressiveness both during and after the treatments (Orlandi et al., 2007). Although this study was conducted under specific circumstances, it shows that human-animal interaction with companion animals can make an impact in multiple settings. In addition, stress levels in students decrease during and after students were able to interact with the therapy dogs on campus. Average stress levels decreased by almost 60% (Anderson et

al., 2017). This is helpful in implementing the use of therapy dogs on college campuses in an effort to help students reduce their stress levels.

Despite these reasons, there is also a type of burden that comes along with the care that goes into pets which could counteract the positive effects. About half of all owners providing care for seriously ill companion animals showed increased levels of burden which is correlated with clinical signs of depression and quality of life reduction (Spitznagel et al., 2019). Another burden that comes along with owning pets is the financial aspect. People spend large amounts of money taking care of their animals; the pet care industry contributes an average of \$43.3 billion to the US economy alone (O’Haire, 2010). Another aspect that can greatly affect the owner's mental health is the loss of a companion animal. Because companion animals have comparatively shorter lifespans than humans, grieving the loss is oftentimes inevitable. Grieving the loss of a companion animal is a process that may result in feelings of numbness, despair, and sadness (Park & Royal, 2020). A common decision owners are faced with making is whether or not to euthanize a companion animal that is suffering. Because of this, owners report this being a difficult decision to make due to the feelings of closeness with their companion animal (Schurrman, 2017). For some, these burdens may outweigh the benefits.

Social Health Effects

Companion animals play a role in the physical and mental health of people, as well as the social aspect of human lives, which contributes to more positive mental health outcomes. Researchers found that the residents in a nursing home showed an increase in both verbal and non-verbal interactions when a dog was present. When a dog was present, residents interacted twice as much as they did without one (Fick, 1993). People have also agreed that they had more of a reason to start a conversation with someone new when they or the other person had

a dog with them (Mader et al., 1989). Pet owners are more likely to get to know their neighbors than non-pet owners (Wood et al., 2015). Because of this research, it is now known that animals can be used as facilitators for increasing social interactions between people of different backgrounds (Wood, 2011).

Companion animals have been shown to act as social catalysts and provide a neutral zone for conversation to begin (Veevers, 1985). Ownership of a companion animal has been associated with perceptions of friendliness as well as higher rates of contact and interaction (Wood et al., 2005). The current literature does not suggest that there are any negative social effects of owning a companion animal.

This study investigates the benefits, if any, of companion animals to undergraduate students. This research project will, more specifically, explore whether or not owning a companion animal benefits college students enough to significantly reduce stress levels, and therefore increase academic success as measured through GPA. We hypothesize that students who own a companion animal will have decreased perceived stress levels and higher academic success than those who do not.

Chapter III. Research Design and Methods

Study Design: This study was a non-experimental and correlational study created to explore the effects of owning companion animals on undergraduate student stress levels and academic success. The survey was developed using Google Forms and participants recruited from the University of Arizona undergraduate student population via emails from academic advisors. Respondents were excluded if they did not identify as 18 years of age or older and full-time University of Arizona undergraduate students.

Procedure: University advisors were contacted to send email the survey to undergraduate students (appendix A), which was sent out no earlier than 30 days into the Spring semester, allowing students to answer questions regarding their experiences over the past 30 days. Two days later, a follow-up email was sent out to advisors to confirm if they had sent the email and survey to students (appendix B). Survey participants were provided informed consent (appendix C) before beginning the survey and were informed that they could opt out of the survey at any time. Throughout the survey, participants were taken to different sections based on their answers to specific questions. The survey remained open for two weeks before the data was collected for analysis.

Survey Questions: To measure the extent to which students perceive stress regarding academics, two questions are asked specifically about stress during a usual semester and perceived stress while actively participating in coursework (see appendix D). To measure how the current COVID-19 pandemic has affected perceived stress levels in students, a question is asked which allows participants to compare overall stress levels before and during the pandemic (see appendix D). Participants are then asked whether or not they live with a companion animal 5 or more days a week; if participants answered no, the survey would conclude; if participants answered yes, they were taken to a section which asks questions about

their companion animal. Participants are asked to rank their average stress level while actively interacting with their companion animal on a scale from 1 to 5, with 1 being no stress and 5 being extreme stress. The following question asked participants to answer whether they feel more or less stressed when around their companion animal. Another question asked participants to rank (out of 5) the degree to which they agree or disagree with the statement “Owning a pet adds stress to my life”. This is followed by questions that allow participants to answer how many hours a week they spend actively taking care of their pet and whether or not their pet requires extra care (see appendix D).

Perceived Stress Measurement and Scoring: To measure perceived stress we used the 10-item Perceived Stress Scale (PSS-10) (Cohen, 1994). PSS-10 questions ask about the thoughts and feelings that participants had experienced over the last 30 days. Each answer is rated on a scale ranging from 0 = ‘never’ to 4 = ‘very often’. PSS scores are calculated by reversing the responses (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1, and 4 = 0) to the positively stated questions (questions 4, 5, 7, and 8), then summing up all scores. Scores can range from 0 - 40, with scores of 0-7 being considered very low stress, scores of 8-11 being considered low stress, scores of 12-15 being considered average stress, scores of 16-20 being high stress, and scores of 21 or higher being considered very high perceived stress (Cohen, 1994).

Statistical Analysis: The f-test was used to determine whether data sets were considered equal under the null hypothesis. The independent t-test was used to determine the significance between study groups.

Chapter IV. Results of Survey

Survey Respondents and Demographics: There were a total of 256 respondents to this survey, with 15 excluded because they did not self-report as full-time University of Arizona

Undergraduate students. Of the 241 participants included in the data analysis, 43 (17.8%) were males, 189 females (78.4%), and eight (3.3%) non-identifying participants. The median age-range of included participants was 18-20 years. Out of 241 participants included in the study, 128 (53.1%) participants lived with a companion animal five or more days a week.

Of the 241 survey participants, 37 (15%) were reported as Freshman (0-30 units completed), 52 (22%) as Sophomores (31-60 units completed), 67 as Juniors (61-90 units completed), and 85 (35%) identified as Seniors (91 or more units completed). When comparing the survey participant population grade levels with the College's population grade levels, there was no significant difference between groups (Figure 1). 132 (55%) participants reported being in the 18-20 age range, 86 (36%) were in the 21-23 age range, 11 (4.6%) were in both the 24-26 and 27+ age ranges. When comparing the ages and grade levels of survey participants with the ages and grade levels of the actual college populations, we found no significant difference between groups ($p>0.05$) (Figure 1).

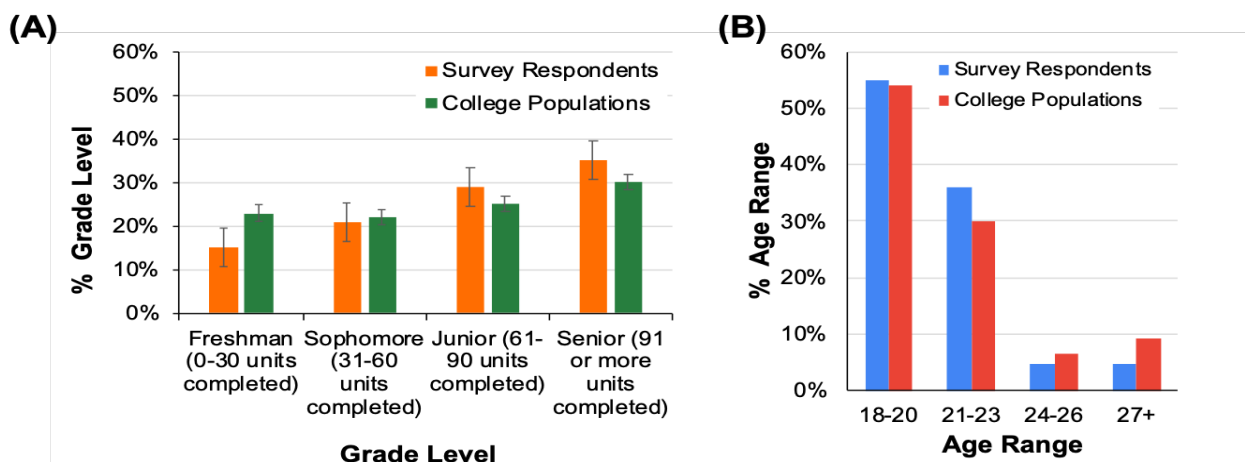


Figure 1. Comparing survey respondents with college populations. Survey respondent and total populations of the responding colleges were compared based upon (A) Grade Levels and (B) Age Groups.

Of the 241 participants included in the data analysis, 43 (17.8%) were males, 189 females (78.4%), and eight (3.3%) non-identifying participants (Table 1). Of the general University of Arizona college populations used for comparison, 6956 (38%) were males, 11,321 (62%) were females, and 5 (<1%) were non-identifying (Table 1).

Table 1. Comparison of survey respondents and college population based on gender. A comparison of the gender reported by survey participants to gender demographics of the student population in responding Colleges shows no difference.

Gender	College Populations	Survey Respondents
Male	38%	17.80%
Female	62%	78.4%
Non-identifying	0.0007%	3.30%

Survey Questions: Figure 2 shows the responses for the survey question “Rank your overall stress level during a usual semester, including both personal and academic life” for both companion animal owners and non-companion animal owners. The average stress level reported for non-companion animal owners was 3.69, while the average stress level reported for companion animal owners was 3.80; there was no significant difference in scores between owners and non-owners of companion animals.

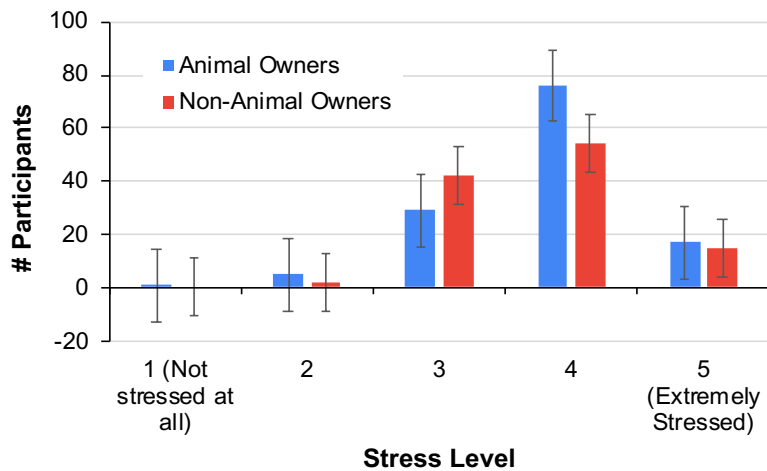


Figure 2: Participants' overall stress during the semester.

This study also investigated stress levels of students while doing school activities (Figure 3). When asked to rank overall stress levels while actively participating in schoolwork (i.e. in lecture, completing homework, reading, taking quizzes, etc.), participants who owned companion animals scored an average of 3.70, while non-companion animal owners scored an average of 3.66. There was no significant difference between groups.

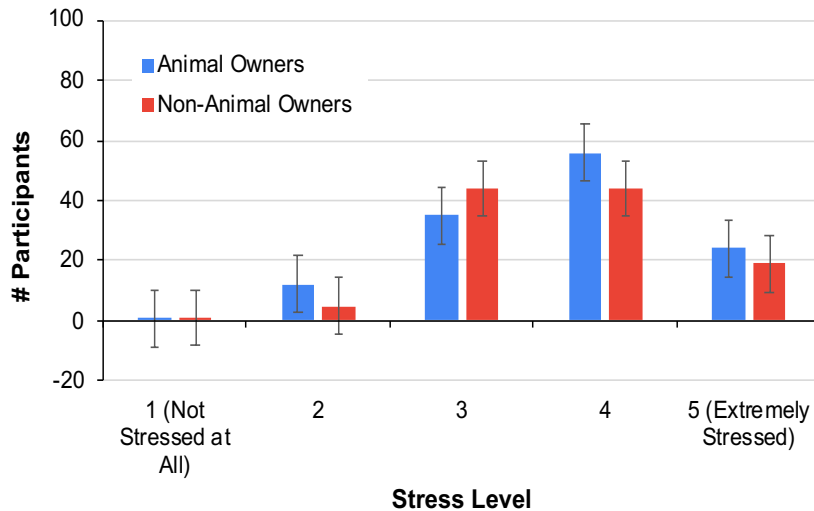


Figure 3. Stress while actively participating in school work.

Figure 4 shows the distribution of participants' overall life stress and academic related stress between companion animal owners and non-companion animal owners. There was no significant difference between groups ($p>0.05$) When asked how the COVID-19 Pandemic has affected participants' overall stress levels (Figure 5), the average score for companion animal owners was 3.93 out of 5, while the average score for non-companion animal owners was 3.99 out of 5 (Figure 5). There was no significant difference between groups ($p>0.05$).

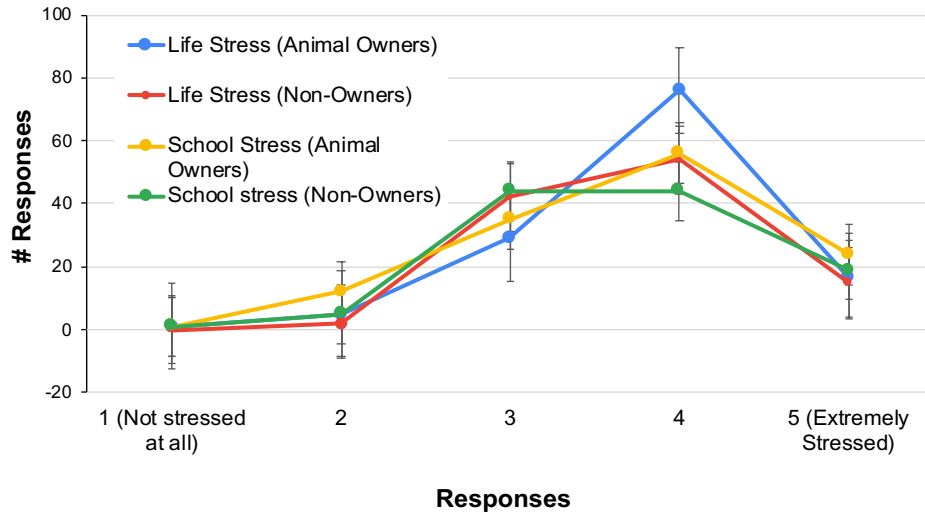


Figure 4: Life stress and academic-related stress for pet owners and non-pet owners.

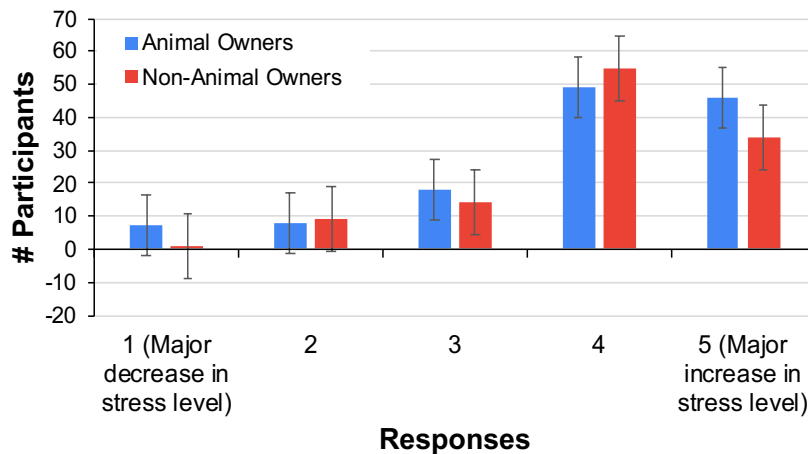


Figure 5: Effect the COVID-19 pandemic on participants' overall stress level.

Perceived Stress Measurement: Of the 241 participants, 134 (55.6%) scored in the very high perceived stress range of the PSS scale, 56 (23.2%) scored in the high perceived stress range, 31 (12.8%) scored in the average perceived stress range, 16 (6.6%) scored in the low perceived stress range, and four (1.6%) scored in the very low perceived stress range (Figure 6A).

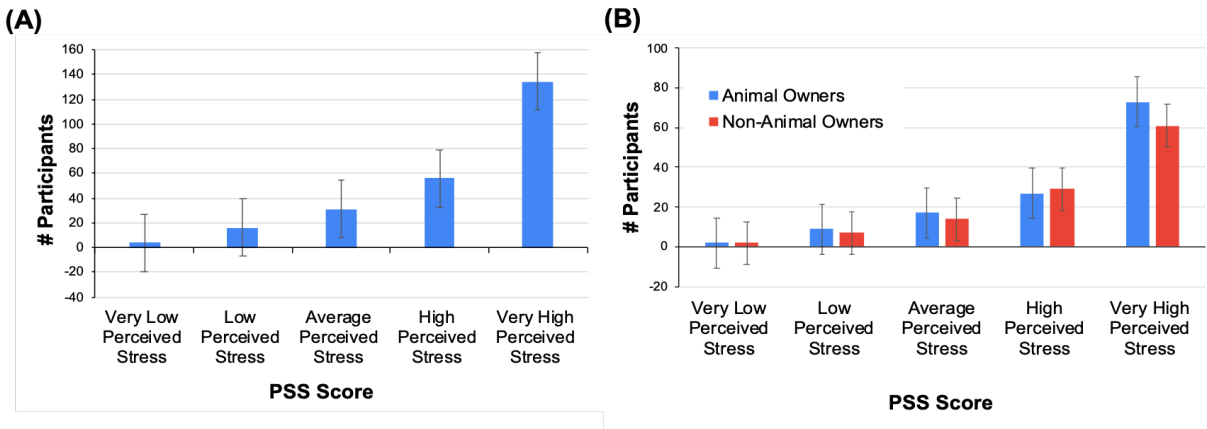


Figure 6: Perceived stress scores for survey participants. (A) Overall perceived stress for all participants. (B) Perceived stress for pet- and nonpet-owners.

Figure 6B shows the PSS scores of pet owner and non-pet owner participants. The average PSS score for participants who owned companion animals was 21.80 and the average PSS score of participants who did not own companion animals was 21.53, with both averages being considered very high perceived stress (Cohen,1994). There was no significant difference in the PSS scores of participants between groups ($p>0.05$).

The average PSS score for survey participants who only owned dogs was 19.36, while the average PSS score for survey participants who owned any other companion animal other than dogs was 24.28. Figure 7 shows the comparison between PSS scores of survey participants who only owned dogs and the PSS scores of participants who owned any other companion animal other than dogs. There was a significant difference between groups ($p=0.004$) (Figure 7).

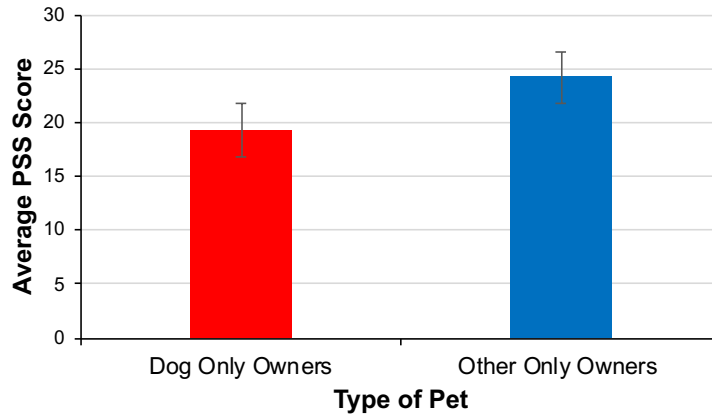


Figure 7: Average perceived stress scores for dog owners compared to owners of other companion animals.

Pet Ownership Questions: Figure 8 shows that the majority of companion animal owners feel little to no perceived stress while actively interacting with their companion animal. 45% of respondents reported feeling no stress at all, 38% reported feeling little stress, and only 17% reported feeling average amount of stress or higher while around their companion animal(s) (Figure 8).

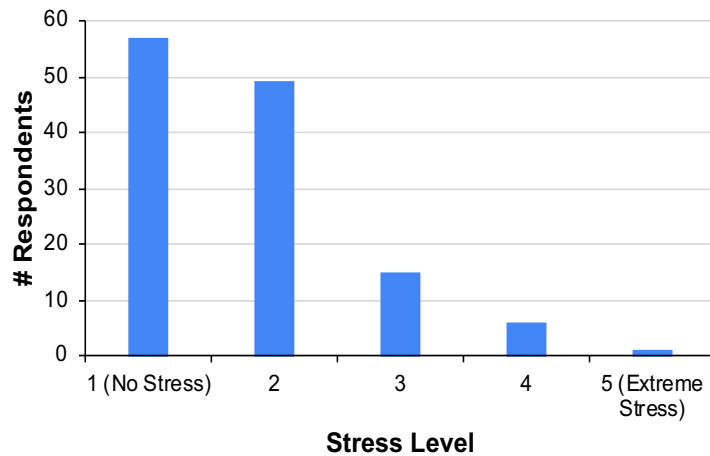


Figure 8. Average stress levels of companion animal owners while actively interacting with their animals.

When asked to rank the amount to which their stress levels changed when around their companion animal, nearly two thirds (57%) of participants recorded feeling a significant

decrease in stress. 38% of participants recorded feeling a slight decrease in stress when around their animal, and 5% of participants felt no change in stress when around their animal. No participants reported any increase in stress when around their companion animal (Figure 9).

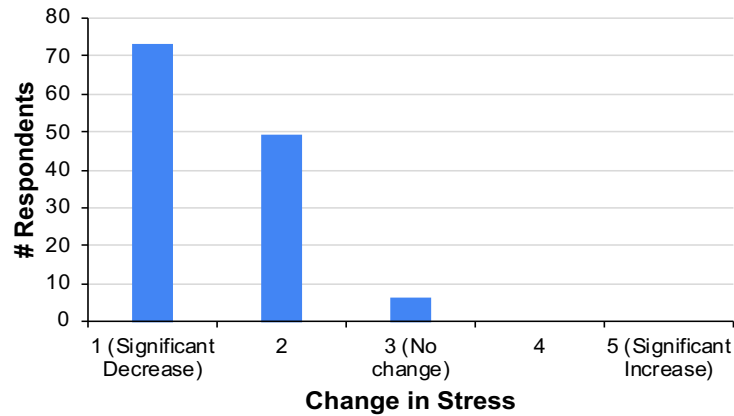


Figure 9. Perceived change in stress levels when interacting with their companion animals.

Figure 10 shows that 77% of survey participants disagree with the statement “Owning a pet adds stress to my life”. 14% of respondents neither agree or disagree with this statement, and 9% agree with this statement.

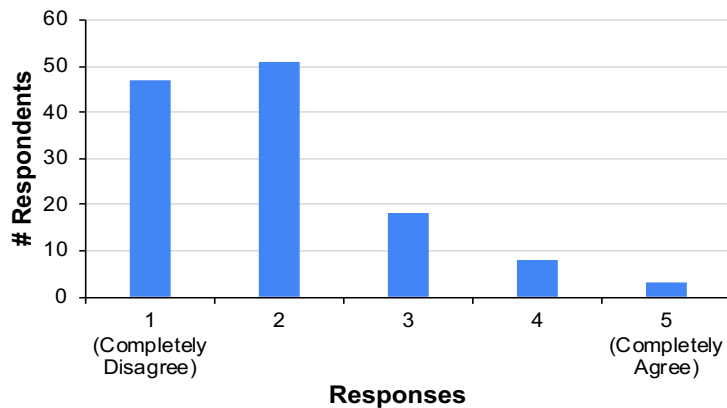


Figure 10. Extent to which participants agree with the statement “Owning a pet adds stress to my life”.

When asked how much time per week survey participants spend actively taking care of their companion animal (i.e. feeding, walking, grooming, playing with, etc.), 17% reported spending one to four hours per week, 30% reported spending five to nine hours per week, 33% reported

spending 10 to 14 hours per week, 9% reported spending 15 to 19 hours per week, and 10% reported spending 20 or more hours per week taking care of their companion animal (Figure 11).

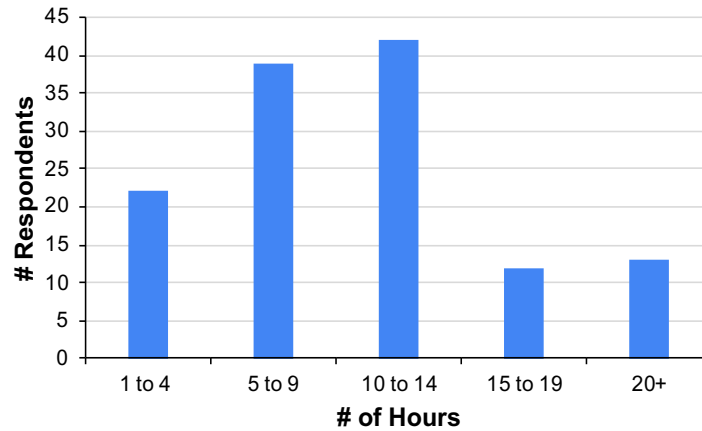


Figure 11. Hours per week participants spend actively taking care of their companion animals.

Of the 128 participants who owned a companion animal(s), 12% reported that their animal is requiring extra care beyond basic management and maintenance. One-third of these participants reported that the extra care of their companion animal has no effect in their overall average stress level. 60% of these participants reported that the extra care of their animal causes a slight increase in their overall average stress level (Figure 12).

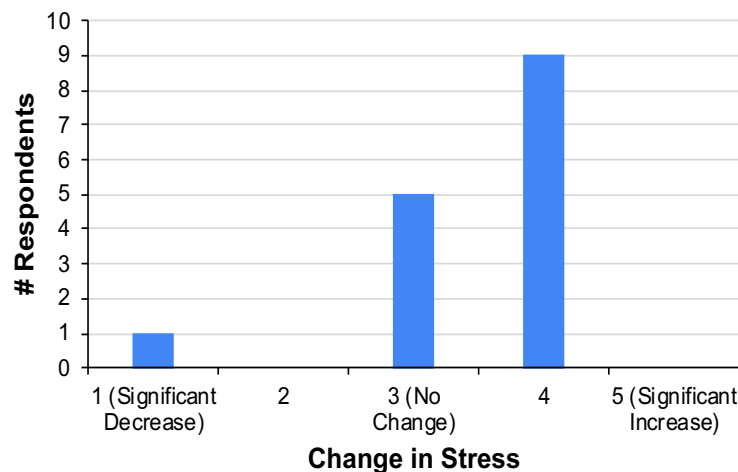


Figure 12. The effects of additional care needs for their companion animal on College students.

Chapter V. Discussion

The study of stress is important because it causes impacts in a multitude of ways physically, mentally, and socially. College students make up a population that is experiencing higher levels of stress than usual (Adlaf, et al., 2001). Because of this, techniques like HAI are needed to help mitigate stress among undergraduate students (Bayram & Bigel, 2008). The objective of this study was to explore whether owning a companion animal can lower students' perceived stress levels. To do this, a questionnaire-based approach was used to survey students on their perceived stress levels. For the purposes of this study, companion animal ownership is defined as owning or living with a companion animal five or more days a week.

Overall, undergraduate students self-reported extremely high perceived stress levels regardless of whether they owned a companion animal. Over half (55%) of the survey participants scored in the "very high perceived stress" range, with the average score 21.6, compared to the normative group score of 14.2 (Cohen, 1994), while only 1.6% of survey participants scored in the "low perceived stress" range. Both companion animal owners and non-companion animal owners reported extremely high perceived stress levels, raising questions about the mental health of students and whether stress levels are so high that coping methods like human-animal interaction (HAI) can have an impact at all.

Perceived Stress Scores Between Groups: In this study, stress was measured through self-reported survey questions and perceived stress scores using the PSS-10 (Cohen, 1994). In addition to survey participants reporting increased stress levels during school related activities as well as during everyday life, respondents reported an average PSS score of 21.6. This PSS score falls within the "very high perceived stress" range, which is considered a very high health concern (Cohen, 1994). The normative group score for the age range 18-29 is 14.2, which falls within the "average perceived stress" range (Cohen, 1994). Only 12.8% of survey participants

scored in this “average perceived stress” range. The majority (78%) of survey participants scored in either the “high perceived stress” or “very high perceived stress” ranges. When comparing these groups, respondents are reporting much higher perceived stress than the normative group (Cohen, 1994), with a difference of 7.4 points between the averages. However, when comparing this study’s average PSS score, with the average PSS score among Turkish college students during the COVID-19 pandemic (Aslan, et al., 2020), there was no difference, as both fall into the “very high perceived stress” range. This suggests that the COVID-19 pandemic has increased the perceived stress of college students.

When comparing the PSS scores between companion animal owners and non-owners, there was no significant difference between groups, however this could be due to the type of animal as well as the number of animals owned. There was a wide range of companion animals reported by survey participants, including dogs, cats, avian species, small mammals, fish and exotics. Studies supporting the use of HAI for reducing stress mainly focuses on dogs and cats (Clancy & Rowan, 2003). However, it is important to note that when comparing dog-only owners with owners of other types of companion animals, we found a significant difference ($p=.004$) between groups. The mean PSS score for dog-only owners was 19.36, which is considered to be in the “high stress” range, compared to 24.28 (“very high”) for owners of any other type of companion animal, this result indicates that HAI with dogs is more likely to help reduce perceived stress levels than HAI with other animals.

Companion Animal Owners: Although companion animal owners in this study showed no significant difference in PSS scores when compared to non-animal owners, it is notable that they did report feeling less stressed while around their companion animal. Our results indicate that almost half of companion animal owners feel no stress at all while actively interacting with their companion animal(s) and 38% report feeling little stress. In addition, over half (57%) of owners in this study reported feeling a significant decrease in stress when around their

companion animal, and no one reported feeling an increase in stress. These results indicate that although overall perceived stress levels are not affected by companion animal ownership in this study, direct interaction with a companion animal may temporarily decrease perceived stress levels during the interaction.

One factor that could play a role in affecting perceived stress levels of companion animal owners is time and maintenance required to properly take care of an animal. This study showed that one-third of companion animal owners reported spending 10-14 hours a week and 19% reported spending over 15 hours a week actively taking care of their companion animal. The amount of time spent committed to taking care of a companion animal may be a stressor in itself, taking away from the therapeutic effects of HAI seen in previous studies (Orlandi et al., 2007). In addition to the basic maintenance needed to take care of an animal, 12% of survey participants reported that their companion animal is requiring extra care. Of this group, 60% reported that the extra care required by their companion animal causes a slight increase in stress. This increase in stress most likely contributes to the respondents overall perceived stress and could therefore help explain the high scores in the companion animal owner group.

The Current COVID-19 Pandemic: There was no significant difference between companion animal owners and non-companion animal owners when asked how the current COVID-19 pandemic has affected their average overall stress level. However, it should be noted that 76% of survey participants reported an increase in overall stress due to the pandemic. These results allow us to conclude that both companion animal owner and non-companion animal owners stress levels were influenced by the COVID-19 pandemic, which could help to explain the extremely high PSS score among both groups. A previous study was also able to show that college students' mental health during the current COVID-19 pandemic is at high risk due to increased perceived stress, anxiety, and low satisfaction with life (Aslan, et al., 2020).

Exploring Perceived Stress Among College Students: The results of this study indicate that undergraduate university students are currently experiencing extremely high levels of perceived stress. Whether or not they owned a companion animal turned out to be a non-contributing factor in this study. Previous research has demonstrated that human-animal interaction is good for overall health because of its stress reducing aspects, as well as its contributions to the physical, mental, and social wellbeing in humans (Slade, 2010). This in contrast to the results reported here that undergraduate students who own companion animals are not experiencing the potential benefits of HAI. While findings do support the idea that college students make up a demographic that is experiencing extremely high levels of perceived stress, we did not see any evidence that companion animals reduce perceived stress levels, which could be due to the extremely high PSS scores. However, although PSS scores between owners and non-owners were equivalent, companion animal owners reported feeling less stressed while interacting with their pet, despite the very high overall PSS scores. We also found that dogs may have more of an impact in reducing stress levels than other companion animals. Furthermore, the extremely high stress levels of the survey participants could partially be due to the current COVID-19 pandemic, as shown by the participants reporting that they have felt an increase in overall stress since the pandemic began. With this in mind, the levels of perceived stress reported by survey participants may be so high that intervention techniques like HAI may not be effective in lowering perceived stress in students.

Future Research: Universities and researchers should collaborate to find effective solutions in mitigating these extreme levels of stress among students. HAI researchers should focus on more specific groups, like college students, in order to find which methods, work best for each demographic while expanding the field of HAI as previous research has shown promising results. Future research should focus on exploring the perceived stress effects of owning a companion animal on different groups to see how each group is affected. Examples of this could

be college students who live in dormitories or college students in certain majors. In addition, future research should explore various methods of using HAI, such as shorter periods of interaction or dog walking on very stressed college students. Future research should also explore which specific interactions, if any, with a companion animal have impactful effects on perceived stress, such as playing, walking, or sitting with an animal.

Conclusions: The state of perceived stress among undergraduate students is alarming and requires action for the overall well-being of the student population. Both companion animal owners and non-owners are experiencing very high levels of perceived stress during academic activities as well as during their everyday lives. Although dog-only owners have shown to have reported lower perceived stress than owners of other companion animals, their scores are still considered to be high perceived stress. One factor that could be contributing to these overall high PSS scores is the current COVID-19 pandemic, which has shown to cause an increase in overall perceived stress in the majority of survey participants. It may also be possible that the benefits of HAI may only help to lower perceived stress levels for people who experience low to moderate levels of stress.

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Appendices

Appendix A. Recruitment Email to University Advisors

The text of the email that was sent to University advisors to recruit survey participants was as follows:

Dear Advisor,

My name is Sydney McKarns and I am a Senior Veterinary Science student in the process of completing my Honors Thesis project. I am contacting you today to ask if you would send an email to your undergraduate students, which includes an IRB approved survey for evaluating the effects of a companion animal on the stress of college students.

I have included the email to students and survey link below.

Thank you in advance for your time and consideration.

Dear student,

My name is Sydney McKarns and I am a senior honors Veterinary Science student in the process of completing my Honors Thesis project. My project includes an anonymous survey on the effect of companion animals on stress of college students. Your participation would be greatly appreciated and will provide helpful feedback to my project.

The survey should take approximately 8-12 minutes and is anonymous.

Survey link: https://docs.google.com/forms/d/e/1FAIpQLSf8gU-Kc5iRCEva4GFeusdiJIYLxEBiRbtTrKnwqNYNOo6FvA/viewform?usp=sf_link

Thank you in advance for your time and consideration.

Sydney McKarns

Principle Investigator; sydneymckarns@email.arizona.edu

Dr. McCarthy, fionamcc@email.arizona.edu and Dr. Coppola, clcoppola@email.arizona.edu

IRB Approval Number: 2011240928

Appendix B. Follow-up Email to University Advisors

The text of the email that was sent to University advisors as a follow-up to recruit survey participants is as follows:

Dear Advisor,

I am contacting you today to follow up regarding my Honors Thesis project. I just wanted to check in to confirm if you have sent the email or not. If so, could you please let me know how many people you have sent it to? If not, could you please send the following email and link to your students?

Thank you in advance for your time and consideration.

Dear student,

My name is Sydney McKarns and I am a senior honors Veterinary Science student in the process of completing my Honors Thesis project. My project includes an anonymous survey on the effect of companion animals on stress of college students. Your participation would be greatly appreciated and will provide helpful feedback to my project.

The survey should take approximately 8-12 minutes and is anonymous.

Survey link: https://docs.google.com/forms/d/e/1FAIpQLSf8gU-Kc5iRCEva4GFeusdiJIYLxEBiRbtTrKnwqNYNOo6FvA/viewform?usp=sf_link

Thank you in advance for your time and consideration.

Sydney McKarns
Principle Investigator
IRB Approval Number: 2011240928

Thank you for your consideration
Sydney McKarns
Principle Investigator
IRB Approval Number: 2011240928

Appendix C. Informed Consent

This appendix contains the Informed Consent form that survey participants were asked to read and agree to before beginning the survey:

University of Arizona

Consent to participate in this Honors Thesis study
Principle Investigator: Sydney McKarns

You are being asked to participate in an Honors Thesis project. Your participation is voluntary and you do not have to participate. This document contains important information about this project and what to expect if you do participate. Please consider the information carefully.

Purpose: The purpose of this study is to collect and analyze data for an Honors Thesis project.

Requirements: As a survey participant, you are being asked to complete an online survey that should take approximately 8-12 minutes to complete.

Risk: Completing this survey may cause feelings of discomfort or emotional distress. Subjects may skip any questions or stop the survey at any time.

Benefits: There are no benefits associated with participating in this study.

Time commitment: Participation in this research includes taking a survey about the effects of companion animals on undergraduate students and their academic performances, which should take approximately 8-15 minutes to complete. There is no cost to you other than your time. You will not be compensated for participation in this project.

Confidentiality: Your name will not be used in any report. The information that you provide in the survey will be anonymous. Your name will not be collected or linked to any data. Because of the nature of the data, it may be possible to deduce your identity; however, there will be no attempt to do so and your data will not be reported in a way that will identify you.

Information collected about you will not be shared or used for future research studies.

The information that you provide in this study will be handled confidentially. However, there are certain circumstances where this information must be released or shared as required by law. The University of Arizona Institutional Review Board may review the research records for monitoring purposes. For questions, concerns, or complaints about the study you may contact Sydney McKarns at sydneymckarns@email.arizona.edu.

An Institutional Review Board responsible for human research subjects at The University of Arizona reviewed this research project and found it to be acceptable, according to applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research, protocol #2011240928

For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not a part of the research team, you may contact the Human Subjects Protection Program at (520)-626-6721 or online at <http://rgw.ari-zona.edu/compliance/human-subjects-protection-program>.

Participants may find counseling services at <https://health.arizona.edu/counseling-psych-services>

I have read (or someone has read to me) this form, and I am aware that I am being asked to participate in a research study. I have had the opportunity to ask questions and have had them answered to my satisfaction. I voluntarily agree to participate in this study.

By clicking the button below, you acknowledge:

1. Your participation in this study is voluntary and,
2. You are 18 years of age or older

Appendix D. List of Survey Questions

The survey questions that participants were asked to complete are as follows:

SECTION 1

1. Are you currently a full time undergraduate student at the University of Arizona?
 - Yes -> continue to section 2
 - No -> submit survey
2. What is your age?
 - 17-20
 - 21-23
 - 24-26
 - Other
3. What grade are you in? (undergraduate)
 - Freshman (0-30 credits completed)
 - Sophomore (31-60 credits completed)
 - Junior (60-90 credits completed)
 - Senior (91 or more credits completed)
4. What is your gender identity?
 - Female
 - Male
 - Non-binary
 - Other
 - Prefer not to say
5. College that you belong to
 - a. College of Agriculture and Life Sciences
 - College of Architecture, Planning, and Landscape Architecture (CAPLA)
 - College and Applied Science and Technology
 - College of Fine Arts
 - College of Education
 - College of Engineering
 - College of Humanities
 - College of Law
 - College of Management (Eller)
 - College of Public Health
 - College of Nursing
 - College of Optical Sciences
 - College of Pharmacy
 - College of Science
 - College of Social and Behavioral Sciences
 - Other

SECTION 2: PSS SECTION

0 - Never, 1- Almost never, 2- Sometimes, 3- Fairly often, 4- Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly?
2. In the last month, how often have you felt that you were unable to control the important things in your life?
3. In the last month, how often have you felt nervous and stressed?
4. In the last month, how often have you felt confident about your ability to handle your personal problems?
5. In the last month, how often have you felt that things were going your way?
6. In the last month, how often have you found that you could not cope with all the things that you had to do?
7. In the last month, how often have you been able to control irritations in your life?
8. In the last month, how often have you felt that you were on top of things?
9. In the last month, how often have you been angered because of things that happened that were outside of your control?
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

SECTION 3: General Stress Questions

1. Rank your overall stress level during a usual semester, including both academic and personal life.
1: No feelings of stress, relaxed, at ease, no loss of appetite/sleep; 2: feeling busier, but still generally relaxed and at ease, no loss of appetite/sleep; 3: Average level of stress, feeling busy but still managing time well, no feelings of being overwhelmed, no loss of appetite/sleep; 4: feeling stressed, busy, and slightly overwhelmed, sometimes loss of appetite/sleep; 5: feeling very overwhelmed by workload, loss of appetite/sleep, emotional distress
2. Rank your overall stress level while actively participating in academics (i.e. in lecture, completing homework, reading, taking quizzes etc.)
3. Rank the amount to which the COVID-19 pandemic has affected your average overall stress level, compared to before the pandemic began.

- 1: Major decrease in stress level; 2: Slight decrease in stress level; 3: No change in stress level; 4: Slight increase in stress level; 5: Major increase in stress level
4. Do you currently live with a pet (5 or more days a week)
- Yes (Takes you to section 4)
 - No (Ends Quiz) SUBMIT FORM

SECTION 4 (If you live with a pet 5 or more days a week)

1. Are you the primary caretaker of the pet? (i.e. primary person who feeds, exercises, takes care of expenses, etc.)
- Yes (continue to next question)
 - No (continue to next question)
2. Did you acquire this pet during the COVID-19 Pandemic (since March 2020)?
- Yes (Continue to section 5)
 - No (Continue to section 5)

SECTION 5: Pet Questions

1. Think about the pet you interact with most on a daily basis, answer the following questions keeping just that one pet in mind.
- Name of that Pet:
1. Rank your average stress level while actively interacting with your pet.
2. Do you experience more or less stress when near/around your pet?
- 1: Significant decrease in stress; 2: Slight decrease in stress; 3: No change; 4: Slight increase in stress; 5: Significant increase in stress
3. Rank how much you agree or disagree with the statement: "Owning a pet adds stress to my life."
4. How many pets do you currently live with?
- 1
 - 2
 - 3
 - 4
 - 5 or more
5. What type of pet do you own? (any animal that you own and have for the primary purpose of companionship). Multiple Select?
- Cat
 - Dog
 - Avian (songbirds, chickens, etc)
 - Equid (horse, donkey, alpaca, llama, burro)
 - Small Mammal (hamster, guinea pig, sugar glider, hedgehog, ferret, chinchilla, rat, mouse, etc)
 - Reptile/Amphibian
 - Fish
 - Pot-bellied pig
 - Exotic
 - Other
7. How many hours a week do you spend actively taking care of your pet? (i.e. walking, grooming, playing with, feeding, etc.).
- 1-4
 - 5-9
 - 10-14

- 15-19
 - 20 or more hours a week
8. Is your pet currently requiring extra care (beyond basic management and maintenance)?
- No (SUBMIT QUIZ)
 - Yes (Continues to section 6)

SECTION 6: Extra Care

1. Rank how your pet currently requiring extra care affects your average overall stress level.
Significant decrease; 2: Slight decrease; 3: No change; 4: Slight increase; 5: Significant increase

End Submission