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Tanya K. Bailey  
*University of Minnesota, tanya@umn.edu*

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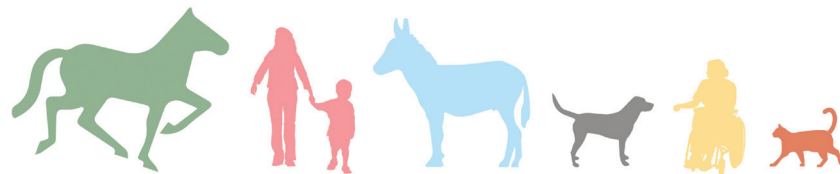
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## A Scoping Review of Campus-Based Animal-Assisted Interactions Programs for College Student Mental Health

Tanya K. Bailey<sup>1</sup>

**Keywords:** animal-assisted therapy, college students, mental health, stress

**Abstract** Background: People have long found support by interacting with animals, which has developed into a health care modality called animal-assisted interactions (AAI). In the past 10 years, AAI has increased as a way to support college students' mental health; however, there is no comprehensive evidence on the effectiveness of these programs.

Method: A scoping review was conducted using the JBI and PRISMA-ScR criteria. Empirical articles were identified through Academic Search Premier (EBSCOhost), PsychINFO (Ovid), and Web of Science using three groups of keywords: AAI, college students, and mental health.

Results: Of the 1,195 publications identified, 37 met this study's eligibility criteria. Results reported statistically significant (positive) changes in college students' mental health within the cognitive, physiological, psychological, and social quality of life domains.

Contributions: This study demonstrated that AAI for college student mental health is an emerging interest in research, practice, and education; however, a robust understanding of these programs remains vastly understudied.

Of the thousands of mental health programs offered on college campuses in the United States, a 2015 census found that 925 colleges or universities had some type of animal-assisted interactions (AAI) or visiting-animal program (Crossman & Kazdin, 2015), despite the lack of commensurate empirical support showing that such programs are effective in helping students deal with stress. AAI is a professional practice whereby a person and an

animal are trained and then work in partnership with each other to provide the purposeful delivery of direct and measurable therapeutic and educational services for human learning and well-being (Fine, 2019). This formalized way for humans and animals to be with each other is just one example of the many types of human-animal relationships that exist and can also include animal-assisted therapy (AAT), animal-assisted education (AAE),

(1) University of Minnesota

and animal-assisted activities (AAA) (IAHAIO, 2018). As far back as the ninth century, individuals with disabilities lived on a farm in Gheel, Belgium, and cared for the animals as a way to contribute to and stay engaged with the surrounding community (Duval, 1860). Many college students also share a similar emotional attachment to their pets; indeed, saying good-bye to family and friends tends to be much easier than leaving their animal companions behind (Rodgers & Tennison, 2009). This transition to college is a significant developmental milestone that can be fraught with difficulty. Individuals in the general population have a 41% chance of being diagnosed with at least one mental health disorder in their lifetime (Eisenberg et al., 2020), and mental health is the number one public health concern across all U.S. college campuses (Eells et al., 2012). It is in this context that the significance of the human–animal bond for college students' well-being needs to be fully examined. Thus, in the present study I focus on the impact of campus-based AAI programs and services for college student mental health and well-being.

## Literature Review

In the fall of 2019, 41% of young adults in the United States or 16.6 million people between the ages of 18 and 24—the traditional college age—were enrolled as undergraduates in a two- or four-year postsecondary institution (Hussar et al., 2020). While today's college students continue to trend female (58%), as a group, students who identified as Black, Hispanic, and Asian/Pacific Islander, American Indian/Alaska Native, and of two or more races increased from 16% of the collegiate population in 1976 to 45% in 2018 (Stolzenberg et al., 2020; U.S. Department of Education, National Center for Education Statistics, 2019). Enrollment has also increased for students who are older (between the ages of 25 to 34), are military veterans, have dependent children, live below the poverty line, or work at least one part-time job (Gault et al., 2014; Hussar et al., 2020). The combined reviews of the literature on college student mental health, college students and stress, and AAI demonstrate that

stress management and improved mental health are the focus of the vast majority of campus-based AAI programs (Binfet et al., 2018; Crossman & Kazdin, 2015; Pendry et al., 2020).

## *College Student Mental Health*

Data from the World Health Organization (WHO) show approximately half of all Americans will experience mental illness such as depression or anxiety in their lifetime (Kessler et al., 2007), and 75% of these disorders will occur by age 24 (Kessler et al., 2005). After accidents, suicide is the second leading cause of college student death (Drapeau & McIntosh, 2020), and students have a 41% lifetime prevalence of being diagnosed with at least one mental disorder (Eisenberg et al., 2020). Comparing undergraduate students from 2007 to 2020, mental illness as a category of student disabilities in the United States has grown in frequency, complexity, and severity (Gallagher & Taylor, 2014; Lipson et al., 2018). Rates of depression rose from 17% to 28% and anxiety increased from 7% to 31% during the same time span (Eisenberg et al., 2013, 2020). As a point of comparison, in 2017 the rate of depression for adults aged 18 to 24 in the general population was 13% (National Institute of Mental Health, 2019). These statistics are significant because they involve the age range of the majority of people enrolled in college and suggest that students' risk of experiencing a decline in their mental health will go untreated, resulting in a dire impact on their college experience and across their lifespan (Hunt et al., 2015).

These rising rates in mental illness are also impacting campus counseling centers, where the number of visits doubled (from 19% to 34%) between 2007 and 2017 and the severity of conditions have become more complex (Lipson et al., 2018). In addition to depression and anxiety, college mental health programs are treating difficult, comorbid issues that now include schizophrenia, bipolar disorder, eating disorders, self-injury, post-traumatic stress disorder (PTSD), and psychosis (Pedrelli et al., 2015; Reetz et al., 2014; Xiao et al., 2017). Furthermore, research shows that people who struggle emotionally

take an average of 11 years until they initially seek treatment (Hunt & Eisenberg, 2010). Often, college students do not recognize the severity of their emotional struggles. Compared to other adults between the ages of 18 and 24, college students are the least likely group to seek help when they experience mental health concerns (Substance Abuse and Mental Health Services Administration [SAMHSA], 2020). Many students remain afraid of the stigma associated with mental illness (Gruttadaro & Crudo, 2012), are unaware of available services (Grasgreen, 2012), and believe their condition is “normal” so that seeking help would use resources—time, student fees, personnel—better allocated to someone else (Kognito, 2015). At the same time, one of the most established contributors to poor mental health in the United States—stress—is vastly understudied for college students as a population (Amanvermez et al., 2020; Robotham & Julian, 2006). This gap hinders a comprehensive understanding of how and in what ways the colleges and universities of tomorrow can meet the needs of their dynamic and diverse campus communities (Bransberger et al., 2020).

### *College Students and Stress*

Campus life brings an onslaught of new experiences amid an unfamiliar environment that many students find stressful and highly overwhelming so that it can be a challenge to manage their stress in a productive manner (Amanvermez et al., 2020; Lipson et al., 2018). The fall 2019 National College Health Assessment surveyed 41,140 students from 67 colleges and found that 76% of respondents reported experiencing *moderate* or *high* stress within the last 12 months, and that stress and anxiety were the top two issues that negatively impacted their academic performance (American College Health Association [ACHA], 2020). As a world unto its own, college is a time of developing new relationships, finding a sense of belonging, experiencing romantic and deep connections with others, and establishing an identity as an independent person away from parental and guardian oversight. Factor in having to adjust to the rigors of time management and academic expectations as well as

the high propensity for poor sleep hygiene and erratic eating patterns, and today’s college students are primed to struggle with immense and unavoidable stress.

The college student experience is a significant development stage for many young adults, yet there is a nominal understanding of how college students as a population experience, perceive, and manage their stress (Robotham & Julian, 2006). Psychological strain is the most common form of college student stress. Some students can manage these unique psychosocial challenges, whereas for others these acute stressors develop into chronic patterns of disruption that can profoundly impact their mental health, academic performance, and long-term success as a member of society (Kessler et al., 2007; Xiao et al., 2017). While some level of stress is considered appropriate because it provides energy and motivation (Ragsdale et al., 2011), the long-term impacts of stress are highly detrimental. In response to the rise in stress levels that are inherent in academia, some colleges are turning to animal-assisted interactions (AAI) as a mental health intervention.

### *Animal-Assisted Interactions*

AAI is a modality that encompasses a wide range of experiences with a variety of animals for human well-being (Hediger et al., 2019; IAHAIO, 2018). The Pet Partners program is a long-standing organization in the United States that has helped to establish best practices and parameters for AAI programs. Following these guidelines, a person who has received some level of instruction, be it clinical, educational, or vocational, may work with an animal, usually their own pet, in a professional or volunteer capacity. Ideally, these animals have also participated in specialized training to work with other people, are at least 6 to 12 months of age depending on the species, have received a health and parasite screening from a veterinarian, and are domestic or farm animals such as dogs, cats, birds, equines, and rabbits (Pet Partners, 2021). In most cases, the human participant and this animal have also passed a skill and aptitude test by an independent evaluator so that together, they are

registered as a *therapy animal team* with a reputable national therapy animal organization such as Pet Partners (Pet Partners, 2021). However, it is also important to note that in the practice of AAI, there remains a significant amount of confusion regarding terminology. For example, some AAI sessions are part of psychotherapy and are defined as animal-assisted therapy (AAT); other AAIs are part of academic instructions and are called animal-assisted education (AAE); and still other AAIs are informal without structured outcomes or goals and are called animal-assisted activities (AAA) (IAHAIO, 2018). Consumers and lay individuals are not always aware of these nuances or understand that safety, determining the suitability of the animals in these programs, and upholding the welfare of these animals are paramount in order to practice ethically and humanely.

In general and among diverse groups of individuals, AAI programs are associated with reduced depression, loneliness, stress, and anxiety (Jones et al., 2019; Kamioka et al., 2014; Souter & Miller, 2007), increased communication and problem-solving skills (Hanselman, 2001), motivation to exercise (Johnson & Meadows, 2010), improved literacy and comprehension (Le Roux et al., 2014), and improved well-being (Bivens et al., 2007). Animals are often seen as “nonjudgmental” and accepting of others (Aydin et al., 2012), and can provide “unconditional positive regard” (Bryant, 2008; Jung, 1969; McCulloch, 1982). The presence of an animal can “socially lubricate” the somewhat awkward or polite exchange between strangers and can invite more person-to-person connection and belonging (Bossard, 1944; Messent, 1983).

While AAI can be found in a wide variety of human health care settings, providing AAI on a large scale such as via programming at a university exemplifies how a therapeutic connection between humans and animals can impact the health of the environment—the campus—and build the collective welfare for all beings involved. The most recent national census in 2015 found that 925 U.S. colleges or universities had some type of AAI or campus-based animal program to help students deal with stress (Crossman & Kazdin, 2015). These programs are typically defined by one or two stress-buster events during midterms

and final examinations and include a broad range of delivery approaches, from sessions provided by registered therapy animal teams, usually dogs, to those conducted with staff pets or Humane Society animals. Campus-based animal programs are known for being highly popular and a source of pleasure, enjoyment, and comfort to many people. However, this enthusiasm for connecting students with animals is not matched with an equal level of rigorous inquiry that provides evidence that AAI should be considered in addition to the many other ways of supporting student well-being (Fine & Ferrell, 2021; McCardle et al., 2011; Serpell et al., 2017). To address this gap and help support additional empirical inquiry, the present study—a scoping review—examined the confluence of the empirical literature on college student mental health, stress, and AAI.

## Present Study

In this scoping review, I identify and summarize existing peer-reviewed or dissertation literature about campus-based AAI programs specifically designed to address college student mental health. A scoping review is about “knowledge synthesis” and explores an evolving body of literature and research related to a broad question (Arksey & O’Malley, 2005; Munn et al., 2018; Peters et al., 2015). Specific to this study, I address the following research questions:

1. What are the mental health outcomes reported as a result of campus-based AAI programs for college student mental health?
2. How much of this evidence reported on college student stress and the resulting outcomes?

In the last 10 years, public opinion has grown in support of AAI services to help support college student mental health; however, there is no comprehensive study of the available evidence for these programs. Societal trends and mainstream media have also helped perpetuate the impression that these campus-based AAI programs are an efficient, high-impact, low-cost way to relieve college students’ stress

(Fine & Ferrell, 2021; Serpell et al., 2017) and thus contribute to improving student well-being. As college student mental health needs continue to rise in frequency and become increasingly more complex in scope, the college experience is a significant opportunity to impact millions of people who are in their primary years of biopsychological development. Hence, the findings from this scoping review will help to inform and strengthen AAI programming overall and help guide additional research to better understand if, how, and in what ways these programs can help colleges meet the needs of their dynamic campus communities.

## Methods

### Study Design

I followed the Joanna Briggs Institute (JBI) manual for developing a scoping review protocol and conducting the study (Peters et al., 2020), and I used the 22-item checklist set forth by the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) (Tricco et al., 2018) for reporting the results of the review. A scoping review examines, summarizes, and produces an overview or map of what is known about a topic or concept (Arksey & O'Malley, 2005), and this mapping follows an organized and essential process to provide rigor and maintain methodological and reporting quality (Levac et al., 2010; Tricco et al., 2018). Often a precursor for a systematic review, the objective of a scoping review is *knowledge synthesis* (Colquhoun et al., 2014), rather than analyzing the quality of study results or making policy and practice recommendations. Specific to AAI programs for college student mental health, exploring the current state of information and research can then help guide further reviews and investigations of limitations and gaps.

### Protocol

First, I developed an a priori protocol to give structure to the decisions that guided the scoping review process. The JBI methodology for this protocol allows

for refinement as content is gathered and further understanding of a concept is gained. The nine steps of a scoping review protocol are (1) selecting a title that clearly identifies the topic of the study and lists it as a scoping review, (2) writing a comprehensive introduction, (3) listing the research objectives and questions, (4) developing and aligning the eligibility criteria with the objectives and questions, (5) describing the search strategy, (6) selecting the evidence, (7) charting the data, (8) synthesizing the data, and (9) summarizing and reporting the results (Peters et al., 2020).

### Eligibility Criteria

Next, I used the PCC model (participants, concept, and context) to develop and use eligibility, inclusion, and exclusion criteria to screen the results of my search. In contrast to other search criteria such as PICO (population, intervention, comparator, outcome), PCC allows for a broader inclusion of information in order to create a scoping review's wide-ranging map of a topic (Peters et al., 2015).

**Participants.** I examined all manuscripts for this scoping review that involved participants enrolled in some form of postsecondary learning throughout the world and who participated in AAIs with a live animal. No limits were placed on student age, status (e.g., full-time or part-time), living situation (e.g., commuting or living on or near campus), or higher education type (e.g., public, private, for-profit, vocational, or community college). The animals in the study could not be immature (e.g., puppies or chicks), had to be identified as *therapy animals* in some fashion (e.g., registered with Pet Partners or Alliance of Therapy Dogs), and had to be classified as domestic or farm animals.

**Concept.** I considered all studies for this review that examined any form of a campus-based AAI program intended to impact college student mental health, and there was no limit to the format, frequency, or duration of these AAI experiences. While stress management was the specific outcome of interest, only a handful of articles identified stress as

the sole concept of study. Therefore, I revised this protocol to include a broader focus on mental health or well-being in an effort to capture a more diverse and extensive sample. Finally, I excluded research studies from this literature review that did not include registered AAI teams because I believe it is professionally and operationally important to uphold the standards of practice developed in 1996 by the Delta Society (now called Pet Partners).

**Context.** I included all articles for this review that listed any context describing a postsecondary education setting throughout the world.

**Other.** Because this body of literature was very small, I included dissertations with articles from peer-reviewed journals that reported an empirical study. The inclusion of dissertations also assists with publication bias. Finally, I excluded studies if their full articles were unavailable or written in a language for which no translation to English was readily available.

### *Evidence Sources and Search Strategy*

In consultation with a library specialist at a large, Midwestern university, I used an iterative, three-step process to conduct my literature search (Peters et al., 2020) that followed the Peer Review of Electronic Search Strategies (PRESS) 2015 Evidence-Based Checklist (McGowan et al., 2016). First, I focused on three groups of subject headings and keywords to guide this search: *AAI* (e.g., animal-assisted therapy, human–pet bonding, dog therapy), *college students* (e.g., campus, higher education, emerging adult, student health services), and *mental health* (e.g., depression, psychological stress, anxiety, loneliness, well-being, mental health services). I used Academic Search Premier (EBSCOhost) and PsychINFO (Ovid) to pilot this search strategy. The retrieved papers were searched for free text in the title, abstract, subject headings, and index terms in order to assess whether other related concepts appropriate for each topic were missing. Second, I revised and adapted this search strategy for Web of Science and conducted a new search in 20 databases listed at the bottom

of Table 1, where the final search strategy for Academic Search Premier (EBSCOhost) can be found. And third, I ensured literature saturation by reviewing the references of included studies, gray literature using Google Scholar, and related AAI websites, reviews, and summaries. I accessed the databases from the libraries of the University of Minnesota, and my search included all languages and all journal publications up to October 25, 2020.

After I completed the literature search, I determined what articles were included in this scoping review by following four steps based on the PRISMA-ScR protocol for a scoping review process (Moher et al., 2009) and illustrated in Figure 1. As the sole reviewer of my literature search results, I acknowledge a variance to the PRISMA-ScR requirements for a team approach to conducting a scoping review study (Levac et al., 2010; Peters et al., 2020). The bias of this scoping review may be a limitation in the replication of this study by other investigators. Potential articles were combined into an Excel spreadsheet and duplicates were removed. I used the eligibility, inclusion, and exclusion criteria in my protocol to review all studies produced from this search. These publications were also screened by title, keywords, and abstract, and I read the full texts of the remaining articles to select potentially relevant articles for inclusion in this scoping review.

I identified 37 articles reporting 45 individual studies that were eligible for this scoping review, and among those in the excluded group of 30 articles, four are worth mentioning because of their strong relationship to this study. The first one is the seminal work by Folse, Minder, Aycock, and Santana (Folse et al., 1994) because it is cited in the majority of articles on AAI. While the authors identified that “animal-assisted therapy” was a worthwhile option to treat college students who self-reported depression in a group format within a mental health clinic, the two dogs that participated in the study were a puppy and an adult dog with no mention of specific training or testing for AAI work. Two articles were authored by Pendry and colleagues (Pendry, Vandagriff, et al., 2019; Pendry & Vandagriff, 2019) and both included cats and dogs as participants in their campus-based animal program.

**Table 1.** Scoping Review Search Terms and Locations

| Subject Headings  | Terms Used in Databases   |
|---|---|
| Population—College Students; Campus; College(s); Education, professional; Emerging adult; Higher education; Post-secondary; Student health services; Students; Universities; Young adult  | <i>universit* or college* or post-secondary or postsecondary or campus* or professional or university education or college education or post-secondary education or postsecondary education or campus education or higher education or professional education or university involvement or college involvement or post-secondary involvement or postsecondary involvement or campus involvement or professional involvement or university undergraduate* or college undergraduate* or post-secondary undergraduate* or postsecondary undergraduate* or campus undergraduate* or professional undergraduate* or university student* or college student* or post-secondary student* or postsecondary student* or campus student* or professional student* or university participation or college participation or post-secondary participation or postsecondary participation or campus participation or professional participation or emerging adult* or young adult* or graduate student* or international student* or law student* or medical student* or seminarian* or seminarian student* or transfer student* or vocational school student* or health promotion or student health service*</i>   |
| Concept—Animal-Assisted Interactions: Animal assisted activity(ies); Animal assisted interaction(s); Animal assisted intervention(s); Animal assisted therapy; Animal therapy; Bonding; Canine therapy; Dog therapy; Human-animal bond(s); Human animal relationship(s); Human-pet; Equine-assisted therapy | <i>animal visit* OR animal psychotherap* OR canine psychotherap* OR dog psychotherap* OR horse psychotherap* OR equine psychotherap* OR pet psychotherap* OR animal-assisted psychotherap* OR canine-facilitated psychotherap* OR dog-facilitated psychotherap* OR horse-assisted psychotherapy* or equine-assisted psychotherapy* or pet-assisted psychotherapy* or animal-facilitated psychotherap* OR canine-facilitated psychotherap* OR dog-facilitated psychotherap* OR horse-facilitated psychotherap* OR equine-facilitated psychotherap* OR pet-facilitated psychotherap* OR pet psychotherapy* or human-animal psychotherap* OR human-pet psychotherap* OR animal bond* OR animal-assisted bond* OR canine-assisted bond* OR dog-assisted bond* OR equine-assisted bond* OR pet-assisted bond* or animal-facilitated bond* OR canine-facilitated bond* OR dog-facilitated bond* OR equine-facilitated bond* OR pet-facilitated bond* or human-animal bond* OR human-pet bond* OR animal intervention* OR canine intervention* OR dog intervention* OR horse intervention* OR equine intervention* OR pet intervention OR human-animal intervention* OR human-pet intervention* OR animal interaction* OR canine interaction* OR dog interaction* OR horse interaction* OR equine interaction* OR pet interaction* OR human-animal interaction* OR human-pet interaction* OR animal-assisted intervention* OR canine-assisted intervention* OR dog-assisted intervention* OR horse-assisted intervention* OR equine-assisted intervention* OR pet-assisted intervention* or animal-assisted interaction* OR canine-assisted interaction* OR dog-assisted interaction* OR horse-assisted interaction* OR equine-assisted interaction* OR pet-assisted interaction OR dog-facilitated interaction* OR canine-facilitated interaction* OR animal-facilitated interaction* OR equine-facilitated interaction* OR horse-facilitated interaction* OR pet-facilitated interaction* OR dog-facilitated intervention* OR canine-facilitated intervention* OR animal-facilitated intervention* OR equine-facilitated intervention* OR horse-facilitated intervention* OR pet-facilitated intervention* or animal relationship* OR canine relationship* OR dog relationship* OR cat relationship* OR horse relationship* OR equine relationship* OR pet relationship* OR human-animal relationship* OR human-pet relationship* OR animal-assisted relationship* OR canine-assisted relationship* OR dog-assisted relationship* OR cat-assisted relationship* OR horse-assisted relationship* OR equine-assisted relationship* OR pet-assisted relationship* OR human-animal relationship* OR human-pet relationship* OR dog-facilitated relationship* OR canine-facilitated relationship* OR animal-facilitated relationship* OR equine-facilitated relationship* OR horse-facilitated relationship* OR pet-facilitated relationship* OR animal therap* OR canine therap* OR dog therap* OR cat therap* OR horse therap* OR equine therap* OR pet therap* OR human-animal therap* OR human-pet therap* OR animal-assisted therap* OR canine-assisted therap* OR dog-assisted therap* OR cat-assisted therap* OR horse-assisted therap* OR equine-assisted therap* OR pet-assisted therap* OR dog-facilitated therap* OR canine-facilitated therap* OR animal-facilitated therap* OR equine-facilitated therap* OR horse-facilitated therap* OR pet-facilitated therap* OR animal activit* OR canine activit* OR dog activit* OR cat activit* OR horse activit* OR equine activit* OR pet activit* OR human-animal activit* OR human-pet activit* OR animal-assisted activit* OR canine-assisted activit* OR dog-assisted activit* OR cat-assisted activit* OR horse-assisted activit* OR equine-assisted activit* OR pet-assisted activit* OR dog-facilitated activit* OR canine-facilitated activit* OR animal-facilitated activit* OR equine-facilitated activit* OR horse-facilitated activit* OR pet-facilitated activit* OR animal education* OR human-animal education* OR human-pet education* OR animal-assisted education* OR canine-assisted education* OR dog-assisted education* OR cat-assisted education* OR horse-assisted education* OR equine-assisted education* OR pet-assisted education* OR dog-facilitated education* OR canine-facilitated education* OR animal-facilitated education* OR equine-facilitated education* OR horse-facilitated education* OR pet-facilitated education* OR animal visit* OR canine visit* OR dog visit* OR pet visit* OR animal-assisted visit* OR canine-assisted visit* OR dog-assisted visit* OR cat-assisted visit* OR horse-assisted visit* OR equine-assisted education* OR pet-assisted education* OR dog-facilitated visit* OR canine-facilitated visit* OR animal-facilitated visit* OR equine-facilitated visit* OR horse-facilitated visit* OR pet-facilitated visit* OR animal program* OR canine program* OR dog program* OR cat program* OR horse program* OR equine program* OR pet program* OR animal-assisted program* OR canine-assisted program* OR dog-assisted program* OR cat-assisted program* OR horse-assisted program* OR equine-assisted program* OR pet-assisted program* OR dog-facilitated program* OR canine-facilitated program* OR animal-facilitated program* OR equine-facilitated program* OR horse-facilitated program* OR pet-facilitated program*</i> |

(continued)



**Table 1.** (continued)

| Subject Headings   | Terms Used in Databases   |
|--|---|
| Outcome measures—Mental Health:<br><i>Anxiety; Anxiety disorder; Counseling; Depression; Depressive disorder; Distress; Health promotion; Loneliness; Mental disorders; Mental healing; Mental health; Mental health services; Mental illness; Mood; Psychiatric illness; Psychological distress; Psychology; Psychotic disorders; Social isolation; Stress, psychological; Therapy; Wellbeing; Well-being; Wellness</i> | <i>mental health or mental health service* or psychological distress or mental disorder* or counseling or stress* or psychological stress* or mental healing or psychotic disorder* or depress* or anxiet* or lonel* or depressive disorder* or anxiety disorder* or social isolation or mood* or distress or mental illness* or psychiatric illness* or psychology or therap* or wellbeing or well-being or wellness or stress reduction or stress management or stress prevention or stress relief or mental health support or emotional support or mental distress or mental stress*</i> |
| <b>Databases Searched</b>  |   |
| EBSCOhost:<br>Academic Search Premier; Alt HealthWatch; Business Source Premier; CINAHL Plus with Full Text; EBSCO MegaFILE; Education Source; ERIC; Health Source—Consumer Edition; Health Source: Nursing/ Academic Edition; Library & Information Science Source; Professional Development Collection; Science Reference Center; SPORTDiscus with Full Text; Wildlife & Ecology Studies Worldwide; OpenDissertations  |   |
| Ovid:<br>CAB Abstracts—Daily; MEDLINE(R)—Daily, Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Without revisions; PsychINFO—Archives   |   |
| Web of Science   |   |

However, these animals came from a local humane society shelter and did not have specific training, testing, or pairing with a human partner to provide these AAI programs. The fourth article examined the impact of mindfulness training on college students’ ability to manage stress, and an AAI dog acted as a control (Shearer et al., 2016). Because this study focused on the outcomes produced through mindfulness training and not an AAI program, it did not meet the inclusion criteria used for this review.

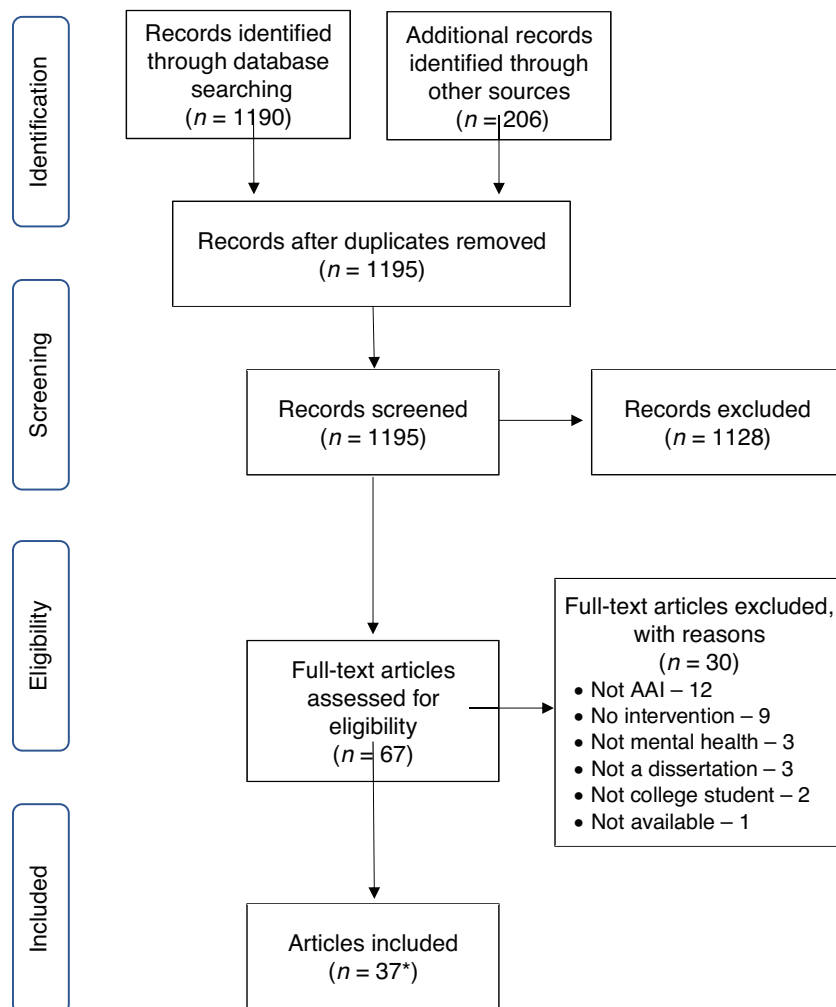
**Data Charting**

The charting process helped answer my research questions regarding what is known about campus-based AAI programs for college student mental health, and what mental health outcomes—specifically stress—were reported in these studies. I developed a data-charting table a priori as shown in Table 2,

and this was revised as needed to extract relevant details from the articles in this scoping review. I included the following data in this chart: author(s) and year of publication; title; journal or dissertation; number of participants; institution, city, state, and country of the lead author; study aim(s); study design; intervention timing (e.g., once or weekly for six weeks) and intervention duration (e.g., 15 minutes or a range of 45 to 60 minutes); animal species and census; outcome(s) measured; and key findings. I did not catalogue intervention and participant types because only articles that used AAI as the intervention for college student participants were included.

**Data Synthesis**

As with the literature search and charting, data synthesis was an iterative process that provided an opportunity to refine all the content into a cohesive and

**Evidence Selection**

**Figure 1.** PRISMA flow diagram for the scoping review process. A full list of reasons for excluding records can be obtained from the author.

orderly report. First, I organized the data in Table 2 into three main categories as shown in Table 3: article demographics, methodology, and results. Article demographics included year published, location of the lead author, and whether the paper was an empirical study or a dissertation. Methodology included study design, participants, and intervention. The subcategory of participants was divided into *human* and *animal*, and the subcategory of intervention was divided into *timing* and *duration*. The results category included the mental health outcomes measured

and the outcome changes. Next, I synthesized the mental health outcomes among four quality of life domains—cognitive, physiological, psychological, or social—that I adapted from the World Health Organization’s quality of life model (World Health Organization [WHO], 2012). I recorded the findings for each outcome in each domain as increased, no change, or decreased, and I used a numerical analysis to present frequency patterns. The next section presents the results of this study and is the final step in the JBI protocol for scoping reviews.

**Table 2.** Summary of Studies Included in a Scoping Review of AAI for College Student Mental Health (N = 37)<sup>a</sup>

| Author and Year Published                             | Title  | Journal or Dissertation         | Participants (N) and Location  | Study Aims   | Study Design   | Intervention Duration and Timing                   |   | Animal Species and Census  |                          | Outcomes Measured   | Study Results  |
|---|--|---------------------------------|--|--|--|--|---|----------------------------|--------------------------|---|--|
| Anderson (2018)                                       | The effect of animal-assisted therapy on nursing student anxiety.  | Dissertation                    | 90<br>University of Kansas<br>Lawrence, KS<br>USA  | This study investigated college students' anxiety levels before and after attending an AAI program.  | Mixed methods  | 1 day  | 35–45 min   | Dog                        | 8                        | 1. Anxiety  | Anxiety decreased.   |
| Barker, Barker, McCain, and Schubert (2016)           | A randomized cross-over exploratory study of the effect of visiting therapy dogs on college student stress before final exams. | <i>Anthrozoös</i>               | 78<br>Virginia Commonwealth University<br>Richmond, VA<br>USA                                    | This study investigated college students' perceived stress and physiological stress before and after attending an AAI program.                                 | Randomized controlled study                              | 1 day  | 15 min  | Dog                        | 10                       | 1. Perceived stress<br>2. Physiological stress<br>-sVAS<br>-SnGF        | Perceived stress and physiological stress decreased.                               |
| Barker, Barker, Randolph, McCain, and Schubert (2017) | The effect of a canine-assisted activity on college student perceptions of family supports and current stressors.              | <i>Anthrozoös</i>               | 74<br>Virginia Commonwealth University<br>Richmond, VA<br>USA                                    | This study investigated college students' perception of family supports and current stressors before and after attending an AAI program.                       | Secondary data analysis of a randomized controlled study | 1 day  | 15 min  | Dog                        | 10                       | 1. Perceived family supports  | No change in perceived family supports.  |
| Binfet (2017)   | The effects of group-administered canine therapy on university students' wellbeing: A randomized controlled trial.             | <i>Anthrozoös</i>               | 163<br>University of British Columbia<br>Vancouver, British Columbia<br>Canada                   | This study investigated college students' perceived stress, homesickness, and connection to campus before and after attending an AAI program.                  | Randomized controlled study                              | 1 day  | 20 min  | Dog                        | 14                       | 1. Connection to campus<br>2. Homesickness<br>3. Perceived stress       | Connection to campus increased; homesickness and perceived stress decreased.       |
| Binfet and Passmore (2016)                            | Hounds and homesickness: The effects of an animal-assisted therapeutic intervention for first-year university students.        | <i>Anthrozoös</i>               | #1–86<br>#2–44<br>#3–17<br>University of British Columbia<br>Kelowna, British Columbia<br>Canada | This study investigated college students' well-being before and after attending an AAI program.  | Mixed methods  | #1–8 days, weekly<br>#2–8 days, weekly<br>#3–1 day | #1–45 min<br>#2–45 min<br>#3–length of time not given | #1–Dog<br>#2–Dog<br>#3–n/a | #1–12<br>#2–20<br>#3–n/a | 1. Connection to campus<br>2. Homesickness<br>3. Satisfaction with life | Connection to campus and satisfaction with life increased; homesickness decreased. |
| Binfet, Passmore, Cebry, Struik, and McKay (2018)     | Reducing university students' stress through a drop-in canine-therapy program.   | <i>Journal of Mental Health</i> | 1960<br>University of British Columbia<br>Kelowna, British Columbia<br>Canada                    | This study investigated college students' perceived stress before and after attending an AAI program, and if length of time at an AAI program was a moderator. | Quasi-experimental design                                | 19 days  | 90 min  | Dog                        | 15–17                    | 1. Perceived stress   | Perceived stress decreased.  |

(continued)

Table 2 (continued)

| Author and Year Published                   | Title  | Journal or Dissertation                     | Participants (N) and Location  | Study Aims  | Study Design                | Intervention Duration and Timing               | Animal Species and Census        | Outcomes Measured  | Study Results  |
|---|--|---|--|---|-----------------------------|--|----------------------------------|--|--|
| Binfet, Trotman, Henstock, and Silas (2016) | Reducing the affective filter: Using canine assisted therapy to support international university students' English language development. | <i>BC TEAL Journal</i>                      | 7<br>University of British Columbia Kelowna, British Columbia Canada | This study investigated international college students' perceptions of their English language development and stress before and after attending an AAI program. | Mixed methods               | 5 days, weekly<br>90 min                       | Dog<br>14                        | 1. Language development<br>2. Perceived stress   | Language development increased and perceived stress decreased.                 |
| Camaioni (2013)                             | Creating social connections in higher education: Insights from the campus canines program at the University of Pittsburgh.               | Dissertation                                | 270<br>University of Pittsburgh Pittsburgh, PA USA                   | This study created a description of an AAI program through exploring the relationships college students created by attending the AAI program.                   | Mixed methods               | 13 days, weekly<br>60 min                      | Dog<br>22                        | 1. Social relationships  | Social relationships increased.  |
| Chakales, Locklear, and Wharton (2020)      | Medicine and horsemanship: The effects of equine-assisted activities and therapies on stress and depression in medical students.         | <i>Cureus</i>                               | 28<br>University of Central Florida Orlando, FL USA                  | This study investigated college students' stress and depression before and after attending an AAI program.  | Quasi-experimental design   | 7 days<br>3-4 hours                            | Horse<br>Unknown total           | 1. Depression<br>2. Perceived stress<br>3. Stress frequency<br>4. Stress severity  | Depression, perceived stress, stress frequency, and stress severity decreased. |
| Crossman, Kazdin, and Knudson (2015)        | Brief unstructured interaction with a dog reduces distress.  | <i>Anthrozoös</i>                           | 67<br>Yale University New Haven, CT USA                              | This study investigated college students' perceived anxiety and mood before and after attending an AAI program.   | Randomized controlled study | 1 day<br>7-10 min                              | Dog<br>1                         | 1. Anxiety<br>2. Mood<br>-Positive mood<br>-Negative mood  | Anxiety and negative mood decreased; positive mood increased.                  |
| Crump and Derting (2015)                    | Effects of pet therapy on the psychological and physiological stress levels of first-year female undergraduates.                         | <i>North American Journal of Psychology</i> | #1-27<br>#2-61<br>Murray State University Murray, KY USA             | This study investigated college students' perceived psychological and physiological stress before and after attending an AAI program.                           | Randomized controlled study | #1-1 day<br>#2-1 day<br>#1-15 min<br>#2-30 min | #1-Dog<br>#1-9<br>#2-Dog<br>#2-7 | #1<br>1. Perceived stress<br>2. Physiological stress<br>- BP<br>- HR<br>#2<br>1. Perceived stress<br>2. Physiological stress<br>- Cortisol | Perceived stress decreased, all forms of physiological stress decreased.       |

(continued)

Table 2 (continued)

| Author and Year Published             | Title  | Journal or Dissertation  | Participants (N) and Location   | Study Aims  | Study Design                | Intervention Duration and Timing  | Animal Species and Census | Outcomes Measured  | Study Results  |
|---------------------------------------|--|--|---|---|-----------------------------|---|---------------------------|--|--|
| Delgado, Toukonen, and Wheeler (2018) | Effect of canine play interventions as a stress reduction strategy in college students.  | <i>Nurse Educator</i>  | 48<br>Cleveland State University<br>Cleveland, OH<br>USA                        | This study investigated college students' perceived stress and physiological stress before and after attending an AAI program.                          | Quasi-experimental design   | 1 day<br>15 min   | Dog<br>5                  | 1. Mood<br>- Negative mood<br>2. Perceived stress<br>3. Physiological stress<br>- BP<br>- Cortisol<br>- HR         | Negative mood, perceived stress, and all forms of physiological stress decreased.  |
| Dell et al. (2015)                    | PAWSing student stress: A pilot evaluation study of the St. John Ambulance Therapy Dog Program on three university campuses in Canada. | <i>Canadian Journal of Counselling and Psychotherapy</i>                 | 403<br>University of Saskatchewan<br>Saskatoon, Saskatchewan<br>Canada          | This study investigated college students' experience of love and support after attending an AAI program.  | Quasi-experimental design   | Site 1—3 days, site 1<br>Site 2—6 days, site 2<br>Site 3—2 days, site 3 | Dog<br>Unclear            | 1. Love<br>2. Support  | Love and support increased.  |
| Dhooper (2003)                        | Animal-assisted therapy: The effects of the presence of a trained therapy dog on group anxiety management training.                    | Dissertation   | 11<br>University of South Dakota<br>Vermillion, SD<br>USA                       | This study investigated college students' perceived anxiety before and after attending an AAI program.  | Randomized controlled study | 6 days, weekly<br>60–90 min   | Dog<br>1                  | 1. Anxiety   | Anxiety decreased.   |
| Dluzynski (2017)                      | A quantitative assessment of test anxiety and human-animal interaction in college students.  | Dissertation   | 56<br>Michigan School of Professional Psychology<br>Farmington Hills, MI<br>USA | This study investigated college students' physiological stress and exam performance before and after attending an exam session with an AAI dog present. | Randomized controlled study | 1 day<br>Unclear, approx. 30 min  | Dog<br>1                  | 1. Physiological stress<br>- HR<br>2. Task completion  | Physiological stress and task completion showed no change.   |
| Engel (2011)                          | An animal-assisted intervention with college students with Asperger's syndrome.  | Dissertation   | 4<br>Alfred University<br>Alfred, NY<br>USA                                     | This study investigated the effectiveness of an AAI program for college students with Asperger's syndrome.  | Quasi-experimental design   | 6 days, weekly<br>30 min  | Dog<br>1                  | 1. Positive and negative behaviors specific to Asperger's syndrome   | Positive and negative behaviors specific to Asperger's syndrome showed no change.  |
| Fiocco and Hunse (2017)               | The buffer effect of therapy dog exposure on stress reactivity in undergraduate students.  | <i>International Journal of Environmental Research and Public Health</i> | 61<br>Ryerson University<br>Toronto, Ontario<br>Canada                          | This study investigated college students' physiological responses before and after attending an AAI program.  | Randomized controlled study | 1 day<br>10 min   | Dog<br>10                 | 1. Mood<br>- Negative mood<br>- Positive mood<br>2. Perceived stress<br>3. Pet attitude<br>4. Physiological stress | Negative mood and physiological stress decreased; positive mood increased; and perceived stress and pet attitude showed no change. |

(continued)

Table 2 (continued)

| Author and Year Published                            | Title   | Journal or Dissertation   | Participants (N) and Location | Study Aims  | Study Design  | Intervention Duration and Timing | Animal Species and Census      | Outcomes Measured                      | Study Results    |              |   |   |
|--|---|---|-------------------------------|---|---|----------------------------------|--------------------------------|--|------------------|--------------|---|---|
| Gebhart et al. (2018)                                | Distraction-focused interventions on examination stress in nursing students: Effects on psychological stress and biomarker levels. A randomized controlled trial. | Distraction and Animation Stress  | #1- 72<br>#2- 72              | FHG—Zentrum für Gesundheitsberufe Innsbruck Austria | This study investigated college students' exam stress before and after three types of distraction-focused interventions (AAI program was included). | Randomized controlled study      | #1—4 days<br>#2—4 days         | #1—45–60 min<br>#2—45–60 min           | #1—Dog<br>#2—Dog | #1—4<br>#2—4 | 1. Anxiety<br>2. Perceived stress<br>3. Physiological stress<br>- Cortisol<br>- IgA                                 | On a non-exam day, anxiety, perceived stress, and cortisol decreased; IgA increased. On exam day, anxiety and perceived stress showed no change; cortisol decreased; and IgA increased. |
| Grajfoner, Harte, Potter, and McGuigan (2017)        | The effect of dog-assisted intervention on student well-being, mood, and anxiety.   | <i>International Journal of Environmental Research and Public Health</i>  | 132                           | Heriot Watt University Edinburgh Scotland           | This study investigated college students' well-being, mood, and anxiety before and after attending an AAI program.                                  | Randomized controlled study      | 1 day                          | 20 min                                 | Dog              | 7–12         | 1. Anxiety<br>2. Mood<br>3. Well-being  | Anxiety decreased; mood and well-being increased.   |
| Hall (2018)  | Nursing campus therapy dog: A pilot study.  | <i>Teaching and Learning in Nursing</i>                                   | 77                            | Amarillo College Amarillo, TX USA                   | This study investigated college students' perception of anxiety and depression before and after attending an AAI program.                           | Randomized controlled study      | 16 weeks, at least 2 days/week | AAI team was available for 7 hours/day | Dog              | 1            | 1. Anxiety<br>2. Depression   | Anxiety decreased and there was no change in depression.  |
| House, Neal, and Backels (2018)                      | A doggone way to reduce stress: An animal assisted intervention with college students.  | <i>College Student Journal</i>  | 235                           | Millersville University Millersville, PA USA        | This study investigated college students' perceived personal benefits after attending an AAI program.   | Quasi-experimental design        | 3 days                         | 5 hours                                | Dog              | Unclear      | 1. Awareness of counseling services<br>2. Homesickness<br>3. Perceived stress<br>4. Perceptions of counseling staff | Awareness of counseling services and perceptions of counseling staff increased; homesickness and perceived stress decreased.  |
| Jarolmen and Patel (2018)                            | The effects of animal-assisted activities on college students before and after a final exam.  | <i>Journal of Creativity in Mental Health</i>                             | 86                            | Kean University Union, NJ USA                       | This study investigated college students' physiological stress before and after attending an AAI program.   | Quasi-experimental design        | 1 day                          | 15 min                                 | Dog              | 11           | 1. Physiological stress<br>- BP   | Physiological stress decreased.   |
| Krause-Parello, Tychowski, Gonzalez, and Boyd (2012) | Human-canine interaction: Exploring stress indicator response patterns of salivary cortisol and immunoglobulin A.   | <i>Research and Theory for Nursing Practice: An International Journal</i> | 33                            | Kean University Union, NJ USA                       | This study investigated college students' salivary cortisol and immunoglobulin A (IgA) before and after attending an AAI program.                   | Quasi-experimental design        | 1 day                          | 20 min                                 | Dog              | 1            | 1. Physiological stress<br>- Cortisol<br>- IgA  | Cortisol decreased and IgA increased.   |
| McArthur and Szyrnok (2018)                          | On-campus animal-assisted therapy events: Post-secondary students' reactions and mood.  | <i>Society &amp; Animals</i>  | #1—80<br>#2—38                | St. Mary's University Calgary, Alberta Canada       | The study investigated college students' mood before and after attending an AAI program.  | Quasi-experimental design        | #1—1 day<br>#2—1 day           | #1—90 min<br>#2—90 min                 | #1—Dog<br>#2—Dog | #1—6<br>#2—6 | 1. Mood<br>2. Program satisfaction  | Mood and program satisfaction increased.  |

(continued)

Table 2 (continued)

| Author and Year Published                | Title  | Journal or Dissertation  | Participants (N) and Location                                    | Study Aims   | Study Design                | Intervention Duration and Timing | Animal Species and Census   | Outcomes Measured   | Study Results   |
|--|--|--|--|--|-----------------------------|----------------------------------|-----------------------------|---|---|
| Morgan (2017)                            | Stress management for college students: An experiential multi-modal approach.  | <i>Journal of Creativity in Mental Health</i>                            | 42<br>Richard Bland College<br>Petersburg, VA<br>USA             | This study investigated college students' perceived stress before and after a multi-modal approach (AAI program was included).   | Quasi-experimental design   | 3 days, weekly<br>45 min         | Horse 5                     | 1. Perceived stress   | Perceived stress decreased.   |
| Muckle and Lasikiewicz (2018)            | An exploration of the benefits of animal-assisted activities in undergraduate students in Singapore.   | <i>Asian Journal of Social Psychology</i>                                | 75<br>James Cook University<br>Singapore                         | This study investigated college students' perceived well-being and physiological stress before and after attending an AAI program.   | Quasi-experimental design   | 1 day<br>60 min                  | Dog 15                      | 1. Anxiety<br>2. Perceived stress<br>3. Physiological stress - BP<br>4. Self-esteem                           | Anxiety and physiological stress decreased, self-esteem increased, and a change in perceived stress was not given.  |
| Pendry, Carr, Gee, and Vandagriff (2020) | Randomized trial examining effects of animal assisted intervention and stress related symptoms on college students' learning and study skills. | <i>International Journal of Environmental Research and Public Health</i> | 309<br>Washington State University<br>Pullman, WA<br>USA         | This study investigated college students' learning and study strategies before and after attending an AAI program.   | Randomized controlled study | 4 days, weekly<br>60 min         | Dog 27                      | 1. Learning and study strategies  | Learning and study strategies increased.  |
| Pendry, Kuzara, and Gee (2019)           | Evaluation of undergraduate students' responsiveness to a 4-week university-based animal-assisted stress prevention program.                   | <i>International Journal of Environmental Research and Public Health</i> | 228<br>Washington State University<br>Pullman, WA<br>USA         | This study investigated college students' responsiveness before and after attending an AAI program.  | Mixed methods               | 4 days, weekly<br>40 min         | Dog 26                      | 1. Behavioral change re. stress mgmt.<br>2. Enjoyment<br>3. Recommend program<br>4. Usefulness                | Behavioral change regarding stress management, enjoyment, likelihood of recommending the program, and finding the program useful increased.                                     |
| Polheber and Matchock (2014)             | The presence of a dog attenuates cortisol and heart rate in the Trier Social Stress Test compared to human friends.                            | <i>Journal of Behavioral Medicine</i>                                    | 48<br>Pennsylvania State University<br>Centre County, PA<br>USA  | This study investigated college students' physiological stress before and after attending a session with a social stressor that included an AAI dog present versus a human friend. | Randomized controlled study | 1 day<br>60 min                  | Dog 1                       | 1. Physiological stress - Cortisol - HR   | Physiological stress decreased.   |
| Robino et al. (2020)                     | College student mental health in an animal-assisted intervention program: A preliminary study.   | <i>Journal of Creativity in Mental Health</i>                            | 38<br>Nova Southeastern University<br>Fort Lauderdale, FL<br>USA | This study investigated college students' short-term emotional state and quality of the human-animal interaction before and after attending an AAI program.                        | Quasi-experimental design   | 2 days<br>60 min                 | Dog 2<br>Bird 1<br>Rabbit 1 | 1. Human-animal interaction quality<br>2. Mood - Negative mood - Positive mood<br>3. Time at the intervention | Negative mood decreased and positive mood increased. The quality of the human-animal interaction and time spent at the intervention had no impact on negative or positive mood. |

(continued)

Table 2 (continued)

| Author and Year Published                            | Title  | Journal or Dissertation                       | Participants (N) and Location   | Study Aims  | Study Design                | Intervention Duration and Timing       | Animal Species and Census     | Outcomes Measured           | Study Results   |  |  |
|--|--|---|---|---|-----------------------------|--|-------------------------------|-----------------------------|---|--|--|
| Stewart, Dispenza, Parker, Chang, and Cunniën (2014) | A pilot study assessing the effectiveness of an animal-assisted outreach program.                                      | <i>Journal of Creativity in Mental Health</i> | 55<br>Idaho State University<br>Pocatello, ID<br>USA  | This study investigated college students' perceived anxiety and loneliness before and after attending an AAI program.     | Quasi-experimental design   | Unclear, twice a month for one quarter | Dog 1                         | 1. Anxiety<br>2. Loneliness | Anxiety and loneliness decreased.   |  |  |
| Thew (2017)  | The effect of interaction with a therapy dog on college student stress levels as measured by physiological indicators. | Dissertation                                  | 67<br>Washington State University<br>Pullman, WA<br>USA                                     | This study investigated college students' physiological stress before and after attending an AAI program.                 | Randomized controlled study | 1 day                                  | Unclear, approx. 60 min       | Dog 10                      | 1. Physiological stress<br>- BP<br>* Diastolic<br>* Systolic<br>- Skin temperature    | There was no change in physiological stress.   |  |
| Trammell (2017)                                      | The effect of therapy dogs on exam stress and memory.  | <i>Anthrozoös</i>                             | #1–127<br>#2–44<br>#3–56<br>Pepperdine University<br>Malibu, CA<br>USA                      | This study investigated college students' perception of stress and exam scores before and after attending an AAI program. | Randomized controlled study | #1–1 day<br>#2–1 day<br>#3–1 day       | #1: Dog<br>#2: Dog<br>#3: Dog | #1: 7–12<br>#2: 6<br>#3: 5  | 1. Exam scores<br>2. Perceived stress   | Exam scores increased in one study and showed no change in two studies; perceived stress decreased in two studies and showed no change in one study. |  |
| Trammell (2019)                                      | Therapy dogs improve student affect but not memory.  | <i>Anthrozoös</i>                             | 44<br>Pepperdine University<br>Malibu, CA<br>USA  | This study investigated college students' affect and memory retention before and after attending an AAI program.          | Randomized controlled study | 2 days                                 | Unclear, no less than 10 min  | Dog 2                       | 1. Cognition and memory<br>2. Mood<br>3. Perceived stress<br>4. Psychological arousal | Cognition and memory showed no change; mood increased; and perceived stress and psychological arousal decreased.                                     |  |
| Ward-Griffin et al. (2018)                           | Petting away pre-exam stress: The effect of therapy dog sessions on student well-being.                                | <i>Stress and Health</i>                      | #1–246<br>#2–246<br>University of British Columbia<br>Vancouver, British Columbia<br>Canada | This study investigated college students' perceived well-being before and after attending an AAI session.                 | Randomized controlled study | 1 day                                  | 90 min                        | #1–Dog<br>#2–n/a            | #1 – 7–12<br>#2- n/a  | 1. Energy<br>2. Happiness<br>3. Mood<br>- Negative mood<br>- Positive mood<br>4. Perceived stress<br>5. Satisfaction with life<br>6. Social support  | Immediately after the intervention, energy and happiness increased and perceived stress decreased. |
| Williams et al. (2018)                               | An animal-assisted intervention's influence on graduate students' stress and anxiety prior to an examination.          | <i>Open Access Library Journal</i>            | 39<br>Belmont University<br>Nashville, TN<br>USA  | This study investigated college students' anxiety and physiological stress before and after attending an AAI program.     | Randomized controlled study | 1 day                                  | 15 min                        | Dog 4                       | 1. Anxiety<br>2. Physiological stress<br>- BP<br>- HR                                 | Anxiety decreased and physiological stress showed no change.   |  |

(continued)



Table 2 (continued)

| Author and Year Published                         | Title   | Journal or Dissertation         | Participants (N) and Location                              | Study Aims   | Study Design              | Intervention Duration and Timing |        | Animal Species and Census | Outcomes Measured                          | Study Results                               |
|---|---|---------------------------------|--|--|---------------------------|----------------------------------|--------|---------------------------|--|---|
| Wood, Ohlsen, Thompson, Hulin, and Knowles (2018) | The feasibility of brief dog-assisted therapy on university students stress levels: The PAwS study. | <i>Journal of Mental Health</i> | 127<br>The University of Sheffield<br>Sheffield<br>England | This study investigated college students' perceived stress and physiological stress (BP) before and after attending an AAI program, and if length of time at an AAI program was a moderator. | Quasi-experimental design | 1 day                            | 15 min | Dog<br>1-2                | 1. Anxiety<br>2. Physiological stress - BP | Anxiety and physiological stress decreased. |

<sup>a</sup>Of the 37 studies, six had multiple studies for a total of 45 studies when examining participant, animal species, and frequency. One study also had multiple locations for a total of 47 studies when examining intervention timing and frequency, and intervention duration and frequency.

## Results

### Characteristics of the Included Papers

**Article Demographics.** As shown in Table 3, the literature in this scoping review on campus-based AAI programs for college student mental health does not precede the 21st century as all 37 articles were published since 2003. From 2017 to 2020, this research has proportionally grown a sizable amount as in this timeframe, 25 (68%) of the 37 articles were published. Furthermore, this body of information is dominated by researchers in the United States and Canada, publishing 25 and 8 articles respectively. The remaining four articles were from Austria, England, Scotland, and Singapore. The sources for this study were empirical articles ( $n = 31$ ) and dissertations ( $n = 6$ ).

**Methodology.** All included articles used a quantitative study design:  $n = 18$  were randomized controlled trials,  $n = 14$  were quasi-experimental, and  $n = 5$  were mixed methods. Overall, 11 of the 37 articles also included some type of open-ended questions to elicit additional qualitative data. The participant section of the methodology category included a total of 45 individual studies because six articles included multiple studies. The range of human participants was  $n = 4$  to  $n = 1,960$ , and close to 75% of all studies had a participant range of  $n = 100$  or fewer. Dogs were the most frequent animal in these studies

( $n = 43$ ), and one of those studies with dogs also included one rabbit and one bird. The remaining two studies included horses. The range of animal participants was  $n = 1$  to  $n = 27$ , and the most frequent choice among all the studies was one dog ( $n = 8$ ).

For the intervention timing and duration sections of the methodology category, a total of 47 individual studies are described because one study operated at three different sites with varied amounts of days and durations for those three study sites. The included studies reported a variety of timing options:  $n = 26$  were offered only once;  $n = 10$  were offered on multiple days, either during the same week or spread out over weeks;  $n = 10$  were offered weekly; and  $n = 1$  was not given. The duration of the AAI interventions in this scoping review ranged from seven minutes to seven hours, and the two most frequent session lengths were 15 minutes ( $n = 10$ ) and 60 minutes ( $n = 9$ ).

**Outcomes.** Overall, the reported results in the 37 articles included in this scoping review showed an improved directional change in the mental health outcomes measured in college students who attended AAI programming. There were  $n = 42$  individual mental health outcomes or codes measured and assigned to one of four quality of life domains: cognitive, physiological, psychological, or social (WHO, 2012). Combined, these mental health outcomes were cited 113 times as shown in Table 3, and the

**Table 3.** Synthesis of Studies in a Scoping Review of AAI for College Student Mental Health (N = 37)

| Article Demographics         |    |                                       |    |   |    |  |  |  |  |
|------------------------------|----|---------------------------------------|----|---|----|--|--|--|--|
| Year Published and Frequency |    | Location of Lead Author and Frequency |    | Empirical Paper or Dissertation and Frequency |    |  |  |  |  |
| 2020                         | 3  | Austria                               | 1  | Empirical article                             | 31 |  |  |  |  |
| 2019                         | 2  | Canada                                | 8  | Dissertation                                  | 6  |  |  |  |  |
| 2018                         | 12 | England                               | 1  |   |    |  |  |  |  |
| 2017                         | 8  | Scotland                              | 1  |   |    |  |  |  |  |
| 2016                         | 3  | Singapore                             | 1  |   |    |  |  |  |  |
| 2015                         | 3  | USA                                   | 25 |   |    |  |  |  |  |
| 2014                         | 2  |                                       |    |   |    |  |  |  |  |
| 2013                         | 1  |                                       |    |   |    |  |  |  |  |
| 2012                         | 1  |                                       |    |   |    |  |  |  |  |
| 2011                         | 1  |                                       |    |   |    |  |  |  |  |
| 2010-04                      | 0  |                                       |    |   |    |  |  |  |  |
| 2003                         | 1  |                                       |    |   |    |  |  |  |  |

| Methodology (page 1)       |                  |   |                   |  | Results (page 1)                                 |                                 |    |           |           |           |  |  |  |
|----------------------------|------------------|---|-------------------|--|--|---------------------------------|----|-----------|-----------|-----------|--|--|--|
| Study Design and Frequency | Participants (N) | Animal Species (N) and Frequency <sup>a</sup> |                   | Intervention Timing and Frequency <sup>b</sup> | Intervention Duration and Frequency <sup>c</sup> | Outcome Changes and Frequency   |    |           |           |           |  |  |  |
|                            |                  |   |                   |  |  | Outcomes Measured and Frequency |    | Increased | No Change | Decreased |  |  |  |
| Mixed methods              | 5                | 2   | Bird <sup>b</sup> | 1  | 1  | One day only <sup>c</sup>       | 26 | 7-10 min  | 1         |           |  |  |  |
| Qualitative                | 0                | 7   | Dog               | 1  | 8  |                                 |    | 10 min    | 1         |           |  |  |  |
| Quasi-experimental         | 14               | 11  | (35 papers)       | 1 to 2   | 1  |                                 |    | 15 min    | 10        |           |  |  |  |
| Randomized                 |                  | 17  |                   | 2  | 2  | Multiple days <sup>d</sup>      | 10 | 20 min    | 3         |           |  |  |  |
| controlled trials          | 18               | 27  |                   | 4  | 3  |                                 |    | 30 min    | 2         |           |  |  |  |
| Open-ended                 |                  | 28  |                   | 5  | 2  |                                 |    | 35-40 min | 1         |           |  |  |  |
| questions out              |                  | 33  |                   | 6  | 3  | Weekly <sup>e</sup>             | 10 | 40 min    | 1         |           |  |  |  |
| of total 37 studies        | 11               | 38  |                   | 7  | 1  |                                 |    | 45 min    | 3         |           |  |  |  |
|                            |                  | 38  |                   | 7 to 12  | 3  |                                 |    | 45-60 min | 2         |           |  |  |  |
|                            |                  | 39  |                   | 8  | 1  | Not given                       | 1  | 60 min    | 9         |           |  |  |  |
|                            |                  | 42  |                   | 9  | 1  |                                 |    | 60-90 min | 1         |           |  |  |  |
|                            |                  | 44  |                   | 10   | 4  |                                 |    | 90 min    | 5         |           |  |  |  |
|                            |                  | 44  |                   | 11   | 1  |                                 |    | 120 min   | 1         |           |  |  |  |
|                            |                  | 44  |                   | 12   | 1  |                                 |    | 3-4 hours | 1         |           |  |  |  |
|                            |                  | 48  |                   | 14   | 2  |                                 |    | 5 hours   | 1         |           |  |  |  |
|                            |                  | 48  |                   | 15   | 1  |                                 |    | 7 hours   | 1         |           |  |  |  |
|                            |                  | 55  |                   | 15 to  | 1  |                                 |    | Not given | 4         |           |  |  |  |
|                            |                  | 56  |                   | 17   | 1  |                                 |    |           |           |           |  |  |  |
|                            |                  | 56  |                   | 20   | 1  |                                 |    |           |           |           |  |  |  |
|                            |                  | 61  |                   | 22   | 1  |                                 |    |           |           |           |  |  |  |
|                            |                  | 61  |                   | 26   | 1  |                                 |    |           |           |           |  |  |  |
|                            |                  | 67  |                   | 27   | 2  |                                 |    |           |           |           |  |  |  |
|                            |                  | 67  |                   | unclear  | 2  |                                 |    |           |           |           |  |  |  |
|                            |                  | 72  |                   | n/a  |  |                                 |    |           |           |           |  |  |  |

| Cognitive (13 individual codes)           |           | Increased | No Change | Decreased |
|---|-----------|-----------|-----------|-----------|
| Awareness of counseling services          | 1         | 1         | 1         |           |
| Behavioral change                         | 1         | 1         | 1         |           |
| Behaviors specific to Asperger's syndrome | 1         | 1         | 2         |           |
| Cognitive recognition                     | 1         | 1         | 1         |           |
| Exam scores                               | 3         | 1         | 1         |           |
| Language development                      | 1         | 1         |           |           |
| Learning and study strategies             | 1         | 1         |           |           |
| Perceptions of counseling staff           | 1         | 2         |           |           |
| Pet attitude                              | 1         | 1         |           |           |
| Program recommendation                    | 1         |           |           |           |
| Program satisfaction                      | 2         |           |           |           |
| Program usefulness                        | 1         |           |           |           |
| Task completion (math)                    | 1         |           |           |           |
| <b>Total</b>                              | <b>16</b> | <b>10</b> | <b>6</b>  | <b>0</b>  |

| Physiological (8 individual codes) |           | Increased | No Change | Decreased |
|------------------------------------|-----------|-----------|-----------|-----------|
| Physiological stress               |           |           |           |           |
| -BP                                | 8         |           | 4         | 4         |
| -Cortisol                          | 6         |           | 1         | 5         |
| -HR                                | 5         |           | 3         | 2         |
| -IgA                               | 3         | 2         | 1         |           |
| -sNGF                              | 1         |           |           | 1         |
| -sVAS                              | 1         |           |           | 1         |
| -skin sweat (EDA)                  | 1         |           |           | 1         |
| - skin temp                        | 1         |           | 1         |           |
| <b>Total</b>                       | <b>26</b> | <b>2</b>  | <b>10</b> | <b>14</b> |

<sup>a</sup> Of the 37 studies, six had multiple studies for a total of 45 studies when examining participant, animal species, and frequency. One study also had multiple locations for a total of 47 studies when examining intervention timing and frequency, and intervention duration and frequency.

<sup>b</sup> Bird and rabbit were part of the same study that also included a dog.

<sup>c</sup> 23 were effective in causing change.

<sup>d</sup> 9 were effective in causing change.

<sup>e</sup> 9 were effective in causing change.

(continued)

Table 3 (continued)

| Methodology (page 2) |   |         |   | Results (page 2)                          |                               |           |           |
|----------------------|---|---------|---|---|-------------------------------|-----------|-----------|
| Participants (N)     | Animal Species (N) and Frequency <sup>a</sup> |         |   | Outcomes Measured and Frequency           | Outcome Changes and Frequency |           |           |
|                      |   |         |   |   | Increased                     | No Change | Decreased |
| 72                   |   |         |   |   |                               |           |           |
| 74                   | Horse   | 5       | 1 |   |                               |           |           |
|                      | (2 papers)                                    |         |   |   |                               |           |           |
| 75                   |   | unclear | 1 |   |                               |           |           |
| 77                   |   |         |   |   |                               |           |           |
| 78                   | Rabbit <sup>b</sup>                           | 1       | 1 |   |                               |           |           |
| 80                   |   |         |   |   |                               |           |           |
| 86                   |   |         |   |   |                               |           |           |
| 86                   |   |         |   |   |                               |           |           |
| 90                   |   |         |   |   |                               |           |           |
| 127                  |   |         |   |   |                               |           |           |
| 127                  |   |         |   |   |                               |           |           |
| 132                  |   |         |   |   |                               |           |           |
| 163                  |   |         |   |   |                               |           |           |
| 228                  |   |         |   |   |                               |           |           |
| 235                  |   |         |   |   |                               |           |           |
| 246                  |   |         |   |   |                               |           |           |
| 246                  |   |         |   |   |                               |           |           |
| 270                  |   |         |   |   |                               |           |           |
| 309                  |   |         |   |   |                               |           |           |
| 403                  |   |         |   |   |                               |           |           |
| 1960                 |   |         |   |   |                               |           |           |
|                      |   |         |   | Cognitive (13 individual codes)           |                               |           |           |
|                      |   |         |   | Awareness of counseling services          | 1                             | 1         | 1         |
|                      |   |         |   | Behavioral change                         | 1                             | 1         | 1         |
|                      |   |         |   | Behaviors specific to Asperger's syndrome | 1                             | 1         | 2         |
|                      |   |         |   | Cognitive recognition                     | 1                             | 1         | 1         |
|                      |   |         |   | Exam scores                               | 3                             | 1         | 1         |
|                      |   |         |   | Language development                      | 1                             | 1         |           |
|                      |   |         |   | Learning and study strategies             | 1                             | 1         |           |
|                      |   |         |   | Perceptions of counseling staff           | 1                             | 2         |           |
|                      |   |         |   | Pet attitude                              | 1                             | 1         |           |
|                      |   |         |   | Program recommendation                    | 1                             |           |           |
|                      |   |         |   | Program satisfaction                      | 2                             |           |           |
|                      |   |         |   | Program usefulness                        | 1                             |           |           |
|                      |   |         |   | Task completion (math)                    | 1                             |           |           |
|                      |   |         |   | Total                                     | 16                            | 10        | 6         |
|                      |   |         |   | Physiological (8 individual codes)        |                               |           |           |
|                      |   |         |   | Physiological stress                      |                               |           |           |
|                      |   |         |   | -BP                                       | 8                             |           | 4         |
|                      |   |         |   | -Cortisol                                 | 6                             |           | 1         |
|                      |   |         |   | -HR                                       | 5                             |           | 3         |
|                      |   |         |   | -IgA                                      | 3                             | 2         | 1         |
|                      |   |         |   | -sNGF                                     | 1                             |           |           |
|                      |   |         |   | -sVAS                                     | 1                             |           |           |
|                      |   |         |   | -skin sweat (EDA)                         | 1                             |           |           |
|                      |   |         |   | - skin temp                               | 1                             |           | 1         |
|                      |   |         |   | Total                                     | 26                            | 2         | 10        |
|                      |   |         |   |   |                               |           | 14        |

most frequently recorded outcome was *stress/perceived stress* (frequency = 20). At least one of the 42 outcomes improved in 33 papers or, explained another way, 85 of the 113 frequencies (75%) improved; at least one outcome did not change in 14 papers (25 of the 113 frequencies, or 22%); one paper reported that two outcomes worsened (2%); and one paper did not report on one outcome (1%). What follows is a summary of the mental health outcomes identified in the 37 articles from this study and assigned to one of the four quality of life domains.

**Cognitive (n = 13, frequency = 16).** I identified 13 cognitive outcomes that were cited 16 times and showed an improved directional change 63% of the time. I define a *cognitive outcome* as one that requires

thought processes such as the creation of attitudes, ideas, or perceptions and academic skills such as language and test taking. The outcome *exam scores* was the most frequent cognitive result listed in this scoping review; one frequency was a positive increase while the other two reported no change. Two studies measured the outcome *students' satisfaction* with the AAI program and both reported increased satisfaction. The remaining 11 cognitive outcomes showed mixed results as four did not change and seven improved.

**Physiological (n = 8, frequency = 26).** There were eight physiological outcomes cited 26 times, and there was an improved directional change 62% of the time. The most frequent physical markers of stress assessed in this scoping review were *blood pressure (BP)*,

*cortisol*, and *heart rate (HR)*, and combined, comprised 19 of the total 26 frequencies (nearly 75%). The results were mixed for these three outcomes, and overall, the ratio of frequency results—no change to decrease (meaning improvement)—had a total split of 8:11: BP was split 4:4; cortisol was split 1:5; and HR was split 3:2. *Immunoglobulin A (IgA)* was measured three times; one frequency showed no change and the other two frequencies showed an improved change. The remaining four physiological outcomes were recorded once; one reported no change while the other three frequencies showed improved results.

**Psychological (n = 16, frequency = 64, one outcome = not reported).** There were 16 psychological outcomes cited 64 times, and there was an improved directional change 86% of the time. Close to 70% of the frequencies for the psychological markers of stress included the three outcomes of *perceived stress* (frequency = 20), *overall mood* (frequency = 13), and *anxiety* (frequency = 11). For *perceived stress*, 16 frequencies reported an improvement, three reported no change, and one was not given. For the *overall mood* outcome, 12 frequencies reported an improvement and one reported no change. For *anxiety*, 10 frequencies reported an improvement and one reported no change.

Of the remaining 13 psychological outcomes, only *homesickness*, *satisfaction with life*, *depression*, and *happiness* were cited more than once. For *homesickness*, all four frequencies reported an improvement. The ratios of frequency results—no change to improvement—were mixed for the other three outcomes: *satisfaction with life* was split 2:1; *depression* was split 1:1; and *happiness* was split 1:1. Among the final nine outcomes within the psychological category, all reported an improved directional change.

**Social (n = 5, frequency = 7).** Five social outcomes were cited seven times, and there was an improved directional change 86% of the time. The social outcome *connection to campus* was the most frequent result at three, and all improved. The frequency of the four remaining social outcomes of *family support*, *social relationships*, *social support*, and *support* were each cited once: family support reported no change and the other three reported an improvement.

**Qualitative Findings.** Finally, the qualitative results to the open-ended questions established the following themes: students attended AAI sessions because of the dogs; AAI sessions produced feelings of “home,” stress relief, enjoyment, relaxation, happiness, and belonging to a community; AAI sessions facilitated interactions and communication with other students; students were in favor of AAI sessions continuing on a regular basis; the interaction with the dogs was the most helpful program aspect; and students were more likely to use a counseling center because of the AAI program. Student responses also demonstrated that attending an AAI program did not increase involvement in other campus programs or foster continued contact with others on campus.

This scoping review protocol successfully provided a rigorous framework by which I was able to execute the study and synthesize the existing research literature regarding campus-based AAI programs for college student mental health. Furthermore, these findings also help answer this study’s research questions regarding what mental health outcomes, and specifically stress, have been identified for these programs. In the next section, I discuss the results of this scoping review and some limitations that must be considered when reviewing the findings.

## Discussion

This is the first scoping review of its kind to explore campus-based AAI programs for college student mental health. I used the JBI method for scoping reviews to identify, select, and explore findings from 37 articles (Peters et al., 2020). I documented the state of campus-based AAI programs for college student mental health by analyzing the demographics of each article, methodologies used, and key findings reported on college students’ mental health outcomes. All 37 studies were published since 2003, and 25 (68%) studies were published from 2017 to 2020, which demonstrates that AAI for college student mental health is an emerging interest in mental health research, practice, and education. Citing the dearth of empirical articles, 6 of the 37 studies were

dissertations in an effort to provide as comprehensive of a review as possible. Furthermore, the United States (68%) and Canada (22%) dominate this research because all articles were published in English and therefore, it is unknown how extensively AAI is practiced and researched in other world regions and institutions. This study demonstrated that AAI for college student mental health is an emerging interest in mental health research, practice, and education; below, I provide key information on the implications of these findings and the gaps that emerged from the results of this review that can be relevant for AAI practitioners and researchers as well as those who work in higher education and mental health.

In this review, the majority of the study methodologies were randomized controlled trials (22 studies reported in 18 articles), and 2 trials included a control group that engaged in another type of therapeutic interaction: connection with a friend (Polheber & Matchock, 2014), and mandala painting and music therapy (Gebhart et al., 2020). It is important that AAI studies are compared alongside other types of therapeutic interventions in an effort to increase the validity and reliability of this body of research as well as differentiate what components are critical for AAI success (Herzog, 2015; Serpell et al., 2017). Furthermore, while 11 studies in this review used some form of open-ended questions to highlight these AAI programs' wide range of perceived benefits, no study has yet to be published that only takes a qualitative approach to better understand the depth and complement the breadth of this small body of research. Authors Hall (2018) and Pendry et al. (2018), who study campus-based animal programs, have called for qualitative research to examine how these programs bring value to the college student experience.

Dogs were the predominant species involved in this research, which likely stems from the general societal emphasis on training dogs for therapeutic work and the ease and accessibility dogs provide when traveling to program sites. The heterogeneity in the numbers of dogs that participated in these AAI intervention studies, or the ratio of participants to animals, did not demonstrate any statistically significant trends regarding the outcomes. However,

the inherent nature of an AAI program is framed as an animal being partnered with a human to form a team. Thousands of these teams exist in the world, and each one is unique because of human and animal differences, making it impossible to have one constant, independent variable to compare to other variables. Did a change in behavior or emotion occur because of a small white poodle or because of a large brown mixed-breed dog? Did perceived stress for one study participant decrease because they felt really supported by the person working with the poodle, while perceived stress for another participant increased because they felt the handler with the brown dog was aloof or awkward in how they engaged with the student? Furthermore, only three other animal species were a part of this scoping review: one bird, one rabbit, and an unspecified number of horses. No study in this review provided an explanation for the species that was part of each study, and there exists an opportunity to examine the impact of noncanine animals in AAI programming, especially in light of a diverse college student body where members may object to dogs based on cultural beliefs, allergies, and phobias or fears (Hanif, 2015; Herzog, 2019; Lawson, n.d.).

The AAI programs studied in this scoping review were most frequently offered once ( $n = 26$ ) for 15 minutes ( $n = 10$ ) and with 1 dog ( $n = 8$ ), and for the programs that offered 1 session, 23 were effective in causing a statistically significant change in students' mental health outcomes. Of the 10 programs that offered multiple days of sessions held over a range of timeframes, 9 reported change; and of the 10 programs that offered weekly sessions for varying lengths of duration, 9 also showed change. Seven studies in this scoping review provided follow-up results with a range of outcomes. No change was found at 2 weeks (Binfet, 2017) or at 6 weeks (Pendry, Kuzara, et al., 2019); at 10 hours post-AAI intervention, negative mood and perceived stress decreased while social support increased (Ward-Griffin et al., 2018); at 6 weeks, academic skills remained high for students who were at risk of academic failure (Pendry et al., 2020); and "days after" and at 3 months, participants favorably recalled the AAI program and

reported that it was helpful in their stress management (Anderson, 2018; Dell et al., 2015). Examination of the length of time spent at an AAI program, the number of visits, and long-term effects reveals important dose-response gaps in the literature.

This body of research suggests that a reduction in outcomes such as stress, anxiety, homesickness, blood pressure, and cortisol as well as a positive increase in mood and connection to campus emerged from students attending campus-based AAI programs. That the most frequent mental health outcome studied in these articles was perceived stress, followed by anxiety, directly parallels some of the most prevalent and presenting concerns noted at college counseling centers across the United States (Eisenberg et al., 2019). Excluding the six dissertations, 31 articles that reported on an intervention for college student mental health are minor when compared to the entire body of college student development literature. Furthermore, the limited number of studies in this review is in stark contrast to the fact that there are more than 925 colleges or universities in the United States that provide some type of campus-based AAI program (Crossman & Kazdin, 2015). This further exemplifies the criticism that while conceptual and anecdotal support for AAI remains high, there is also a lack of high-quality reporting analyzing the effectiveness of AAI programs on college students' mental health (Haggerty & Mueller, 2017; Pendry & Vandagriff, 2019). This imbalance of what is known about AAI and what is being practiced across college campuses clearly warrants further investigation and conversation.

Finally, by illuminating the current state of what is known about AAI programs for college student mental health, this scoping review demonstrated the need for more rigorous research to address the threats found in this study and provide a more comprehensive understanding of this body of knowledge. First, no study in this review included reasons for study withdrawal, nonparticipation, or undesirable results (e.g., allergies, animal bites/scratches, or worsening of symptoms the study was intended to improve), which are just as important as a study's compliance in order to deepen and create a well-rounded understanding of AAI (Herzog,

2015). Second, the overall field of AAI suffers from a lack of clarity as to what types of human–animal interactions constitute or qualify as AAI rather than a common encounter with an animal. Third, there are no standardized and agreed-upon requirements for each of the AAI components of animal, practitioner, and environment such as training, testing, oversight, and features (e.g., space size, animal species, and the ratio of participants to animals). Ideally, to become an AAI team, a human and trained animal must pass an evaluation administered by a person who has also received specific training and testing to administer these exams. While there are national and international organizations working to develop these standards and best practices, such as the American Veterinary Medical Association (AVMA, 2021) and the International Association of Human-Animal Interaction Organizations (IAHAIO, 2018), there is no method to oversee or mandate that AAI programs follow these protocols. And fourth, because a researcher sets inclusion and exclusion criteria for their study, they may select a way or ways of defining AAI that does not effectively translate to other studies (Fine & Ferrell, 2021). As a result, the evaluation of one campus-based AAI program could examine very different program components than another research study and therefore, produce dissimilar results that limit the capacity to generalize to other settings and populations.

### *Limitations*

As is the case for all studies, this scoping review has some limitations that must be considered when reviewing the findings. First, this scoping review was open to selection and assessment bias because I hold more than 25 years of experience as an educator, practitioner, and researcher in AAI, and for the past 10 years, I have been conducting a campus-based AAI program for college student mental health. To address this limitation, I relied heavily on my eligibility criteria, which is a part of the JBI method for conducting scoping reviews as a rubric against which I screened and selected the articles in this study. Second, while I included studies across all institutions of higher education, I limited my analysis

to monolingual, English-language publications. Therefore, the results showing that the United States dominates the studies in this scoping review cannot be interpreted to also mean worldwide. Differences in terminology and definitions of key concepts indicate that some studies might have been missed during the search process that could have added to my final description and findings (O'Brien et al., 2016). I attempted to address this limitation by applying a wide variety of search terms and databases to detect as many studies as possible. Third, while the rigor of this body of empirical information includes randomized controlled trials (RCTs) in addition to quasi-experimental studies, the small number of articles identified in this scoping review makes it difficult to issue strong recommendations about AAI programs for college mental health. As the results' quality are only as representative of that data upon which they are based, publication bias and unpublished manuscripts may have hindered a more balanced understanding of AAI programs for college student mental health (Arksey & O'Malley, 2005). And finally, because scoping reviews examine all available data on a topic, they also typically do not answer a direct research question or hypothesis such as, *Do students who attend a campus-based AAI program demonstrate improved mental health?* However, the use of scoping review methods developed by JBI and the 22-item checklist set forth by PRISMA-ScR provide an empirical framework and impetus for further research on AAI for college student mental health.

## Conclusions

This scoping review examined 37 articles that reported the impact of campus-based AAI programs and services for college student mental health and well-being and in doing so, illustrated the following current state of this field and the need for further rigorous, well-designed, and openly reported studies to address the gaps that exist in this body of knowledge. This study established that the research to date is a 21st-century endeavor and because only English-language reports were included, the research in this scoping review is dominated by the United States.

The key findings from the 37 articles in this review demonstrated a broad range of mental health benefits in the cognitive, physiological, psychological, and social quality of life domains. The studies included in this review reported statistically significant (positive) changes in college students' mental health outcomes; a reduction in stress was the most frequently recorded outcome followed by a reduction in anxiety. The most common format for the AAI sessions in this study consisted of 1 event where students engaged with 1 dog for 15 minutes. To date, all studies that examined these programs were quantitative and of the 37 articles, 18 were randomized controlled studies and 11 included open-ended questions.

The importance of the knowledge gained from this scoping review is considered high because it is the first to present the current state of the research about AAI programs for college student mental health—a crisis that is unlikely to decrease in the wake of COVID-19. If institutions of higher learning were unable to adequately address students' needs before the pandemic, they now face this challenge with even fewer resources. AAI programs can address some of these concerns because they are well attended and the majority of AAI teams volunteer their time. Furthermore, the findings in this scoping review demonstrate that AAI programs and services may contribute to mental health outcomes by decreasing negative emotions and improving positive emotions.

As college students continue to experience stress and universities innovate the most effective and evidence-based ways to provide support and healing for their respective campus communities (Regehr et al., 2013), AAI for college student mental health is a clear and important research agenda within the extensive body of postsecondary literature. E. O. Wilson wisely asked, "What service [do animal species bring] to the human spirit?" (Kellert & Wilson, 1993, p. 37). Given that the traditional age for the majority of college students is a time for the onset of 75% of mental illnesses, postsecondary institutions have an opportune time to make a difference in millions of college students' lives across the United States. This review is an instrumental catalyst to investigate Wilson's

question further and continue to inform the fields of postsecondary education, mental health, and AAI.

## Summary for Practitioners

Knowledge gained from this research is considered of high importance given that the findings are so unique and is an important contribution to the small but growing research and practice agenda that focuses on AAI programs and services for mental health. More specifically, these findings are focused on stress and college students, a unique group who are steadily demonstrating increasing and more complex mental health challenges (Crossman & Kazdin, 2015; Eisenberg et al., 2020) that far surpass what many colleges can adequately address in the way of prevention, intervention, and treatment (LeViness et al., 2019). In response, many colleges and universities are exploring how bringing animals to campus might be one way of exposing students to a therapeutic activity that is engaging, fun, and helps to normalize mental health support and care. Furthermore, when pets are commonly considered family members by 95% of U.S. households (Shannon-Missal, 2015), a relationship described in terms of kinship (Charles, 2014), this study also provides support for a deeper understanding of the human–animal bond and the role that animals play in people’s lives. By recognizing that for some college students, leaving their pet to attend college may be a source of distress (Rodgers & Tennison, 2009), mental health providers and educators can establish various contexts in which feelings of sadness and grief are normalized and students are encouraged to openly share and express thoughts and feelings about their pets.

Despite a 2015 census that identified 925 campus-based services on college campuses across the United States (Crossman & Kazdin, 2015), this scoping review establishes that the research on this topic remains in its infancy. Furthermore, this study affirms that campus-based AAI programs and services are highly complex, extremely varied, and lack an overall conceptual model of practice. What limits a comprehensive understanding of AAI in general, and for

college students specifically, is a lack of standardization in terminology, methodology, human–animal team training, and intervention protocols that clearly identify intervention mechanisms of change and outcomes. Continued research is needed that uses randomized controlled trials, follow-up studies, assessments of AAI programs with noncanine species, and a process to measure program fidelity to isolate intervention dosage and effect sizes.

AAI programs on college campuses are not just an opportunity to support mental health, but also to address a social justice deficit for students who have never had the means or privilege to have a pet. And if future AAI studies continue to demonstrate positive mental health outcomes for college students, and more importantly, if they can be tied to a particular dose-response, then policies will need to address an equitable way for students to benefit from these interactions since it is highly unlikely that every college student who may want to attend an AAI program on their campus can make that happen. However, in order for human service providers and educators to understand the importance of the human–animal bond so as to also appreciate and advocate for these programs, they must have this information incorporated throughout their professional training in the same way that they learn about what risk factors, buffers, and evidence-based interventions are important across the lifespan. In conjunction with public health promotion campaigns on college campuses that address smoking cessation, food and housing insecurity, and sexual assault, continued research to demonstrate the efficacy of campus-based AAI programs is an appropriate and worthwhile research agenda because of the ability for these programs to positively impact such a broad group of people at a critical and highly stressful phase in their development.

## References

- Alliance of Therapy Dogs, Inc. (2017, March 23). *Certified therapy dog: Get your therapy dog certification*. Alliance of Therapy Dogs, Inc. <https://www.therapydogs.com/therapy-dog-certification/>



- Amanvermez, Y., Rahmadiana, M., Karyotaki, E., de Wit, L., Ebert, D. D., Kessler, R. C., & Cuijpers, P. (2020). Stress management interventions for college students: A systematic review and meta-analysis. *Clinical Psychology: Science and Practice*, e12342.
- American College Health Association (ACHA). (2020). *American College Health Association (ACHA)—National College Health Assessment III: Reference group data report fall 2019*. American College Health Association (ACHA).
- American Veterinary Medical Association (AVMA). (2021). *Animal-assisted interventions: Guidelines*. Animal-Assisted Interventions: Guidelines. <https://www.avma.org/resources-tools/avma-policies/animal-assisted-interventions-guidelines>
- Anderson, D. (2018). The effect of animal-assisted therapy on nursing student anxiety. *Dissertation Abstracts International Section A: Humanities and Social Sciences*, 79(11-A(E)), No-Specified.
- Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology*, 8(1), 19–32.
- Aydin, N., Krueger, J. I., Fischer, J., Hahn, D., Kastenmüller, A., Frey, D., & Fischer, P. (2012). “Man’s best friend”: How the presence of a dog reduces mental distress after social exclusion. *Journal of Experimental Social Psychology*, 48(1), 446–449.
- Binfet, J.-T. (2017). The effects of group-administered canine therapy on university students’ wellbeing: A randomized controlled trial. *Anthrozoös*, 30(3), 397–414.
- Binfet, J.-T., Passmore, H.-A., Cebry, A., Struik, K., & McKay, C. (2018). Reducing university students’ stress through a drop-in canine-therapy program. *Journal of Mental Health*, 27(3), 197–204.
- Bivens, A., Leinart, D., Klontz, B. T., Klontz, T., Bivens, A., Leinart, D., & Klontz, T. (2007). The effectiveness of equine-assisted experiential therapy: Results of an open clinical trial. *Society & Animals*, 15(3), 257–267.
- Bossard, J. H. S. (1944). The mental hygiene of owning a dog. *Mental Hygiene*, 28, 408–413.
- Bransberger, P., Falkenstern, C., & Lane, P. (2020). *Knocking at the college door: Projections of high school graduates* (10th ed.). Western Interstate Commission for Higher Education.
- Bryant, B. K. (2008). Social support in relation to human animal interaction. In *NICHD/MARS meeting on directions in human-animal interaction research: Child development, health and therapeutic interventions*. NICHD/MARS.
- Charles, N. (2014). “Animals just love you as you are”: Experiencing kinship across the species barrier. *Sociology*, 48(4), 715–730.
- Colquhoun, H. L., Levac, D., O’Brien, K. K., Straus, S., Tricco, A. C., Perrier, L., Kastner, M., & Moher, D. (2014). Scoping reviews: Time for clarity in definition, methods, and reporting. *Journal of Clinical Epidemiology*, 67(12), 1291–1294.
- Crossman, M. K., & Kazdin, A. E. (2015). Animal visitation programs in colleges and universities: An efficient model for reducing student stress. In A. H. Fine (Ed.), *Handbook on animal-assisted therapy* (4th ed., pp. 333–337). Academic Press.
- Dell, C. A., Chalmers, D., Gillett, J., Rohr, B., Nickel, C., Campbell, L., Hanoski, R., Haugerud, J., Husband, A., Stephenson, C., & Brydges, M. (2015). PAWSing student stress: A pilot evaluation study of the St. John Ambulance Therapy Dog program on three university campuses in Canada. *Canadian Journal of Counselling and Psychotherapy*, 49(4), 332–359.
- Delta Society. (1996). *Standards of practice for animal-assisted activities and animal-assisted therapy*. Delta Society.
- Drapeau, C. W., & McIntosh, J. L. (2020). *U.S.A. suicide: 2019 official final data*. American Association of Suicidology.
- Duval, J. (1860). *Gheel, or a colony of lunatics living in family and freedom*. Guillaumin.
- Eells, G. T., Marchell, T. C., Corson-Rikert, J., & Dittman, S. (2012). A public health approach to campus mental health promotion and suicide prevention. *Harvard Health Policy Review*, 13, 3–6.
- Eisenberg, D., Hunt, J., & Speer, N. (2013). Mental health in American colleges and universities: Variation across student subgroups and across campuses. *Journal of Nervous and Mental Disease*, 201(1), 60–67.
- Eisenberg, D., Lipson, S. K., Ceglarek, P., Phillips, M., Zhou, S., Morigney, J., Talaski, A., & Steverson, S. (2019). *The Healthy Minds Study: 2018–19 data report*. University of Michigan.
- Eisenberg, D., Lipson, S. K., Heinze, J., & Zhou, S. (2020). *The Healthy Minds Study: Fall 2020 data report*. University of Michigan.
- Fine, A. H. (Ed.). (2019). *Handbook on animal-assisted therapy: Foundations and guidelines for animal-assisted interventions* (5th ed.). Academic Press.
- Fine, A. H., & Ferrell, J. (2021). Conceptualizing the human–animal bond and animal-assisted interventions.

- In J. M. Peralta & A. H. Fine (Eds.), *The welfare of animals in animal-assisted interventions: Foundations and best practice methods* (pp. 21–41). Springer International.
- Folse, E. B., Minder, C. C., Aycock, M. J., & Santana, R. T. (1994). Animal-assisted therapy and depression in adult college students. *Anthrozoös*, 7(3), 188–194.
- Gallagher, R. P., & Taylor, R. (2014). National survey of college counseling. *American College Counseling Association (ACCA)*, 9, 54.
- Gault, B., Reichlin, L., & Roman, S. (2014). *College affordability for low-income adults: Improving returns on investment for families and society*. Institute for Women's Policy Research.
- Gebhart, V., Buchberger, W., Klotz, I., Neururer, S., Rungg, C., Tucek, G., Zenzmaier, C., & Perkhofer, S. (2020). Distraction-focused interventions on examination stress in nursing students: Effects on psychological stress and biomarker levels. A randomized controlled trial. *International Journal of Nursing Practice*, 26(1), e12788.
- Grasgreen, A. (2012). Colleges don't always help with mental health issues, student survey shows. *Inside Higher Ed*. <https://www.insidehighered.com/news/2012/10/30/colleges-dont-always-help-mental-health-issues-student-survey-shows>
- Gruttadaro, D., & Crudo, D. (2012). *College students speak: A survey report on mental health*. National Alliance on Mental Illness (NAMI).
- Haggerty, J., & Mueller, M. (2017). Animal-assisted stress reduction programs in higher education. *Innovative Higher Education*, 42(5/6), 379–389.
- Hall, D. (2018). Nursing campus therapy dog: A pilot study. *Teaching & Learning in Nursing*, 13(4), 202–206.
- Hanif, M. (2015). Of dogs, faith and imams. *The New York Times*. <https://www.nytimes.com/2015/07/25/opinion/sunday/mohammed-hanif-of-dogs-faith-and-imams.html>
- Hanselman, J. (2001). Coping skills interventions with adolescents in anger management using animals in therapy. *Journal of Child & Adolescent Group Therapy*, 11(4), 159–195.
- Hediger, K., Grimm, H., & Aigner, A. (2019). Ethics of animal-assisted psychotherapy. *The Oxford Handbook of Psychotherapy Ethics*. <https://www-oxfordhandbooks-com>
- Herzog, H. (2015). The research challenge: Threats to the validity of animal-assisted therapy studies and suggestions for improvement. In A. H. Fine (Ed.), *Handbook on animal-assisted therapy: Foundations and guidelines for animal-assisted interventions* (4th ed., pp. 402–407). Academic Press.
- Herzog, H. (2019). Is a love of dogs mostly a matter of where you live? *Psychology Today*. <https://www.psychologytoday.com/us/blog/animals-and-us/201908/is-love-dogs-mostly-matter-where-you-live>
- Hunt, J., & Eisenberg, D. (2010). Mental health problems and help-seeking behavior among college students. *Journal of Adolescent Health*, 46(1), 3–10.
- Hunt, J., Eisenberg, D., Lu, L., & Gathright, M. (2015). Racial/ethnic disparities in mental health care utilization among U.S. college students: Applying the Institution of Medicine definition of health care disparities. *Academic Psychiatry: The Journal of the American Association of Directors of Psychiatric Residency Training and the Association for Academic Psychiatry*, 39(5), 520–526.
- Hussar, B., Zhang, J., Hein, S., Wang, K., Roberts, A., Cui, J., Smith, M., Mann, F. B., Barmer, A., & Dilig, R. (2020). *The condition of education 2020 (NCES 2020-144)*. National Center for Education Statistics, U.S. Department of Education.
- International Association of Human-Animal Interaction Organizations (IAHAIO). (2018). *Definitions for animal assisted interventions and guidelines for wellness of animals involved*. IAHAIO.
- Johnson, R. A., & Meadows, R. L. (2010). Dog-walking: Motivation for adherence to a walking program. *Clinical Nursing Research*, 19(4), 387–402.
- Jones, M. G., Rice, S. M., & Cotton, S. M. (2019). Incorporating animal-assisted therapy in mental health treatments for adolescents: A systematic review of canine assisted psychotherapy. *PLoS ONE*, 14(1), e0210761.
- Jung, C. G. (1969). *The archetypes and the collective unconscious*. Princeton University Press.
- Kamioka, H., Okada, S., Tsutani, K., Park, H., Okui-zumi, H., Handa, S., Oshio, T., Park, S.-J., Kitayuguchi, J., Abe, T., Honda, T., & Mutoh, Y. (2014). Effectiveness of animal-assisted therapy: A systematic review of randomized controlled trials. *Complementary Therapies in Medicine*, 22, 371–390.
- Kellert, S. R., & Wilson, E. O. (1993). *The Biophilia Hypothesis*. Island Press.
- Kessler, R. C., Amminger, G. P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., & Ustün, T. B. (2007). Age of onset of mental disorders: A review of recent literature. *Current Opinion in Psychiatry*, 20(4), 359–364.
- Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in

- the National Comorbidity Survey replication. *Archives of General Psychiatry*, 62(6), 539–602.
- Kognito. (2015). *The benefits of investing in students' mental health*. Kognito.
- Lawson, K. (n.d.). Pet keeping and pet hiding in Black America. *US History Scene*. Retrieved June 5, 2021, from <https://ushistoryscene.com/article/pets-black-america/>
- Le Roux, M. C., Swartz, L., & Swart, E. (2014). The effect of an animal-assisted reading program on the reading rate, accuracy and comprehension of grade 3 students: A randomized control study. *Child Youth Care Forum*, 43, 655–673.
- Levac, D., Colquhoun, H., & O'Brien, K. K. (2010). Scoping studies: Advancing the methodology. *Implementation Science*, 5(1), 69.
- LeViness, P., Gorman, K., Braun, L., Koenig, L., & Bershad, C. (2019). *The Association for University and College Counseling Center Directors (AUCCCD) annual survey: 2019*. 56.
- Lipson, S. K., Lattie, E. G., & Eisenberg, D. (2018). Increased rates of mental health service utilization by U.S. college students: 10-year population-level trends (2007–2017). *Psychiatric Services*, 70(1), 60–63.
- McCardle, P., McCune, S., Griffin, J. A., & Maholmes, V. (Eds.). (2011). *How animals affect us: Examining the influence of human-animal interaction on child development and human health*. American Psychological Association.
- McCulloch, M. (1982). Animal facilitated therapy: Overview and future direction. *California Veterinarian*, 8(36), 13–24.
- McGowan, J., Sampson, M., Salzwedel, D. M., Cogo, E., Foerster, V., & Lefebvre, C. (2016). PRESS peer review of electronic search strategies: 2015 guideline statement. *Journal of Clinical Epidemiology*, 75, 40–46.
- Messent, P. R. (1983). Social facilitation of contact with other people by pet dogs. In A. H. Katcher & A. M. Beck (Eds.), *New perspectives in our lives with companion animals*. University of Pennsylvania Press.
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Med*, 6(7), e1000097.
- Munn, Z., Peters, M. D. J., Stern, C., Tufanaru, C., McArthur, A., & Aromataris, E. (2018). Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Medical Research Methodology*, 18(1), 143.
- National Institute of Mental Health. (2019). *Major depression*. Major Depression. [https://www.nimh.nih.gov/health/statistics/major-depression#part\\_155029](https://www.nimh.nih.gov/health/statistics/major-depression#part_155029)
- O'Brien, K., Colquhoun, H., Levac, D., Baxter, L., Tricco, A., Straus, S., Wickerson, L., Nayar, A., Moher, D., & O'Malley, L. (2016). Advancing scoping study methodology: A web-based survey and consultation of perceptions on terminology, definition and methodological steps. *BMC Health Services Research*, 16(305).
- Pedrelli, P., Nyer, M., Yeung, A., Zulauf, C., & Wilens, T. (2015). College students: Mental health problems and treatment considerations. *Academic Psychiatry: The Journal of the American Association of Directors of Psychiatric Residency Training and the Association for Academic Psychiatry*, 39(5), 503–511.
- Pendry, P., Carr, A. M., Gee, N. R., & Vandagriff, J. L. (2020). Randomized trial examining effects of animal assisted intervention and stress related symptoms on college students' learning and study skills. *International Journal of Environmental Research and Public Health*, 17(6), 1909.
- Pendry, P., Carr, A. M., Roeter, S. M., & Vandagriff, J. L. (2018). Experimental trial demonstrates effects of animal-assisted stress prevention program on college students' positive and negative emotion. *Human-Animal Interaction Bulletin*, 6(1), 81–97.
- Pendry, P., Kuzara, S., & Gee, N. R. (2019). Evaluation of undergraduate students' responsiveness to a 4-week university-based animal-assisted stress prevention program. *International Journal of Environmental Research and Public Health*, 16(18).
- Pendry, P., & Vandagriff, J. L. (2019). Animal visitation program (AVP) reduces cortisol levels of university students: A randomized controlled trial. *AERA Open*, 5(2).
- Pendry, P., Vandagriff, J. L., & Carr, A. M. (2019). Clinical depression moderates effects of animal-assisted stress prevention program on college students' emotion. *Journal of Public Mental Health*, 18(2), 94–101.
- Pet Partners. (2021). *Program requirements*. Pet Partners. <https://petpartners.org/volunteer/become-a-handler/program-requirements/>
- Peters, M. D. J., Godfrey, C. M., Khalil, H., McInerney, P., Parker, D., & Soares, C. B. (2015). Guidance for conducting systematic scoping reviews. *International Journal of Evidence-Based Healthcare*, 13(3), 141–146.
- Peters, M. D. J., Godfrey, C., McInerney, P., Munn, Z., Trico, A., & Khalil, H. (2020). Chapter 11: Scoping reviews (2020 version). In E. Aromataris & Z. Munn (Eds.), *JBI manual for evidence synthesis*. JBI.

- Polheber, J. P., & Matchock, R. L. (2014). The presence of a dog attenuates cortisol and heart rate in the Trier Social Stress Test compared to human friends. *Journal of Behavioral Medicine, 37*(5), 860–867.
- Ragsdale, J. M., Beehr, T. A., Grebner, S., & Han, K. (2011). An integrated model of weekday stress and weekend recovery of students. *International Journal of Stress Management, 18*(2), 153–180.
- Reetz, D. R., Krylowicz, B., & Mistler, B. (2014). *The Association for University and College Counseling Center Directors Annual Survey 2014*. Aurora University.
- Regehr, C., Glancy, D., and Pitts, A. (2013). Interventions to reduce stress in university students: A review and meta-analysis. *Journal of Affective Disorders, 148*(1), 1–11.
- Robotham, D., & Julian, C. (2006). Stress and the higher education student: A critical review of the literature. *Journal of Further and Higher Education, 30*(2), 107–117.
- Rodgers, L. S., & Tennison, L. R. (2009). A preliminary assessment of adjustment disorder among first-year college students. *Archives of Psychiatric Nursing, 23*(3), 220–230.
- Serpell, J. A., McCune, S., Gee, N. R., & Griffin, J. A. (2017). Current challenges to research on animal-assisted interventions. *Applied Developmental Science, 21*(3), 223–233.
- Shannon-Missal, L. (2015). More than ever, pets are members of the family. *The Harris Poll*, survey no. 41.
- Shearer, A., Hunt, M., Chowdhury, M., & Nicol, L. (2016). Effects of a brief mindfulness meditation intervention on student stress and heart rate variability. *International Journal of Stress Management, 23*(2), 232–254.
- Souter, M. A., & Miller, M. D. (2007). Do animal-assisted activities effectively treat depression? A meta-analysis. *Anthrozoös, 20*(2), 167–180.
- Stolzenberg, E. B., Aragon, M. C., Romo, E., Couch, V., McLennan, D., Eagan, M. K., & Kang, N. (2020). *The American freshman: National norms fall 2019*. Higher Education Research Institute, UCLA.
- Substance Abuse and Mental Health Services Administration (SAMHSA). (2020). *Behavioral health barometer United States, Volume 6: Indicators as measured through the 2019 National Survey on Drug Use and Health and the National Survey of Substance Abuse Treatment Services* (HHS Publication No. PEP20-07-02-001). Substance Abuse and Mental Health Services Administration.
- Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., . . . Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine, 169*(7), 467–473.
- U.S. Department of Education, National Center for Education Statistics. (2019). *Table 306.30. Fall enrollment of U.S. residents in degree-granting postsecondary institutions, by race/ethnicity: Selected years, 1976 through 2029*. Digest of Education Statistics. [https://nces.ed.gov/programs/digest/d19/tables/dt19\\_306.30.asp](https://nces.ed.gov/programs/digest/d19/tables/dt19_306.30.asp)
- Ward-Griffin, E., Klaiber, P., Collins, H. K., Owens, R. L., Coren, S., & Chen, F. S. (2018). Petting away pre-exam stress: The effect of therapy dog sessions on student well-being. *Stress and Health: Journal of the International Society for the Investigation of Stress, 34*(3), 468–473.
- World Health Organization (WHO). (2012). *Programme on mental health: WHOQOL user manual*. World Health Organization. <https://www.who.int/tools/whoqol>
- Xiao, H., Carney, D. M., Youn, S. J., Janis, R. A., Castonguay, L. G., Hayes, J. A., & Locke, B. D. (2017). Are we in crisis? National mental health and treatment trends in college counseling centers. *Psychological Services, 14*(4), 407–415.