THE PHYSIOLOGICAL BENEFITS ASSOCIATED WITH HUMAN-DOG INTERACTIONS AMONGST COLLEGIATE STUDENTS

An Undergraduate Research Scholars Thesis

by

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RESEARCH COMPLIANCE CERTIFICATION

Research activities involving the use of human subjects, vertebrate animals, and/or biohazards must be reviewed and approved by the appropriate Texas A&M University regulatory research committee (i.e., IRB, IACUC, IBC) before the activity can commence. This requirement applies to activities conducted at Texas A&M and to activities conducted at non-Texas A&M facilities or institutions. In both cases, students are responsible for working with the relevant Texas A&M research compliance program to ensure and document that all Texas A&M compliance obligations are met before the study begins.

I, Freya Manuel, certify that all research compliance requirements related to this Undergraduate Research Scholars thesis have been addressed with my Faculty Research Advisor prior to the collection of any data used in this final thesis submission.

This project did not require approval from the Texas A&M University Research Compliance & Biosafety office.

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ABSTRACT

The Physiological Benefits Associated with Human-Dog Interactions Amongst Collegiate Students

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The physiological benefits that come from human-dog interactions have been studied in depth in the past several decades with an increase in our knowledge of results gained. There have been studies that can convey the use of canine companionship as beneficial to a variety of health factors impacting cardiovascular and neurological development. Using this information to establish the link between health benefits and human-dog interactions, the question now lies within a specific age group that is still undergoing overall development of physical and mental health, i.e., collegiate-level students.

By narrowing the age group to one that focuses on undergraduate students, it is our goal to determine if these physiological benefits result any differently with a more specific age-range, and if there is an established increase in benefits with the amount of human-dog interactions per student. With students interacting at different levels (pet ownership, work setting, service dog, no interaction, etc.), it can be determined if there is a correlation between certain health benefits and the amount of interaction a student can gain with a dog.

Both physical and mental health is important to recognize for developing students at the collegiate level, and through increased interaction, we can determine if these interactions with dogs are beneficial for the health of these students, and why we see these benefits from a scientific perspective. Different college students are surveyed on their level of human-dog interactions and how they personally believe their amount of interactions (no matter how limited or increased), and to determine if the benefits collegiate students are experiencing are a continuation of current research or if there is a new discovery to be made.

DEDICATION

[To my friends, faculty advisors, and professors who have supported me throughout the process. Being able to conduct my own research has been a goal of mine that would not have been possible without your support. A special thank you to my father, Dirk Manuel, that has supported me and my goals for as long as I have dreamed of them.]

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The data analyzed for this research study were provided by public research databases, and were then used to create the surveys made available to the general public of undergraduate students at Texas A&M University. The analyses depicted in this were written by a variety of other research authors, including Tiffany M. Love, Lauren Powell, Jillian T. Teo, and Sandra B. Barker, and were published in 2014, 2019, 2022, and 2008, respectively.

All other work conducted for the thesis was completed by the student independently.

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1. INTRODUCTION

1.1 Types of Companionship

The relationship between a human and a companion is known to have many benefits for both parties. When it comes to owning a companion, canines are among the most owned pets in American households, as observed by the rapid increase in dog adoptions during the COVID-19 pandemic.[6] This relationship between a canine and a human provides a unique interaction as it is based entirely on nonverbal communication and signals.[1] Studies have shown that this particular interaction, pet-facilitated psychotherapy (PFP), provided to psychiatric patients exhibited improvement in their mental health and overall preliminary results.[11] In addition to data collected from independent research studies, literature reviews of these articles have been used to retrieve information regarding these interactions, such as pet therapy and pet ownership.[4,8] These human-dog interactions have been able to provide many benefits, primarily related to neurocognitive stimulation, establishing a favorable advancement in our knowledge of treating mental health.

In addition to the known psychological improvements associated with human-dog interactions, studies have also found that these relationships can improve the physiological health of humans. Within the brain, a hormone known as oxytocin is released by the hypothalamus when stimulated by social interactions. Through studies of this particular hormone, research findings have been used to conclude neural pathways responsible for its transmission.[2] As the hypothalamus develops through cognitive and social learning, such as reacting to reward-based stimuli, this function in the brain would be fully matured by the start of adulthood, creating a positive outcome from these interactions.[7,9] In recognizing the health benefits conducted from research using human-

dog interactions of adults, the next area to study concerning this would be the health benefits of a different age group, such as young adults.

1.2 Collegiate Students

At Texas A&M University as of the Fall 2022, there are currently 58,000 undergraduate students enrolled in this campus. Within these four classifications of undergraduate students, there are more than 130 majors and career paths to choose from, giving each student the opportunity to create their own independent study with guidance from a variety of faulty members and academic advisors. The opportunities provided create a diverse population of undergraduate students at Texas A&M with unique goals and varying factors that can contribute to their academic success. One common issue facing undergraduate students today is the importance of mental health and the impact it can have on one's academic performance. With as many career paths, majors, resources, and various factors that come into play, the overall health of a student can depend on the difficulty of their curriculum and how they can counter an impact on their health to avoid impacting their grades.

1.3 Coronary Artery Disease in Young Adults

Many health risks are found to start in young adults, specifically at the collegiate age. The reason we currently have a gap in the known diseases at a matured adult age versus the developing age where we only know risk factors is because it would require decades of physiological testing and research to create a definitive answer. In the meantime, given that all we have is a list of known risk factors, we can pull what we know from literature review, and determine if we can find relevant data collected from surveys. One important example of a known health risk in collegiate-aged adults is coronary artery disease (CAD).

In previous studies used in review to identify evidence of the health benefits associated with human-dog interactions, two of the most commonly found improvements were linked to cardiovascular and hormone health.[5] Within these interactions, the release of oxytocin, a commonly affiliated hormone as discussed before, has been studied and shown various benefits related to cardiovascular health.[3] To narrow in on how these interactions can improve the cardiovascular health of a different age group, research needs to be conducted to determine the different risks associated with cardiovascular diseases in young adults, and what factors we can improve.[10]

Although only a very broad age range has been studied so far, it is conceivable that Coronary Artery Disease (CAD) can result in permanent or long-lasting cardiovascular health issues in patients below the age of 40.[12] As observational studies are continued to assess this particular subgroup, a common risk factor that is often found in young adults include depressive and anxiety disorders, exposing a patient to develop CAD at such a young age.[13] With the risk factors found in this age group, which are known to heavily impact physiological health, it is yet to be studied how these human-dog interactions can yield these risks associated with CAD, and overall improve the health of young adults over time.

As young adults, aged 16-25, are known to be in a fairly high-risk period for developing mental health disorders, it is important to recognize the association between psychological and physiological benefits, particularly that of cardiovascular health.[14] As previously stated, risk factors for CAD in young adults are directly linked to mental health disorders, impacting their overall physiological health based on cognitive development. Knowing that the development and overall growth of the hypothalamus, which is linked to the reward-based stimuli associated with social interactions, it can be concluded that there is potential for studies to determine if these

human-dog interactions can heavily influence the physiological health of young adults. In examining the cardiovascular health and affiliated risk factors of this particular age group, it has yet to be studied if there is definitive evidence that these interactions can benefit the health of young adults as they do for adults above the age of 40. As the risk of developing CAD increases as patients grow older, with an average age of 51, it is important to study the development of this disease in younger age groups to determine how it can be prevented as these adults age.[15] Until additional research is conducted for this age group, it is unknown if human-dog interactions can decrease the risk of developing CAD through their relationship with young adults in particular.

The reason surveying is so important in current research is because until we have conclusive scientific evidence that what we are studying has a direct correlation, we can use surveys to reach a specific audience and gather results from this population. By doing so, we are able to initiate our next step in research using feedback from the population of adults it may be affecting. By surveying collegiate students about their physical/mental health, we are able to determine if this population is at risk for developing diseases, such as CAD, and determine what steps we can take from there in order to establish treatment or prevention.

1.4 Canine Adoptions During COVID-19

During the COVID-19 pandemic, there was a global period of time in which collegiate students were asked to return home to prevent the spread of infection and ultimately "quarantine". In this period of social isolation, studies were conducted in response to the increased changes in human-dog interactions, more specifically, how the population had responded to dog adoption and abandonment.[6] As an online questionnaire was made available seeking responses related to the increase in dog adoptions, more than 50% of the survey responses indicated that the reason for the recipient's recent adoption was directly in response to

the COVID-19 pandemic.[6] With more than 300 new dog owners during the pandemic, particularly during the months of January 2020 to May 2020, roughly 8% reported that they adopted a dog during "quarantine" because they felt isolated or stressed and believed a canine companion would alleviate their worries.[6] As previously conducted studies had determined that these interactions can improve mental health in humans, it is evident that new dog owners during the pandemic had adopted due to known benefits related towards stress and social isolation.[16]

Knowing that there was a global increase in canine adoptions at the start of the global pandemic, further assessment needs to be made regarding the dog adoptions of collegiate students during the COVID-19 pandemic and its period of general social isolation. With the known risk factors of depression, anxiety, and other stress related disorders in this specified age group, it is important to consider how human-dog interactions in relation to canine adoptions were impacted in particular by collegiate students during the pandemic.[13] As we know the current benefits of these interactions in relation to stress and mental stimulation, we must analyze a potential correlation between the physical and mental health of collegiate students and their increase in dog interactions during this period in the COVID-19 pandemic.

1.5 Physical Health in Young Adults

In addition to the potential risk factors associated with coronary artery disease, the overall physical health in young adults can be improved through human-dog interactions. For the few physiological benefits that have shown positive results, reactions between humans and canine companions have presented mutual benefits for both parties involved.[17] For example, when analyzing the mean arterial blood pressure in both parties during an interaction comprised of a human petting a dog, there was a mutual decline in blood pressure, suggesting a decrease in sympathetic activity.[17] Using this same interaction, researchers were also able to detect a

measurable increase in dopamine, cortisol, and oxytocin, which are also released from the hypothalamus as a result from social interactions.[2,17] As petting a dog can cause neurophysiological benefits in humans and canine companions, it is justified to assume these results will be the same for a specified age group, i.e. collegiate students. In assessing the physical health of young adults, it is important to distinguish between those who do interact with canines and those who do not, to give a more accurate determination if the overall neurophysiological health of the student is related to the amount of interactions they may have with a canine companion.

1.6 Mental Health in Young Adults

Human-dog interactions have shown to produce benefits for the development of mental health and overall improvement in adults. As young adults mature, it is important that their social skills and ability to improve relationships are benefitted as they grow and create these interactions. Many research studies have shown that human-dog interactions have the potential to improve social relationships between people, as well as increase personal growth and character development.20 These interactions are especially important in young adults as they are building professional relationships throughout their collegiate studies. It is also concluded that these interactions, alongside personal development and social skills, can benefit the mental health of humans by alleviating depression, anxiety, and stress.19 As these interactions can aid in social development and improving mental health, it is important to assess this in collegiate students that may be struggling in these areas to provide options for improvement.

Some universities are already aware of the stimulation these benefits can provide to collegiate students. University-based animal visitation programs are available at several campuses throughout the United States in an attempt to provide enrichment to canine

companions, as well as alleviate stress in collegiate students.[18] Although there is room for more research to be done, self-reported ratings of students placed into these interactions demonstrated an overall decrease in cortisol levels, which is detected at the neurophysiological level through release at the hypothalamus.[2,17,18] As other universities strive to implement campus-based canine interactions for students, it is important to recognize the available data and encourage other universities to do the same. As Texas A&M University is yet to provide regular animal visitation programs on campus, it can be changed through assessing current collegiate students via self-reporting results and potential to increase over time.

2. METHODS

2.1 Levels of Human-Dog Interactions

In order to assess a variety of diverse human-dog interactions, we had to divide these classifications into separate categories to appropriately survey the students. There was a total of six categories that students were able to self-identify with when completing the survey. The following categories have been identified as such below:

1. No dog interactions, avoid to an extent

This category is defined as students who often avoid interacting with dogs. Ideally, this selected survey is to be completed by a student that does not own a personal pet dog, does not interact with other dogs in public, and may not want to interact with dogs (personal aversion or opinions about dogs will not negatively impact the survey recipient's response). The goal of receiving this student's feedback is to analyze their mental and physical well-being assessed on a series of questions to further understand the human-dog interaction from a *very limited perspective*.

2. Some dog interactions, will visit others

This category is defined as students who are interested in interacting with other dogs, but do not personally own one themselves. This would include interactions such as visiting a friend's house to interact with their pet dog or volunteering with dogs at a shelter. The goal of receiving this student's feedback is to analyze their mental and physical well-being assessed on a series of questions to further understand the human-dog interaction from a *slightly increased perspective*.

3. Family pet, kept in home-town (not in College Station, Texas, not a personal pet)

This category is defined as students who have a family pet dog at home, but is not actively owned by them or is kept in their college home. This would be a pet dog that they may visit when

going home for an academic break, but the survey recipient is not limited to how much time is spent with the dog when visiting (as long as it is not a personal pet kept in College Station, Texas). The goal of receiving this student's feedback is to analyze their mental and physical well-being assessed on a series of questions to further understand the human-dog interaction from a *somewhat moderate perspective.*

4. Personal pet, kept at home

This category is defined as students who have a personal pet at their college home that they interact with on a regular basis. This could include a free-roam or kennel trained dog that the survey recipient would interact with when they are home from classes, but are not limited to how much interaction they would have with them inside or outside of the home (primarily living in College Station, Texas). The goal of receiving this student's feedback is to analyze their mental and physical well-being assessed on a series of questions to further understand the human-dog interaction from a *strong perspective*.

5. Clinical setting, working with dogs

This category is defined as students who work in a veterinary practice, kennel facility, or other workplace setting where part of the respondent's role involves close/physical interaction with dogs. This could be assisting a veterinarian during an exam, hands-on research, or grooming dogs for example (the survey recipient would also be asked how many hours they work on average, but are not limited to a minimum/maximum number of hours). The goal of receiving this student's feedback is to analyze their mental and physical well-being assessed on a series of questions to further understand the human-dog interaction from a *professional/workplace perspective*.

6. Service dog, constantly interacting with dogs

This category is defined as students who have a service dog or guide dog working by their side on a daily basis. This could be a personal service dog that has been paired to the survey recipient or a service dog that they are training for an organization (Aggie Guide Dogs & Service Dogs, Patriot Paws, etc.). The goal of receiving this student's feedback is to analyze their mental and physical well-being assessed on a series of questions to further understand the human-dog interaction from a *very in-depth perspective*.

Given these six identified categories of varying levels of human-dog interactions, ranging from no interaction all the way to constant interaction with little to no break, we are able to survey a large population of collegiate students that may come from any background of canine companionship. When extrapolating the desired information to determine physiological benefits, it is important to start from a blank slate of no dog interactions to compare the results of all categories to determine where the bottom level would increase. As a service or working dog is constantly at the handler's side, this would be the highest level of canine interaction for collegiate students, especially offered through various opportunities provided by community service and other student organizations at Texas A&M University.

2.2 Survey Questions

A survey titled "Human-Dog Interactions of Collegiate Students" was made available to undergraduate students to participate in and submit their responses for this research project. There were 20 questions to answer on the survey (all of which were required) that included multiple-choice and short answer. The survey questions asked of each student are as follows:

1. Name
2. TAMU email
3. Classification

4. Major
5. Which of the following levels of dog interactions would you classify yourself as? Pick whichever category most accurately describes you.
6. In correspondence to the category you chose in the previous question, please briefly describe how this level of interaction pertains to you? (i.e. why you do not interact with dogs, what type of work environment affects your exposure, etc.)
7. How has your level of dog interactions changed since beginning your collegiate studies? (increased, decreased, stayed the same, etc.)
8. Do you agree or disagree with the following statement?: "I find my academic coursework to be stressful, leading to an effect on my mental health."
9. Do you agree or disagree with the following statement? "I have options for physical or mental outlets to improve/decrease my stress levels."
10. Do you agree or disagree with the following statement?: "My level of dog interactions has a positive impact on my physical exercise."
11. Do you agree or disagree with the following statement?: "My level of dog interactions has a positive impact on my mental health."
12. Did you adopt/foster a canine companion during "quarantine" of the COVID-19 pandemic? (March 2020 - August 2020)
13. During the COVID-19 pandemic, an online questionnaire was made available in response to the increase in canine adoptions (January 2020 - May 2020) to understand reasoning or motivation. More than 50% of respondents had adopted a canine companion due to reasons related to the pandemic, including abandonment, loneliness, and stress (Humanities & Social Sciences Communications, 2020). Do you agree or disagree with

the following statement?: "The adoption of canine companions during the COVID-19 pandemic has helped improve mental health amongst collegiate students."

14. If you own a canine companion (level 3 - level 6), was this intended for the purpose of physical/mental health benefit? (can include ESA, service dogs, personal companion, etc.)
15. If you do not own a canine companion (level 1 & level 2), do you believe your current physical/mental health would improve if you were to own one?
16. As observational studies continue to assess young adults, a common risk factor that is often found include depressive and anxiety disorders, exposing a patient to develop Coronary Artery Disease (CAD) at such a young age (*Psychosomatic Medicine*, 2001). Do you agree or disagree that human-dog interactions at the collegiate-age can lead to a decrease in CAD for young adults?
17. Studies have found that human-dog interactions have produced mutual physiological benefits between both species, such as lowered blood pressure, decreased cortisol levels, and increased dopamine levels (*The Veterinary Journal*, 2003). Do you agree or disagree that human-dog interactions in collegiate students can produce similar physiological benefits for young adults facing stressful academic lifestyles?
18. A majority of previously conducted studies regarding the impact of human-dog interactions on mental health have helped with depression, anxiety, stress, and social isolation (*Frontiers in Psychology*, 2012). Do you agree or disagree that collegiate students may use human-dog interactions to improve their mental health as implied by its benefits in previous studies?

19. Previous studies have suggested that human-dog interactions have the ability to improve social relationships as well as increase a sense of respect, trust, and empathy between people (*BMC Public Health*, 2019). Do you agree or disagree that your level of dog interactions has aided in the development of your personal relationships and interactions with others?
20. The use of canine companions in university-based events for the purpose of reducing student stress has gradually increased in recent years due to its known physical and mental health stimulation (*Anthrozoös*, 2020). Are you in favor of Texas A&M University implementing more events for students involving canine companions with implied physiological benefits?

2.3 Evaluation of Questions

Questions 1-4 were asked of each student to identify/confirm that only Texas A&M undergraduate students were submitting survey responses. More specifically, "classification" and "major" were asked to ensure that a diverse array of undergraduate students was receiving access to the survey, without bias to a particular academic college or classification of undergraduate level.

Question 5 asks the survey recipient to select one of the six described levels of dog interactions to classify themselves as. This question was intended to group survey responses in with each corresponding category to further analyze similarities or differences between students in different levels of dog interactions. The following questions were the same for each student with the idea that each survey responder may use their personal level of interaction with a canine companion may influence or have an impact on their response.

Questions 6 and 7 ask the student to briefly describe how the category selected pertains to them, to better understand the diverse lifestyles of collegiate students or how they may find themselves interacting with a canine companion, and if they believe their level of interactions has increased or decreased during their time in undergraduate studies. Given that some survey recipients may be limited in how they can measure an increase/decrease over time (i.e. U1 or U2), this will allow us to analyze the benefit of increased interactions from other students (U3, U4, or U5) to assess if they *may benefit* from these interactions in the future.

Questions 8-11 were asked to assess a baseline for the student's responses to physical and mental health related questions. Given that the survey is used to determine if an increase in human-dog interactions demonstrated a corresponding increase in the alleviation or improvement of physical or mental health, it is important to first ask if the survey responder believes current stimuli revolving their academic lifestyle, such as rigorous coursework or time-consuming majors, already expressed an impact on physical and mental health. In turn, we must also ask if the student has pre-existing outlets to deal with academic stress. Once we establish the survey recipient's response regarding current physical and mental health, we must then ask about physical and mental health directly in response to their level of human-dog interactions, more specifically, if they agree or disagree that their interactions have had a *positive impact* on their overall health and well-being. By doing so, we can further analyze the levels of interaction by determining a correlation between increase in interactions with canine companions and if it had impacted their health in a positive way.

Questions 12 and 13 were asked in direct response to the increase in canine adoptions during the COVID-19 pandemic. As addressed in section 1.4, it has been studied that there was an increase in dog adoptions during the pandemic, particularly during the months of January

2020 to May 2020. As for collegiate students, the period of time during the pandemic in which universities has sent students home was referred to as “quarantine”, which consisted of the months between March 2020 an August 2020, supposedly when universities had started inviting students back to campus to continue their courses with a remote option. During this period, students were in a similar social isolation state as previously described, leading us to ask if dog adoptions were increasing during these months for collegiate students as well. With the option to foster canine companions as well, survey recipients were asked if they had either fostered or adopted a dog during this period, or if they had not participated in either activity. In addition to the possibility of the student adopting or fostering a canine, they were also presented with previous research results analyzing the increase in dog adoptions during the COVID-19 pandemic and if they agree or disagree that these adoptions aided in the improvement of mental health amongst collegiate students.

Questions 14 and 15 were asked to narrow down the categories and ask if the survey recipient’s canine companion was in response to a needed improvement in physical or mental health, or simply in the case that they do not have a canine companion, if they believe the implementation of one into their daily lives *would improve* their physical or mental health. By doing so, we are able to determine what percentage of survey recipients identifying as categories 3-6 own a canine companion for a particular health related issue that was in need of improvement or alleviation. By also presenting studies of previously conducted research analyzing the physiological benefits of human-dog interactions, we are able to ask survey recipients identifying as categories 1 or 2 if they agree or disagree, to their best knowledge, that their physical or mental health would improve if they had an increased relationship with canine companions.

Questions 16-20 were extrapolated from previous research studies analyzing the development of young adults in relation to physical health, mental well-being, and social relationships. Survey recipients were asked to agree or disagree with statements related to the analysis of these research studies in relation to their personal level of human-dog interactions or their beliefs of the outcomes of these results. Presenting the student with cited studies allows them to learn about current research regarding physical and mental health of young adults and if human-dog interactions can lead to an impact in these areas of study.

2.4 Presentation of Survey

The aforementioned questions were compiled into a Google Forms survey, made available for students to scan through a QR code. This QR code and link to the Google Forms survey, as pictured below as well as labeled *Figure 1: QR Code and Website Link to the Corresponding Survey*, was available for students to scan, submit, and share to others in the form of both physical and virtual flyers.

https://forms.gle/5GocGSYD5wPykF4D9

Figure 1: QR Code and Website Link to the Corresponding Survey

The survey is intended to remain open and continue to collect data after the publishing of this thesis. The intent of this is to continue to evaluate the growing change of human-dog interactions amongst undergraduate students at Texas A&M University as we gather more data and learn more about our ever-changing student population.

3. RESULTS

3.1 Survey Results

A total 120 undergraduate students at Texas A&M University provided their responses to this survey. Of the six categories for the survey recipient to choose from, 3.3% (4 students) identified as level 1, “no dog interactions, avoid to an extent”, 17.5% (21 students) identified as level 2, “interested in interacting with other dogs”, 39.2% (47 students) identified as level 3, “family dog at home, not in College Station”, 25% (30 students) identified as level 4, “own a personal dog in College Station”, 10.8% (13 students) identified as level 5, “interact with dogs in a workplace setting”, and 4.2% (5 students) identified as level 6, “own/train a service dog on a daily basis”. These results have been compiled into the following table, labeled *Table 1: Categories*, to help organize the number of students surveyed and their corresponding answer as previously stated:

Table 1: Categories (as described in section 2.1)

Survey Results	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Identified students	4	21	47	30	13	5
Total students	3.3%	17.5%	39.2%	25%	10.8%	4.2%

Note: This table is to accurately track data as collected from survey results.

Level 1 gives an idea of students that are unable to assess their physiological benefits associated with dog interactions. A slight increase from this limited perspective would be level 2, which gives a relative idea of how to assess the difference in responses between two levels of interactions that do not own a canine companion, but may be interested in some social

interactions from other dog owners. Categories 3-6 are submitted by students that do own a dog or heavily interact with canine companions in various settings.

Of the 120 collegiate students, the most commonly surveyed majors include Biomedical Sciences, Engineering, and other Sciences. Majors such as Biomedical Sciences (BIMS) and Animal Science (ANSC), which are known to involve opportunities, student jobs, and events including the use of canine companions, most heavily identified with level 3 and level 4, including responses such as service-dog based student organizations, work-related setting at veterinary clinic or wildlife center involving dogs, and personal or family-owned pet for the types of human-dog interactions they experience in that category. When asked if their level of dog interactions has changed throughout their time during undergraduate studies, 21.67% (26 students) have stated that their interactions have increased, 26.67% (32 students) have stated their interactions have decreased, and 51.66% (62 students) have stated their interactions have stayed the same.

When looking at the classifications that undergraduate students are able to electively choose from, 9.2% (11 students) identified as U1 (0-29 credit hours), 10% (12 students) identified as U2 (30-59 credit hours), 23.3% (28 students) identified as U3 (60-89 credit hours) and 57.5% (69 students) identified as U4/U5 (90+ credit hours). Given this information, it is implied that the U4/U5 surveyed students would be able to better assess a change in their level of dog interactions as compared to U1 students who have not completed one full year of undergraduate studies yet. This would be able to give an estimate of how a student's interactions could change between U1 and U4/U5. These results have been comprised into the following table, labeled *Table 2: Classifications*, to help organize the number of students surveyed and their corresponding answer as previously stated:

Table 2: Classifications (credit by undergraduate hours completed)

Classification	U1	U2	U3	U4/U5
Identified students	11	12	28	69
Total students	9.2%	10%	23.3%	57.5%

Note: This table is to accurately track data as collected from survey results.

3.2 Previous Research

Students were asked to either agree or disagree with a series of statements, some including a quote from an article or a conclusion drawn from reviews of previously conducted studies. The students were given the options “strongly agree”, “agree”, “neutral”, “disagree”, and “strongly disagree”, allowing them to choose from the options that most aligns with their personal views on the statement being presented. The questions appeared as listed below, along with the results from the surveyed students:

Do you agree or disagree with the following statement?

"I find my academic coursework to be stressful, leading to an effect on my mental health."

Results are presented in *Figure 2: Survey Question 8 Results*:

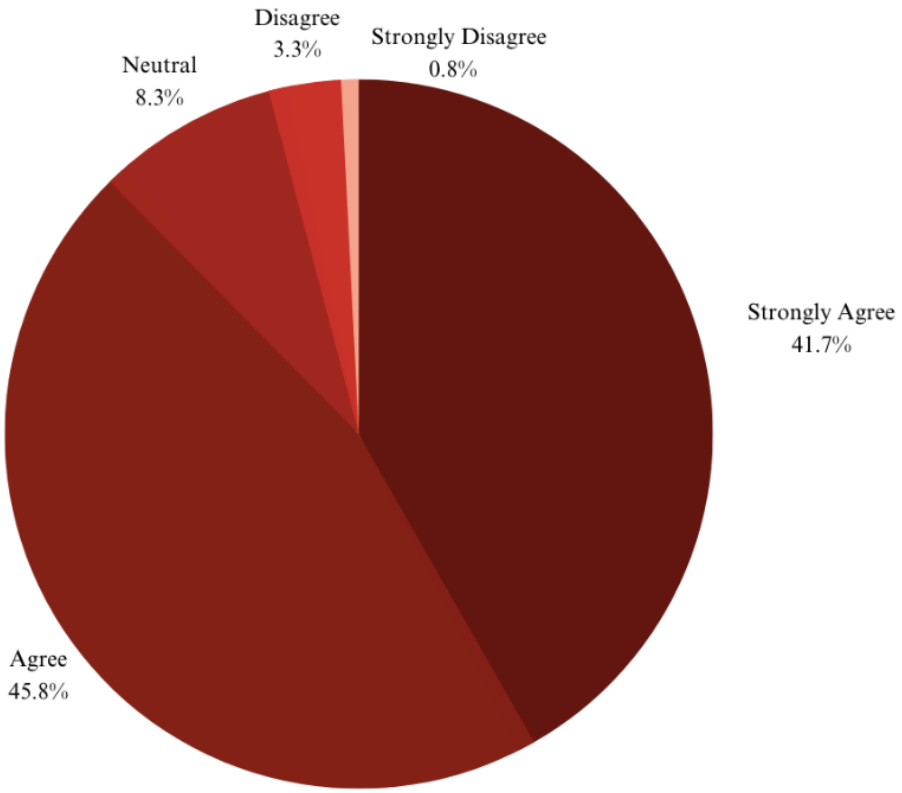

Figure 2: Survey Question 8 Results

Do you agree or disagree with the following statement?

"I have options for physical or mental outlets to improve/decrease my stress levels."

Results are presented in *Figure 3: Survey Question 9 Results*:

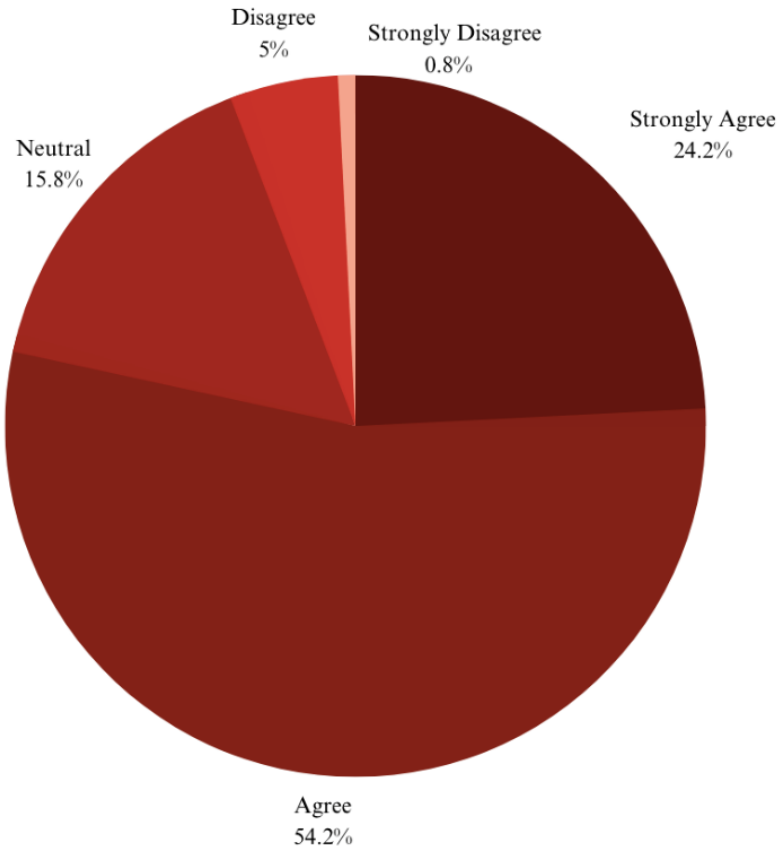

Figure 3: Survey Question 9 Results

Do you agree or disagree with the following statement?

"My level of dog interactions has a positive impact on my physical exercise."

Results are presented in *Figure 4: Survey Question 10 Results*:

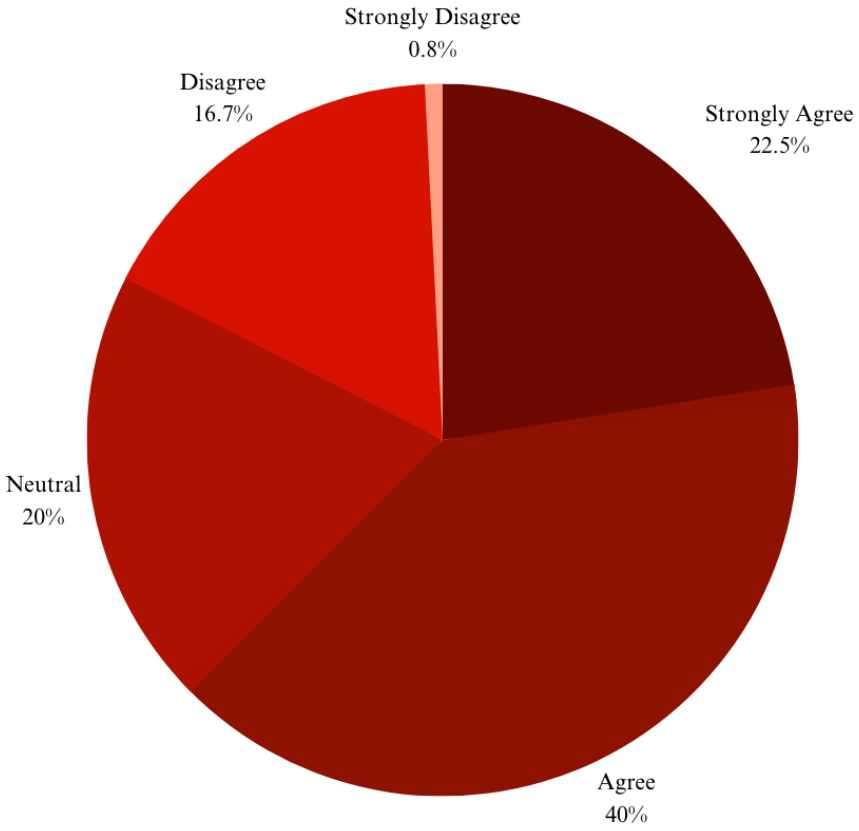

Figure 4: Survey Question 10 Results

Do you agree or disagree with the following statement?

"My level of dog interactions has a positive impact on my mental health."

Results are presented in *Figure 5: Survey Question 11 Results*:

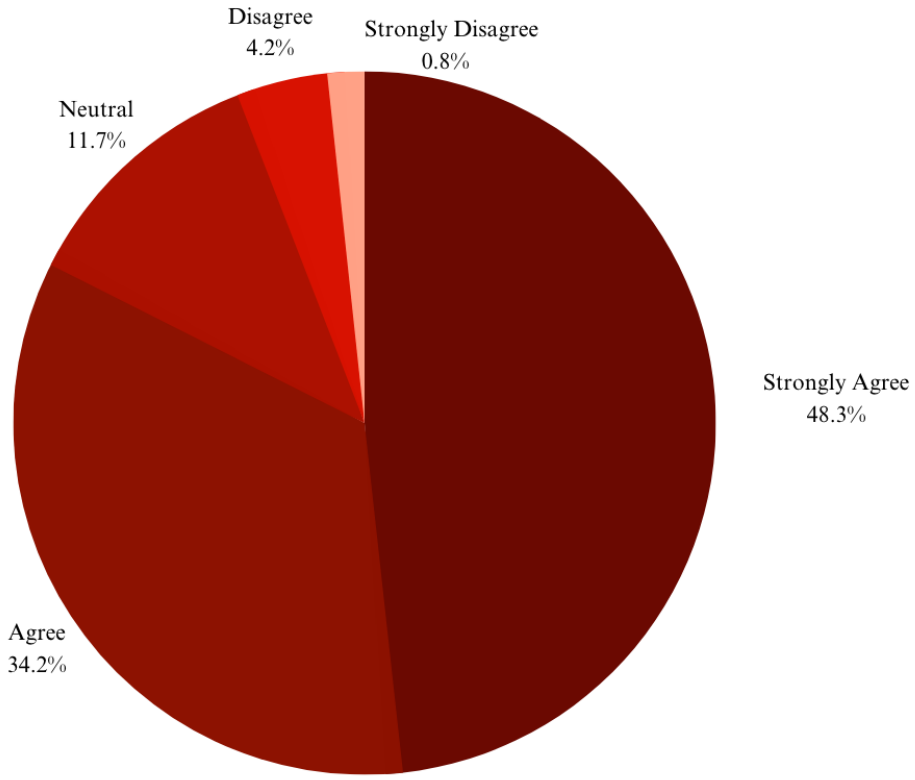

Figure 5: Survey Question 11 Results

During the COVID-19 pandemic, an online questionnaire was made available in response to the increase in canine adoptions (January 2020 - May 2020) to understand reasoning or motivation. More than 50% of respondents had adopted a canine companion due to reasons related to the pandemic, including abandonment, loneliness, and stress (*Humanities & Social Sciences Communications*, 2020).

Do you agree or disagree with the following statement?

"The adoption of canine companions during the COVID-19 pandemic has helped improve mental health amongst collegiate students."

Results are presented in *Figure 6: Survey Question 13 Results*:

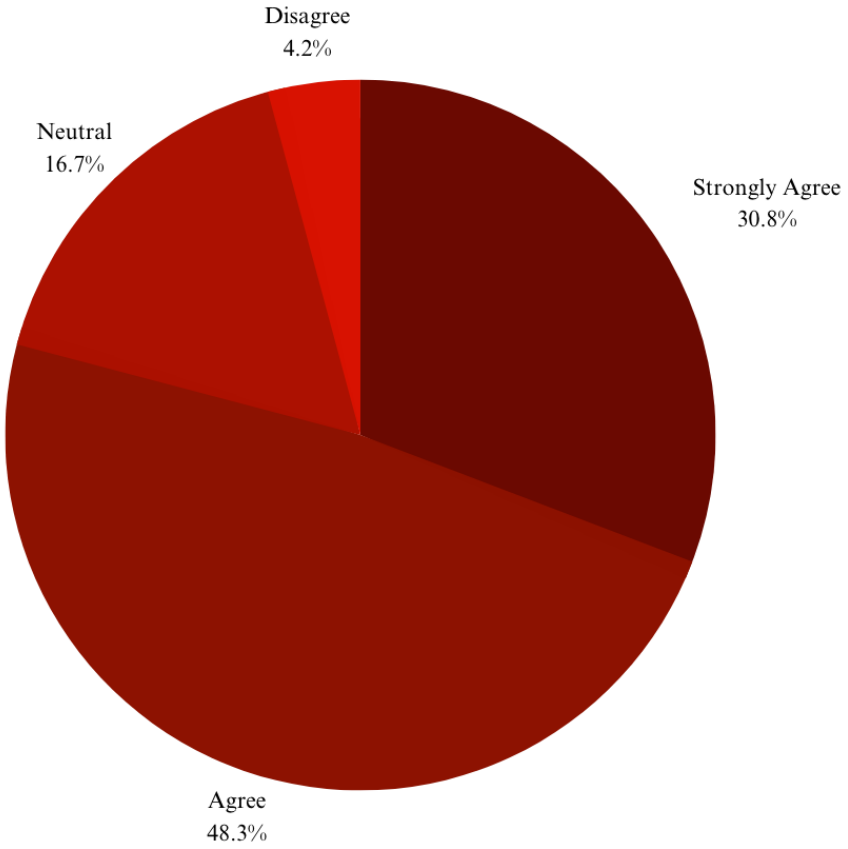

Figure 6: Survey Question 13 Results

As observational studies continue to assess young adults, a common risk factor that is often found include depressive and anxiety disorders, exposing a patient to develop coronary artery disease (CAD) at such a young age (*Psychosomatic Medicine*, 2001).

Do you agree or disagree that human-dog interactions at the collegiate-age can lead to a decrease in CAD for young adults?

Results are presented in *Figure 7: Survey Question 16 Results*:

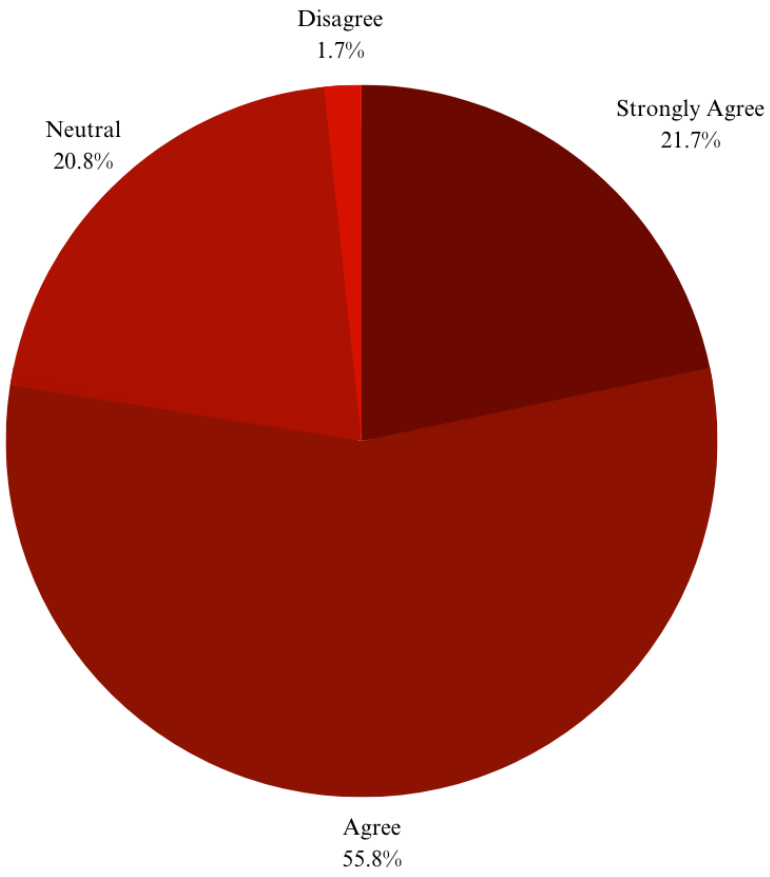

Figure 7: Survey Question 16 Results

Studies have found that human-dog interactions have produced mutual physiological benefits between both species, such as lowered blood pressure, decreased cortisol levels, and increased dopamine levels (*The Veterinary Journal*, 2003).

Do you agree or disagree that human-dog interactions in collegiate students can produce similar physiological benefits for young adults facing stressful academic lifestyles?

Results are presented in *Figure 8: Survey Question 17 Results*:

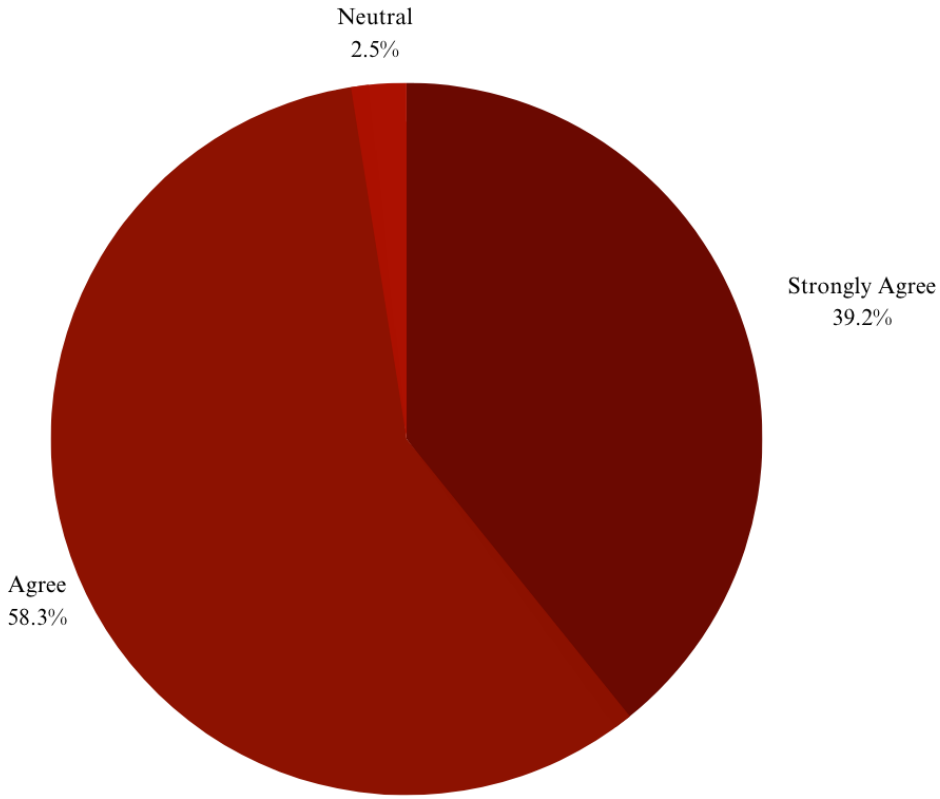

Figure 8: Survey Question 17 Results

A majority of previously conducted studies regarding the impact of human-dog interactions on mental health have helped with depression, anxiety, stress, and social isolation (*Frontiers in Psychology*, 2012).

Do you agree or disagree that collegiate students may use human-dog interactions to improve their mental health as implied by its benefits in previous studies?

Results are presented in *Figure 9: Survey Question 18 Results*:

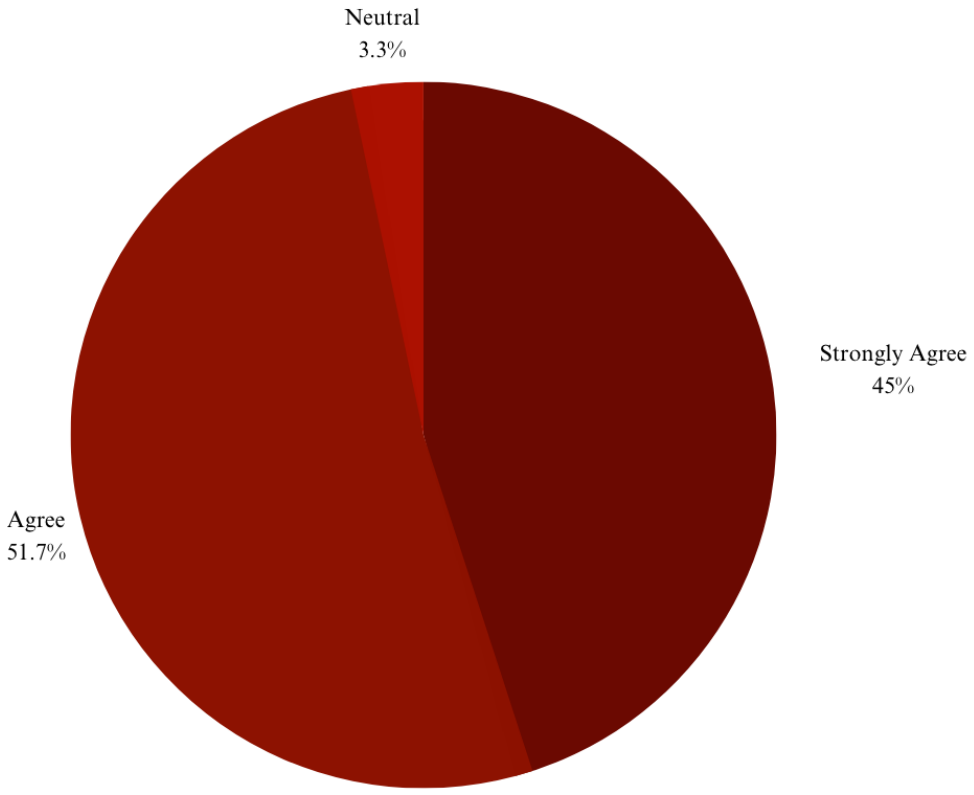

Figure 9: Survey Question 18 Results

Previous studies have suggested that human-dog interactions have the ability to improve social relationships as well as increase a sense of respect, trust, and empathy between people (*BMC Public Health*, 2019).

Do you agree or disagree that your level of dog interactions has aided in the development of your personal relationships and interactions with others?

Results are presented in *Figure 10: Survey Question 19 Results*:

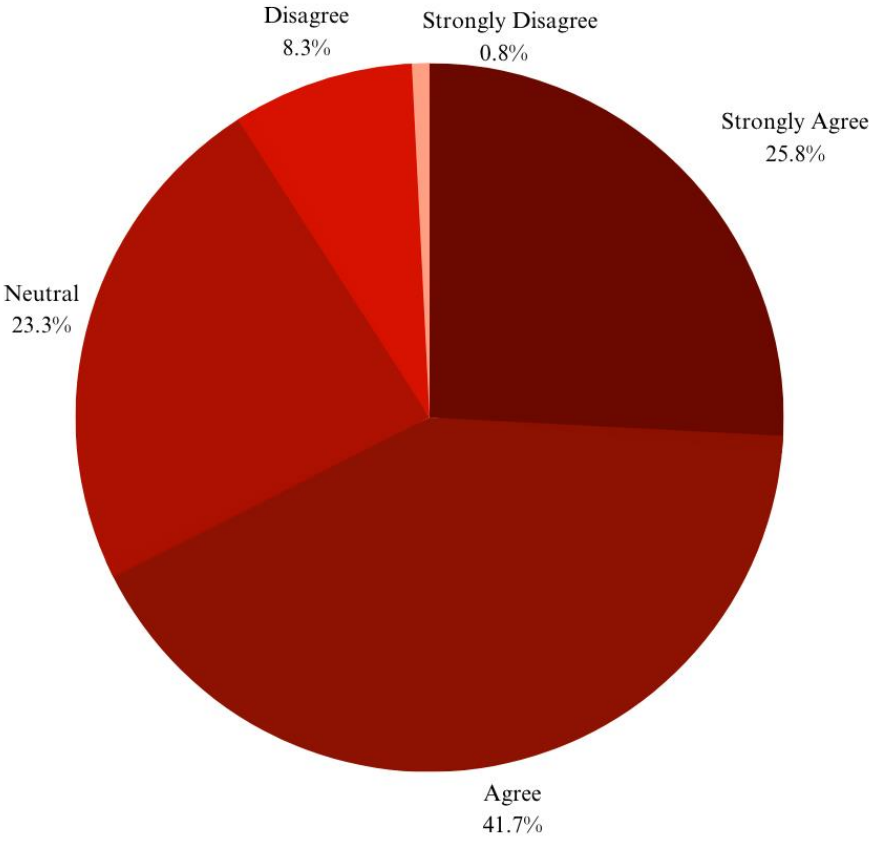

Figure 10: Survey Question 19 Results

The use of canine companions in university-based events for the purpose of reducing student stress has gradually increased in recent years due to its known physical and mental health stimulation (*Anthrozoös*, 2020).

Are you in favor of Texas A&M University implementing more events for students involving canine companions with implied physiological benefits?

Results are presented in *Figure 11: Survey Question 20 Results*:

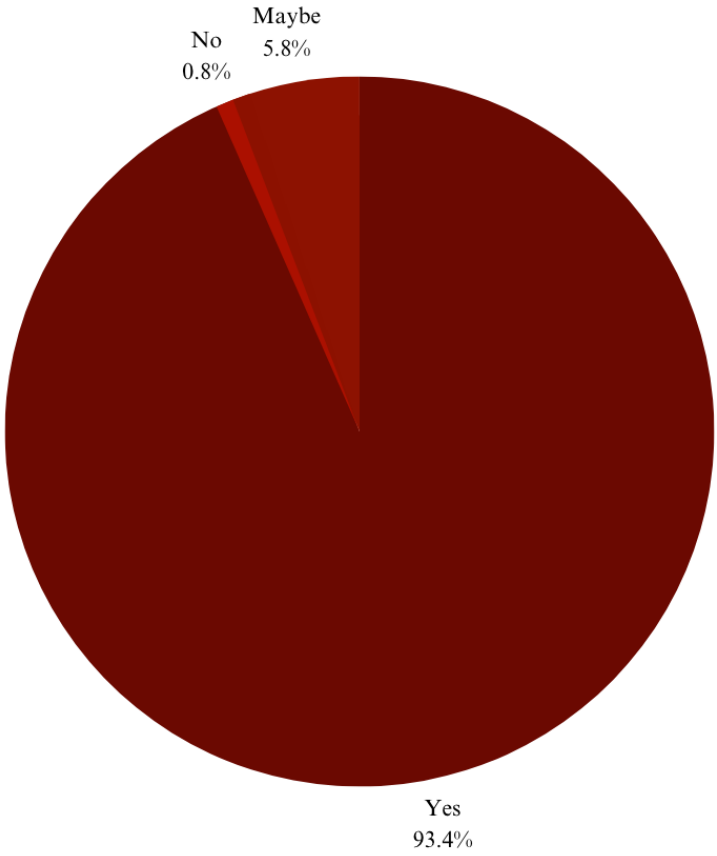

Figure 11: Survey Question 20 Results

4. CONCLUSION

4.1 Conclusions Drawn

It can be concluded that 79.2% of the surveyed population identifies as levels 3-6, meaning they are experienced in canine companionship and are knowledgeable about the social and physiological benefits of human-dog interactions. When asked if the survey recipient's level of dog interactions has had a positive impact on their physical exercise, a majority of students (60%) agreed or strongly agreed with the statement. Additionally, surveyors were asked a similar question, if their level of dog interactions had a positive impact on their mental health, which led to a vast majority of students (82.5%) confirm there is a benefit to their mental health solely from these interactions. It can be seen that in light of collegiate students facing stressful academic coursework, a majority are able to see positive benefits to their physical and mental health from their interactions, proving the implied physiological outcomes for this particular age group remains true to existing studies. When survey recipients were asked if they are in favor of Texas A&M implementing campus events with canine companions, 93.3% of responses said "yes", 5.8% said "maybe", and 0.8% said "no". Given the implied physiological benefits of human-dog interactions, it is best assumed that universities implementing these campus events can expect a positive outcome in relation to the mental well-being and overall physical health of their students. Given that more than 90% of students are in favor of these events sponsored by the university, we can see that this statistic also includes students from level 1, "no dog interactions, avoid to an extent". This means that although these students may not want to interact with canines themselves, they are in favor of the idea that other students would benefit from the physiological stimulations associated with these events involving dog interactions.

Additionally, students were asked their beliefs on how dog interactions can impact various life events, diagnoses, or development of humans. 79.1% agreed that canine companions during the COVID-19 pandemic had improved mental health, 77.5% agreed that dog interactions can potentially lead to a decrease in the diagnosis of CAD for young adults, 97.5% agreed that these interactions can produce a positive impact on stressful academic lifestyles, 96.7% agreed that these interactions have impacted mental health as a whole, and 67.5% agreed that these dog interactions have aided in the development of personal relationships.

4.2 Future Research

As evident by these survey responses, it can be seen that human-dog interactions of collegiate students produce positive benefits and aid in the physical/mental health of this age group. It can be concluded that students at Texas A&M University are comfortable with their level of dog interactions, with room for improvement, and support the idea of these benefits bring available to other students through campus-sponsored events. It is research such as this that is able to help draw conclusions about these interactions and their benefits amongst specific age groups, and how we can progress our knowledge from there.

In the future, as previously stated, the Google Form survey, entitled “Human-Dog Interactions of Collegiate Students”, shall remain open with the intent to continue to collect data. As the field of science and research is ever-changing as we collect data and form new conclusions, it is justified to believe that new students will respond to this survey and will skew the current percentages presented in these results. As it was concluded that a majority of students at Texas A&M University are comfortable with their level of dog interactions, as well as being open to the idea of campus-based events with the use of canine companions, it is safe to assume that the possibility of this institution implementing more human-dog interactions on campus

would further develop our knowledge of collegiate students with respect to their physical, mental, and social development. The purpose of this survey was to determine a correlation between a student's physiological health and how it may be benefitted from the level of human-dog interactions the student is exposed to. A conclusion can be drawn that there is a direct correlation, according to these survey results, between a student's physical or mental health and the level at which they engage in interactions with canine companions. As all students have room for further development, it is possible that these results may change with more responses collected to give increasingly accurate conclusions over time. These survey results are pooled from a small percentage of the Texas A&M University undergraduate population (during the Spring 2023 semester), and are open to interpretation or similar surveys conducted at other universities in the future. The goal of this survey was to further navigate our current knowledge of human-dog interactions in a specified age group. This survey and its results have been successful in creating this evaluation, and is now open to further analysis and research observed in future studies.

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