Perceived Attitudes of Pet Owners About Their Pets During the COVID-19 Pandemic

An Honors Thesis for the Department of Psychology.

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Abstract

The global COVID-19 pandemic has impacted the lives of both people and animals worldwide. Research conducted during the early phases of the pandemic indicated mixed but generally positive relationships with pets, which were exacerbated both positively and negatively during the early lockdown phases of the pandemic. This longitudinal study of U.S. residents (n = 63) sought to collect novel data related to the perceived attitudes toward, attachment to, and relationship with pets held by participants at two points during the COVID-19 pandemic. Many participants reported a positive relationship with their pets and appreciated the increased amount of time they could spend with them during the pandemic. Some participants noted an increase in negative behaviors, such as separation anxiety, in their pets. This study contributes to a body of research collected within the context of the COVID-19 pandemic in the U.S.

Keywords: pets, COVID-19, human-animal interaction, attitudes, attachment

Perceived Attitudes of Pet Owners About Their Pets During the COVID-19 Pandemic

The global COVID-19 pandemic has impacted the lives of both people and animals worldwide. While many around the world struggled as a result of social isolation during the initial months of the pandemic, a number of people reported a strong appreciation for their dog and that their dog ameliorated their sense of isolation and loneliness (Bussolari et al., 2021). While Bussolari and colleagues' study featured participants primarily located in the United States (U.S.) and focused specifically on dogs, similar results have been reported in other countries and with pets generally. For example, Bowen et al. (2020) investigated the effects of lockdowns in Spain and found that pet owners reported receiving substantial support from their pets. However, while many individuals report positive relationships with their pets, the pandemic has also exacerbated stressors associated with pet ownership (which has been primarily studied with dog-owning participants). Researchers in the United Kingdom (U.K.) found that participants reported more time walking with their dogs, but fewer interactions with other dogs, as well as dogs demonstrating some signs of separation anxiety, caused in part by the fact that few owners provided alone time for their dogs during the initial lockdown phase (Holland, Owczarczak-Garstecka, et al., 2021). Other researchers have also reported a marked increase in separation anxiety in dogs (Christley et al., 2021; Holland, Mead, et al., 2021). The COVID-19 pandemic has also brought about a number of stressors, including social isolation,

unemployment and scarcity, as well as fear of the virus itself (Bavel et al., 2020; Pierce et al., 2020).

A number of studies have been conducted investigating the mental health benefits of pet ownership in a non-pandemic setting (Beetz et al., 2012; Powell et al., 2019). However, these findings have been mixed, and especially as people spend more time with their pets than before COVID-19, further research is needed into the complex relationship between people and their pets to ascertain for whom and under which conditions pets are beneficial (Gee & Mueller, 2019; Wells, 2019). Some research has indicated that people associate images of or interactions with their pets as effective methods of reducing stress and anxiety (Banks et al., 2018; Ein et al., 2019). As such, people may turn to their pets for comfort during times of stress. Due to the uncertainty and stress caused by the pandemic, and a reduced ability to interact with others they might usually rely on for support, people may look toward pets as a form of adaptive coping.

However, the results from research on the effects of pets on loneliness have been mixed. One controlled three-arm study found that acquiring a companion dog may reduce loneliness (Powell et al., 2019). Similarly, in a cross-sectional study of nearly 10,000 older Japanese adults, Ikeuchi et al. (2021) found that socially isolated participants who never owned a dog "were associated with significantly higher odds ratios…of low psychological health [compared to socially isolated current or past dog owners]" (p. 5). On the other hand, one longitudinal study by Duvall Antonacopoulos (2017) found mixed results; the study used both direct and indirect measures of loneliness (i.e., asking directly if

participants are lonely vs. asking how often do they feel that no one knows them well), and they found a significant reduction in directly measured loneliness 8 months after acquiring a dog, but no significant effect in indirectly measured loneliness over the same amount of time. In other words, people possibly perceive that acquiring a dog will result in lower levels of loneliness, even though there are no behaviorally measured reductions in loneliness.

One indicator that people may look toward pets as a form of adaptive coping can potentially be seen in the form of investigations into purported ballooning rates of dog adoptions during the pandemic. For example, one study in Israel during the onset of the pandemic reported increased rates of adoption, with no significant change in relinquishments (Morgan et al., 2020). Researchers in the UK conducted a study which found that in some cases, participants had taken in a dog when a relative or friend became unable to care for the dog, while others simply encountered a dog in need (Holland, Mead, et al., 2021).

There have been a number of studies conducted looking at pets and COVID-19 (Oliva & Johnston, 2020; Ratschen et al., 2020). However, there has not been a study that has examined if and how the COVID-19 pandemic has changed perceived attitudes of pet owners about their pets within the context of the U.S.—which has a high proportion of dog-owning households compared to other types of pets (American Veterinary Medical Association, 2018). Households could be affected differently by social distancing measures depending on which type of pets they own (e.g., dog vs. guinea pig). This longitudinal study aims to investigate perceived attitudes of pet owners about their pets during the COVID-

19 pandemic in the U.S. Furthermore, this study seeks to examine how these attitudes change as COVID-19 vaccination rates increase and social distancing restrictions are eased, allowing people to spend more time away from home.

Background

Attitudes Toward Pets

Attitudes toward pets can be broadly defined as how people feel or think about either their pets specifically or pets generally. Attitudes toward animals generally and companion animals specifically are meaningfully influenced by culture (Gustafsson et al., 2020; Phillips et al., 2012). The Modified Pet Attitudes Scale (PAS-M) used in this research has been used and validated across a number of cultural contexts, from the U.S. to Kuwait and beyond (Munsell et al., 2004). Attitudes toward animals have been studied in the context of employee attitudes (Foreman et al., 2019), styles of love (Guthrie et al., 2018), and differences between rural and urban students' attitudes (Morrison et al., 2021). Attitudes toward animals also vary based on the species and role of the animal within the context of the participants' lives (Mueller, 2014; Taylor & Signal, 2015).

One consequence of the social distancing requirements of the COVID-19 pandemic is that many people in the U.S. have transitioned to working from home for a greater amount of time than pre-pandemic levels. According to the U.S. Bureau of Labor Statistics (2021), the rate of employed persons working from home rose to 42% from 22% between 2019 and 2020. One recent study investigated how adults perceive their pets when suicidal and found that during these times of acute personal stress, some participants reported that their pets are

positive influences in their lives, but others—especially those owning pets with health or behavioral problems—were perceived as additional stressors (Love, 2021). Less research has been done about attitudes toward pets during times of long-term societal stress. This study intends to contribute to the literature to explore how people feel about their pets during these times of global stress.

Pet Attachment and Life Impact

Although the concepts of attitudes and attachment are similar, they can be differentiated by both specificity and conceptualization. As opposed to attitudes, attachment to pets can be broadly defined as the emotional bond between a person and their specific pet or pets. Despite the general conception that pets are universally good for people—dubbed the "pet effect" (Allen, 2003)—pets can contribute both positively and negatively to a person's mental health outcomes (Beetz et al., 2012; Hawkins et al., 2021; Herzog, 2011). Some studies have linked pet ownership with a higher likelihood of ever having had depression and an increased prevalence of depressive symptoms (Mueller et al., 2018; Parslow et al., 2005). On the other hand, a recent study by Matijczak et al. (2020) suggests that for LGBT+ young adults, comfort from companion animals moderated the relationship between interpersonal microaggressions and depressive symptoms. Additionally, another recent study found that the deleterious effects of gender-based victimization among sexual and gender minority (SGM) emerging adults were moderated by comfort from companion animals (McDonald, O'Connor, Matijczak, Tomlinson, et al., 2021).

Herzog (2011) explored the reasons why research on the mental and physical effects of pet ownership is inconclusive. He reported that studies of the effects of pets on human health are marked by a lack of methodological rigor, are often not experimental studies, rely on the self-reports of pet owners, and additionally that researchers or journals may be reticent to publish negative or null findings about pets (Herzog, 2011). These issues continue to be a problem in HAI research. Rodriguez et al. (2021) noted that HAI studies utilize a variety of different methodologies, measurements, and interventions. Additionally, Rodriguez et al. (2021) hypothesized that one possible underlying cause for the mixed results in HAI research is that it involves the interaction between two incredibly complex organisms, namely, a human and a non-human animal. Gee et al. (2021) suggest additionally that the mixed results in HAI research are at least partially due to a lack of an overarching model—such as the biopsychosocial model, which has been used to "conceptualize how biological, psychological, and social influences combine to determine human health and well-being" (p. 2). Gee et al. (2021) note the potential for HAI interventions to impact each of the three biopsychosocial model realms differently.

The Pet Attachment and Life Impact Scale (PALS) used in this research was developed and validated as a measure of pet attachment (Cromer & Barlow, 2013). The scale was used in a recent study by Tomlinson et al. (2021) to assess pet attachment in a sample of SGM emerging adults. Assessing the level of attachment to a pet is a helpful measure because people have differing levels of closeness with their pets. Additionally, regardless of a pet's effect on the mental

health outcomes of their owner, it is apparent that many people have attachments to their pets. One study of university students found that they perceive pets to be distinctive sources of social support (Meehan et al., 2017). One unique feature of the COVID-19 pandemic was the necessity of social isolation, so having pets as an additional source of social support could potentially ameliorate the effects of this isolation.

Pets and COVID-19

While research conducted prior to the COVID-19 pandemic is immensely valuable, the pandemic has fundamentally altered many people's relationships with their pets. Research has emerged regarding various aspects of people's pets in relation to the COVID-19 pandemic, including one cross-sectional study by McDonald, O'Connor, Matijczak, Murphy, et al. (2021). This study investigated transitions in mental health following the onset of the COVID-19 pandemic. The research found mixed results, pointing to the complex relationship between mental health and attachment to pets.

The COVID-19 pandemic has affected pets, pet owners, and how the two parties interact. The pandemic—to the surprise of many—has persisted and mutated far beyond initially imagined, so the human-animal relationship in terms of COVID-19 has shifted dramatically not only between pre-pandemic to during the pandemic, but also between the various phases of the pandemic. Many of the studies published so far related to pets and COVID-19 fall into a few broad categories: social isolation and mental health, access to services, and pet adoption/relinquishment.

Social Isolation and Mental Health. Extended periods of social isolation are a notable component of the COVID-19 pandemic, especially before vaccines were widely available in the U.S. One study on older adults found that among those who experienced high social consequences of the COVID-19 pandemic, walking a dog one or more times per day was not associated with a significant increase in loneliness (Carr et al., 2021). A number of studies across the world which focused on the experiences of those in quarantine reported that pet owners received substantial support from their pets (Bowen et al., 2020; Bussolari et al., 2021; Kogan, Currin-McCulloch, et al., 2021; Young et al., 2020). In a paper published early in the pandemic, Nieforth and O'Haire (2020) theorized that pets may provide this perceived support by offering unconditional positive regard, nonjudgmental support, and additionally by necessitating a consistent routine, thereby managing uncertainty in the personal sphere.

However, some studies have found mixed results in terms of loneliness in the context of the COVID-19 pandemic. In a longitudinal study looking at companion animal relationships and loneliness in pre- and during COVID-19 samples of adolescents, Mueller et al. (2021) reported that the results did not show a buffering effect of companion animal ownership on loneliness in adolescents but found that adolescents often reported turning to their pets as a strategy for coping with stress. Applebaum et al. (2021) found mixed results in a study examining the impact of pets on older adults during the pandemic, specifically that many found both benefits and stressors in their pets to be exacerbated by the pandemic. On the other hand, in two studies looking at

Australian and British populations, researchers found that dog and pet ownership were protective against loneliness (Oliva & Johnston, 2020; Ratschen et al., 2020).

In terms of the health and well-being of the pets themselves, the pandemic has also reduced the amount of alone time that pets enjoy under normal circumstances and has also reduced the number of social behaviors while on walks, resulting in behavioral challenges being reported by owners (Bowen et al., 2020; Christley et al., 2021; Holland, Owczarczak-Garstecka, et al., 2021; Owczarczak-Garstecka et al., 2021). Some evidence of these behavioral challenges in the U.K. was found by Tulloch et al. (2021), who reported that admissions to pediatric emergency rooms due to dog bites rose significantly and in conjunction with COVID-19 social distancing protocols. The pandemic also prompted a large number of employers to allow their employees to work from home, which is interconnected with the amount of time spent with companion animals and the benefits and drawbacks associated with that (Hoffman, 2021).

Access to Services. In addition to increasing social isolation and stress, the COVID-19 pandemic also severely constricted access to medical and veterinary care facilities and resulted in stressful experiences for pet owners (Kogan, Erdman, Bussolari, et al., 2021; Kogan, Erdman, Currin-McCulloch, et al., 2021; Wu et al., 2021). Kogan, Erdman, Bussolari, et al. (2021) conducted an online survey examining the veterinary-care-related concerns of dog owners during the pandemic and found that the top concern of these owners was the availability of emergency veterinary care; many additionally expressed concern

about who would take over the care of their dog if they were to become sick. A survey conducted by Applebaum et al. (2020) noted a similar concern among owners for the welfare of their pets when making decisions related to healthcare. Another study conducted by Adams et al. (2021) discusses the complications that COVID-19 poses specifically in the realms of child and pet care decisions. The stress that a lack of access to services could bring may put a strain on the human-animal bond.

Adoptions. Pet adoptions and relinquishment have also been the subject of much attention in the media. Reports of mass-adoptions and concerns about mass-relinquishments of adopted pets have been prevalent during the pandemic (e.g., Kavin, 2020; Reeder, 2020). The actual trends of pet adoption and relinquishment may not emerge for a number of years due to inconsistencies in record-keeping and the lack of a central database of pet trends (Rowan, 2021). However, research that has been conducted so far has shown mixed results. For example, one study in Israel found that adoption rates increased significantly, while relinquishment did not change (Morgan et al., 2020). Another study of interest in pet adoptions found an initial increase in interest but reported that interest in dog adoptions did not see a sustained increase, whereas interest in cat adoptions did (Ho et al., 2021). Furthermore, an article for WellBeing International—a U.S. non-profit—by Rowan (2021) reported that adoptions from shelters and rescues actually decreased in 2020 but visits to Banfield veterinary clinics saw a significant increase, possibly pointing to alternative means of pet acquisition, such as through friends or relatives who were unable to continue care

of their pet (Holland, Mead, et al., 2021). Additionally, one study using a nationally-representative sample investigated the experience of family pet ownership during COVID-19 and found that a relatively small number of families changed their pet ownership status (Halbreich & Mueller, in press).

This study intends to build upon the previous literature related to attitudes toward pets, attachment to pets, and relationships with pets during the COVID-19 pandemic. Specifically, this study attempts to fill in gaps in the literature regarding the relationship between attitudes toward pets and attachment to pets, particularly within the context of COVID-19 in the U.S. To investigate potential changes in attitudes toward and attachment to pets in the context of the COVID-19 pandemic, this study utilized a longitudinal approach, collecting follow-up data a period of six months after study initiation. Based upon the prior literature, I hypothesized that attitudes toward pets would significantly change as a result of the pandemic, and additionally that the change would have a relationship with attachment to pets. Specifically, I hypothesized that attitudes toward pets would become more positive in people with higher attachment to their pets, and more negative in people with lower attachment to their pets. This study also sought to gather information specific to the interaction between people and their pets during the COVID-19 pandemic, including adoptions and relinquishments.

Methods

Participants

This study was distributed via HAI-related email lists and social media platforms (i.e., Facebook, Twitter, LinkedIn). The eligibility criteria included pet

owners currently in the U.S. who are 18 years and older. Specifically, the study was distributed to HAI-related Facebook pages, other public Facebook pages (i.e., related to psychology or local issues), Tufts class Facebook pages (e.g., Class of 2022), as well as on the author's professional Twitter and LinkedIn pages. Recruitment materials included a brief description of the study aims, structure, inclusion criteria, estimated time of survey completion, an anonymous link to a survey hosted on Qualtrics (Qualtrics, Provo, UT).

Initial Survey Participants

Initial survey (IS) distribution began during the COVID-19 pandemic. 82 participants responded to the survey, but 19 either did not complete the survey or were otherwise ineligible, resulting in an IS sample size of 63 ($n = 63$).

Follow-up Survey Participants

IS participants who agreed to participate in the Follow-up Survey (FS) were contacted by email a period of six months after IS distribution began (i.e., September 2021). Of the 48 who agreed to follow-up, a total of 23 completed the FS (five participants were excluded due to incomplete responses). FS distribution began during a time in which well over half of the 18 or older U.S. population were fully vaccinated against COVID-19 (NCIRD, 2021; Ogunwole et al., 2021).

Participant Demographics

Demographic information is displayed in Table 1. The full text and response forms of the questions can be found in Appendix A. Racial/ethnic identity and gender identity language were adapted from Matijczak et al. (2020). Participants were asked if they have any animals that live with them, and that they

or anyone in their household are the main caretaker of, and to specify the name and species of these animals. Participants were instructed not to include animals kept as livestock. This language was adapted from Matijczak et al. (2020) and Ratschen et al. (2020). Participants were asked if they had acquired any of their pets within the past year (i.e., since February 1st, 2020) for IS participants, and within the last six months (i.e., since March 1st, 2021) for FS participants. Participants were also asked if they had to give up a pet within the last year (i.e., since February 1st, 2020) for IS participants, and within the last six months (i.e., since March 1st, 2021) for FS participants. The timeline of this question is intended to correlate with adoption and relinquishment patterns during the COVID-19 pandemic. IS participants reported acquiring a total of 25 pets and 6 IS participants reported giving up a pet within the last year. FS participants reported acquiring a total of 4 pets and 0 FS participants reported giving up a pet within the last year. Participants were also asked if any of the animals listed above hold the role of: service animal, therapy animal, emotional support animal, other form of working animal, or none of the above. This language was adapted from Ratschen et al. (2020). Participants were asked to report their household size and the number of adults in their household.

Participants were also asked to describe their own current isolation status, whether they or the adults in their house had isolated since the onset of the pandemic, and if they or anyone with which they live had received a COVID-19 vaccination. Isolation status questions were adapted from Christley et al. (2021).

Information related to participants' COVID-19 vaccination and isolation status is laid out in Table 2.

Materials

The survey for this paper was generated using Qualtrics software, Version March 2021 of Qualtrics. Copyright © 2021 Qualtrics. Qualtrics and all other Qualtrics product or service names are registered trademarks or trademarks of Qualtrics, Provo, UT, USA. https://www.qualtrics.com

Measures

Pet Attitudes. Pet attitudes were measured using the PAS-M developed by Munsell et al. (2004). The original Pet Attitudes Scale (PAS) was developed by Templer et al. (1981). The PAS-M has shown consistently high internal validity (Coleman et al., 2016; Crossman & Kazdin, 2018; Munsell et al., 2004; Templer & Arikawa, 2011; Templer et al., 1981; Wilson & Netting, 2015). Three questions (specifically 2, 8, and 16) were later revised by Munsell et al. (2004). Items were rated on a 7-point Likert scale ranging from *strongly disagree* to *strongly agree*. The scale is scored by taking the sum of each participant's responses on the 18 items, with the range of possible scores being 18-126. The scale has been slightly modified for clarity and some phrasing was modified to bring the language in line with this study. The full text and coding key of the questions can be found in Appendix B. The PAS-M demonstrated good reliability; IS $\alpha = .82$, FS $\alpha = .71$.

Participants were also asked if they "feel that [their] attitudes toward pets have changed since the onset of the COVID-19 pandemic (~March 2020)" and

were instructed to respond with the same pet they had previously chosen. Responses to this question were in the form of a text box.

Pet Attachment and Life Impact. Pet attachment and life impact were measured using the PALS initially developed by Cromer and Freyd in 2004 (Barlow et al., 2012). The scale used in this study is the most recent version published by Cromer and Barlow (2013). Items were rated on a 5-point Likert scale ranging from *not at all* to *very much*. The scale is scored by averaging the means of each participant's responses. The full text of the questions can be found in Appendix C. The PALS contains four factors, namely "Love," "Regulation of Emotions," "Personal Growth," and "Negative Impact." The factors are noted as F1, F2, F3, and F4, respectively. The factor to which each question pertains is noted in Appendix C. Items in the "Negative Impact" factor have been reverse scored. The PALS demonstrated excellent reliability; IS α = .95, FS α = .94.

Participants were also asked if they "feel that [their] relationship with [their] pet has changed—either positively or negatively—since the onset of the COVID-19 pandemic (~March 2020)" and were instructed to respond with the same pet they had previously chosen. Responses to this question were in the form of a text box.

Pets and COVID-19. The relationships between pets and their owners in the context of the COVID-19 pandemic was measured by the Pets and COVID-19 (PAC-19) scale, which is comprised of original questions. The language was partially adapted from discussions presented in research by Kelemen et al. (2020) and Nieforth and O'Haire (2020). Items were rated on a 7-point Likert scale

ranging from *strongly disagree* to *strongly agree*. The full text of the questions can be found in Appendix D. The PAC-19 scale demonstrated good reliability; IS α = .80, FS α = .66. However, this scale is intended to quantity individual aspects of the COVID-19 pandemic, so reliability was not a focus of its construction.

Procedure

The Tufts Institutional Review Board (IRB) determined that the study was exempt from review. The Tufts Integrative Safety Committee (ISC), from which approval was needed for any research involving COVID-19, approved the study. The IS was first distributed on March 2, 2021, during the COVID-19 pandemic and prior to distribution of vaccines to the general population in the United States. After completion of the IS, participants were asked if they would like to take part in the FS. Participants who agreed to take part in the FS provided their email address. As opposed to the IS, which was distributed indirectly, the FS was sent directly to participants via email. The FS was first distributed on September 2, 2021, a period of six months after the IS distribution. The median completion times for IS and FS completion were approximately 14 and 13 minutes, respectively. To increase FS participant engagement, the email to FS participants noted that upon completion they would be entered into a raffle to win one of 10 gift cards at a $50 value. FS participants who completed the FS were entered into the raffle, and the winners were chosen using a random number generator.

Data Analysis

For cross-sectional analyses assessing IS and FS data separately, the full cross-sectional data were used. For analyses involving change, a matched sample

of participants at IS and FS was used. Paired samples Wilcoxon signed rank tests were used to assess change from IS to FS in participants who completed the FS (n = 23). Wilcoxon rank sum tests were used to assess differences in results between IS participants who completed the FS (n = 23) and IS participants who did not complete the FS (n = 40). Spearman's rank correlation was used to measure correlations between paired participants at IS and FS (n = 23). An alpha level of .05 was used for all inferential analyses. For all box plots, lower and upper hinges correspond to the 25th and 75th percentiles, respectively. Lower and upper whiskers extend from the hingers to the smaller and largest values no further than 1.5 * inter-quartile range. Outliers beyond the ends of the whiskers are plotted individually. All statistical analyses were conducted using R (R Core Team, 2019) and figures were produced using the package ggplot2 (Wickham, 2016).

Results

Pet Attitudes

The difference between IS participants and FS participants on the PAS-M was not significant, M = 109.3 (SD = 9.75) and M = 111.78 (SD = 7.24), respectively, v = 59.5, p = .157. A box plot visualization of the paired IS and FS scores on the PAS-M can be found in Figure 1. The difference between IS participants who completed the FS and those who did not was also not significant M = 109.3 (SD = 9.75) and M = 109 (SD = 12.38), respectively, w = 438.5, p = .764.

When asked if they feel that their attitudes toward pets had changed since the onset of the COVID-19 pandemic, the majority of IS participants (38; 60%)

and FS participants (16; 70%) subjectively reported that their attitudes had not changed. Three (5%) IS participants reported becoming more cognizant of their pets' needs and daily routines during the course of the pandemic. No FS participants reported this increased cognizance. Nine (14%) IS and 3 (13%) FS participants noted their increased appreciation of the companionship that their pets bring to their lives, especially during the period of quarantine and social isolation. Six (10%) IS and 3 (13%) FS participants noted an increased interdependence between them and their pets. This dependence included both owners being dependent on their pets (i.e., increased anxiety leaving their pets) and pets being more dependent on their owners (i.e., attention-seeking and neediness from pets). One (4%) FS participant noted that their attitudes toward pets had changed but did not specify how.

Pet Attachment and Life Impact

The difference between IS participants and FS participants on the overall PALS was not significant, $M = 3.91$ ($SD = 0.62$) and $M = 3.92$ ($SD = 0.57$), respectively, $v = 113$, $p = .673$. The difference between IS participants who completed the FS and those who did not was also not significant $M = 3.91$ ($SD = 0.62$) and $M = 3.94$ ($SD = .71$), respectively, $w = 438$, $p = .759$.

The descriptive statistics for the PALS factors have been laid out in Table 3. A box plot visualization of the paired IS and FS scores on the PALS can be found in Figure 2.

When asked if they felt that their relationship with their pet had changed since the onset of the COVID-19 pandemic, 24 (38%) IS and 11 (48%) FS

participants subjectively reported that their relationship with their pet had not changed. 15 (24%) IS and 3 (13%) FS participants reported that they had become closer with their pets. 10 (16%) IS and 3 (13%) FS participants reported an unspecified positive change and one (2%) IS participant reported an unspecified negative change. No FS participants reported an unspecified negative change. 3 (5%) IS participants and one (4%) FS participant reported that their pets had become clingy or developed separation anxiety. One (2%) IS participant and no FS participants noted that their pet missed its time alone in the house. One (4%) FS participant noted that they and their pet had become reliant on each other. One (4%) FS participant noted that their pet brought stability to their life and one (4%) FS participant appreciated being able to practice for and compete in performance sports (i.e., obedience, rally, and nose work) with their pet. 3 (5%) IS and 2 (9%) FS participants noted that their relationship with their pets had changed but did not specify how.

Relationship Between Attitudes and Attachment

There was a significant positive correlation between the attitudes toward and attachment to pets in paired participants at both IS (s = 790.67, p = .002, ρ = .61) and FS (s = 414.06, p = .00, ρ = .79). Visualizations of these relationships have been laid out in Figure 3 and Figure 4, respectively.

Pets and COVID-19

There were no significant differences between IS participants and FS participants on the PAC-19. There were also no significant differences between IS participants who completed the FS and those who did not. Participant responses to

the PAC-19 Scale have been laid out in Table 4. A box plot visualization of the IS and FS responses to the Pets and COVID-19 questions can be found in Figure 5 and Figure 6, respectively.

Discussion

This longitudinal study aimed to investigate perceived attitudes of pet owners about their pets during the COVID-19 pandemic in the U.S. Additionally, this study sought to examine how these perceived attitudes changed as the pandemic eased (allowing people to safely spend more time away from home). This study also sought to gather data related to people and their pets during COVID-19, including adoptions and relinquishments.

The PAS-M, PALS, and PAC-19 scales proved to be reliable, and measured attitudes toward pets, pet attachment and life impact, and aspects of the relationship with pets in the context of the pandemic, respectively, well. The PAC-19 scale could serve as a foundation for future research conducted during the COVID-19 pandemic or future similar pandemics that may occur. Future studies could work to validate this measure and investigate the specific factors of the scale.

I hypothesized that attitudes toward pets would significantly change as a result of the pandemic, and additionally that the change would have a relationship with attachment to pets. Specifically, that the attitudes toward pets in people with higher attachments to their pets would become more positive, and more negative for those with lower attachments to their pets. These hypotheses were not supported by the data gathered in this study. Attitudes toward pets did not

significantly change between initial contact and follow-up. Similarly, pet attachment did not significantly change. For the individual factors of the PALS, there were no significant changes. Within the sample of this study, people's attitudes toward and attachment to their pets mostly did not change between these stages of the pandemic, but some reported a reduction of negative impact.

One significant finding was the strong, positive correlation between reported attitudes toward and attachment to pets, which was maintained between IS and FS. In fact, the correlation increased in strength between IS and FS. Although attitudes and attachment did not significantly change over the phases of the pandemic measured in this study, this finding could indicate a link between attitudes toward pets and attachment to pets. A relationship between these two constructs could have implications for programs or research targeting the relationship between people and their pets. Additionally, the direction of the relationship could be explored by future research; that is, if attachment improves attitudes, attitudes strengthen attachment, or if the relationship is bi-directional.

Qualitative reports from participants were more mixed than the quantitative data show. In terms of attitudes toward pets, most participants felt that their attitudes did not change. However, some participants reported becoming more cognizant of their pets' needs and daily routines, having an increased appreciation of the companionship that their pets brought to their lives, and also reported an increased interdependence between them and their pets. This increased interdependence was bidirectional and potentially points to some

maladaptive outcomes as a result of the pandemic, including increased separation anxiety from owners and an increase in attention-seeking behaviors in pets.

In contrast with reported attitudes toward pets, fewer than half of IS and FS participants reported that their relationship with their pet had not changed as a result of the pandemic. This finding could indicate that participants' pre-existing conceptions of pets generally remained relatively stable, but when considering their day-to-day relationship with their current pets, participants reported increased change. Many reported that they had become closer with their pets, mostly in a positive manner. There were some negative outcomes reported, such as pets developing separation anxiety, but these were outweighed by the positives that pets brought to their life.

The lives of participants saw a number of changes due to the pandemic, which have had lasting impacts, albeit slightly eased by the time of follow-up. Most IS participants reported only leaving the house for essential activities such as grocery shopping or dog walking, but this number was 27% less as reported by FS participants. Similarly, FS participants reported a lower degree of self-isolation compared to IS participants. As rates of self-isolation have gone down, vaccination rates have increased, with only one FS participant reporting having not been vaccinated. Participant reports do seem to reflect an increased amount of pet ownership change as a result of the onset of the pandemic. As was reported, IS participants acquired a total of 25 pets from the start of the pandemic and 6 participants had to relinquish one of their pets during that same timeframe. While there were fewer FS participants, the rate of change in pet ownership had greatly

reduced between initial contact and follow-up contact. For example, only 4 pets were acquired between these timeframes and no FS participants reported relinquishing a pet. However, there may be some bias in who chose to take both the IS and FS. For example, a participant who was forced to relinquish a pet or otherwise experienced trauma as a result of the pandemic may be reticent to participate in a study related to their pets.

For the PAC-19 scale, there were no significant changes in responses between IS participants and FS participants. Participants agreed most strongly with whether they had been able to spend more time with their pet because of the pandemic. Participants also strongly agreed that playing with their pet is comforting and that they feel less lonely because of their pet. Participants agreed that they feel that their days have more structure because of their pet, that they feel more certain of the future because they have their pet with them, and that they have been turning to their pet for social support and companionship since the beginning of the pandemic. Participants were most mixed when responding to the question asking if they had bought more toys than usual for their pet during the pandemic.

Participants disagreed that they had found it difficult to provide their pet with an adequate amount of exercise as a result of the pandemic. Participants strongly disagreed when asked if they worry that their pet could become infected with COVID-19 and if they worry that their pet could infect them with COVID-19. They also reported strongly disagreeing with the notion that having a pet has increased their risk of being infected with COVID-19. Finally, participants

strongly disagreed with the question asking if they had found it difficult to afford caring for their pet as a result of the pandemic.

Although these data should not be generalized to the general population, they offer useful insights into the perceptions of some pet owners during the COVID-19 pandemic. Many of the participants reported a positive relationship with their pets, despite the difficulties brought about as a result of the pandemic. This study adds to the body of literature which shows that pets are important members of many households and provide families with comfort and companionship during times of stress. As such, pets should be considered in future planning for crisis and disaster responses.

Relation to Prior Work

The results of this study largely support the findings of research that has been done in relation to attitudes toward pets, attachment to pets, and relationships with pets during the pandemic. In line with research conducted by Bussolari et al. (2021), many participants reported strong appreciation for their pets and that their pets helped them feel less lonely. Similarly, participants agreed that they perceived their pets to be sources of social support, pointing to a possible trend of participants turning to their pets as a form of adaptive coping, building upon previous research (Meehan et al., 2017).

Some of the participants in this study did observe increased separation anxiety in their pets, which was maintained over time, supporting research done during earlier stages of the pandemic (Bowen et al., 2020; Christley et al., 2021; Holland, Mead, et al., 2021; Holland, Owczarczak-Garstecka, et al., 2021).

Similar to what was reported by Love (2021) and Applebaum et al. (2021), many participants reported that their pets are—on balance—positive factors in their lives, but sometimes contribute to stress, a relationship which was made more extreme by the pandemic.

This study could point to a similar trend investigated by Duvall Antonacopoulos (2017), essentially that people hold their pets conceptually in high regard when asked directly but hold more mixed views on a day-to-day basis. This study also found differences in pet adoptions as a result of the pandemic, building upon work done by Morgan et al. (2020) and Ho et al. (2021) stating that adoption rates did seem to rise as a result of the pandemic, but the trend of adoptions dropped as the pandemic progressed.

Study Limitations

The original design intended to measure these data at two periods in time: during the pandemic and after the pandemic. However, COVID-19 variants (e.g., Delta) and vaccine hesitancy have prolonged the duration of the pandemic beyond initially accounted for (Mlcochova et al., 2021; Wake, 2021). Instead, this study measured two distinct periods within the pandemic: before vaccines became widely available and after vaccines became widely available. This study also suffered from an oft-repeated flaw in HAI research, a non-representative sample. Specifically, participants in this study were primarily White cisgender women living in the U.S. who owned either a cat or dog. As such, the responses provided by participants may not be representative of the experience of pet owners generally, especially given the impact of culture as well as animal species/role on

attitudes toward animals. This biased sample, in combination with the relatively small sample size, reduces the external validity of the findings reported here. Additionally, participants seemed to conflate attitudes toward and attachment to their pets, which became apparent in some of the qualitative responses, so in future research these constructs should be separated further to avoid confusion.

The data are also marred by the ceiling effect, as participants reported very positive opinions of their pets, so future research should consider this phenomenon and attempt to account for it in the study design. The majority of IS participants did not participate in the FS, despite many noting that they would be interested in participating in the FS. Thus, the sample size was limited even further beyond the initial sample, reducing the statistical power of the analyses. Furthermore, FS participants agreed to participate in the FS without knowing that they would be compensated, so it is possible that these participants—who were willing and able to complete two surveys without compensation—are not representative of pet owners generally. Offering an incentive to participants during the IS to be redeemed after completion of the FS could increase retention in future research and could additionally produce less biased results.

Future Directions

Increasing the validity and representativeness of HAI research is essential to the future of the field, and so measures need to be taken to ensure that a representative sample is recruited. There are a number of methods that could be applied to solve this issue, including over-recruiting underrepresented participants and utilizing study recruitment channels outside of listservs and social media.

Two possible avenues through which a more representative sample could be recruited include using Amazon Mechanical Turk (Bao & Schreer, 2016; Crossman & Kazdin, 2018) or a community on Reddit dedicated to recruitment for research (Luong & Lomanowska, 2021).

Furthermore, future research should explore the role that culture plays in attitudes toward animals by conducting cross-cultural analyses, as many regions are still understudied (Gustafsson et al., 2020). Additionally, because people hold different attitudes toward animals based on the species and role of the animal within the context of their lives (Mueller, 2015; Taylor & Signal, 2015). Future research should further isolate responses by species and role, and additionally look toward recruiting participants with only one species of pet within the home. As the pandemic is still ongoing, it is unclear how future pet acquisition and relinquishment will change as more people return to work in person, so future research should be conducted into these trends. While COVID-19 may never fully disappear, a follow-up study should be conducted after vaccination rates globally have reached a high enough point for social distancing measures to be completely eased.

Conclusions

This longitudinal study collected novel data related to the perceived attitudes toward, attachment to, and relationship with pets held by U.S. residents at two points during the COVID-19 pandemic. Participants did not report significant changes in either their attitudes toward or attachment to their pets as a result of the pandemic. There was a significant positive correlation between

attitudes toward and attachment to pets, which was maintained over time. Many participants reported a positive relationship with their pets and appreciated the increased amount of time they could spend with them during the pandemic. Some participants noted an increase in negative behaviors, such as separation anxiety, in their pets. Future research should be conducted with a more representative sample to capture the full experience of U.S. residents. Overall, this study shows that participants held generally positive attitudes toward pets, which was maintained over time; and additionally, that participants reported generally positive relationships with their pets during the COVID-19 pandemic.

References

Adams, B. L., Applebaum, J. W., Eliasson, M. N., McDonald, S. E., & Zsembik, B. A. (2021). Child and pet care-planning during COVID-19: Considerations for the evolving family unit. *Family Relations, 70*(3), 705-716. https://doi.org/10.1111/fare.12542

Allen, K. (2003). Are pets a healthy pleasure? The influence of pets on blood pressure. *Current Directions in Psychological Science, 12*(6), 236-239. http://www.jstor.org.ezproxy.library.tufts.edu/stable/20182888

American Veterinary Medical Association. (2018). *AVMA pet ownership and demographics sourcebook* (2017-2018 ed.). American Veterinary Medical Association.

Applebaum, J. W., Adams, B. L., Eliasson, M. N., Zsembik, B. A., & McDonald, S. E. (2020). How pets factor into healthcare decisions for COVID-19: A one health perspective. *One Health, 11*, 100176. https://doi.org/10.1016/j.onehlt.2020.100176

Applebaum, J. W., Ellison, C., Struckmeyer, L., Zsembik, B. A., & McDonald, S. E. (2021). The impact of pets on everyday life for older adults during the COVID-19 pandemic. *Frontiers in Public Health, 9*, 652610. https://doi.org/10.3389/fpubh.2021.652610

Banks, J. B., McCoy, C., & Trzcinski, C. (2018). Examining the impact of a brief human-canine interaction on stress and attention. *Human-Animal Interaction Bulletin, 6*(1), 1-13. https://www.apa-hai.org/haib/download-

info/examining-the-impact-of-a-brief-human-canine-interaction-on-stress-and-attention/

Bao, K. J., & Schreer, G. (2016). Pets and happiness: Examining the association between pet ownership and wellbeing. *Anthrozoös, 29*(2), 283-296. https://doi.org/10.1080/08927936.2016.1152721

Barlow, M. R., Cromer, L. D., Caron, H. P., & Freyd, J. J. (2012). Comparison of normative and diagnosed dissociation on attachment to companion animals and stuffed animals. *Psychological Trauma: Theory, Research, Practice, and Policy, 4*(5), 501-506. https://doi.org/10.1037/a0028134

Bavel, J. J. V., Baicker, K., Boggio, P. S., Capraro, V., Cichocka, A., Cikara, M., Crockett, M. J., Crum, A. J., Douglas, K. M., Druckman, J. N., Drury, J., Dube, O., Ellemers, N., Finkel, E. J., Fowler, J. H., Gelfand, M., Han, S., Haslam, S. A., Jetten, J., … Willer, R. (2020). Using social and behavioural science to support COVID-19 pandemic response. *Nature Human Behaviour, 4*(5), 460-471. https://doi.org/10.1038/s41562-020-0884-z

Beetz, A., Uvnäs-Moberg, K., Julius, H., & Kotrschal, K. (2012). Psychosocial and psychophysiological effects of human-animal interactions: The possible role of oxytocin. *Frontiers in Psychology, 3*, 234. https://doi.org/10.3389/fpsyg.2012.00234

Bowen, J., García, E., Darder, P., Argüelles, J., & Fatjó, J. (2020). The effects of the Spanish COVID-19 lockdown on people, their pets, and the human-

animal bond. *Journal of Veterinary Behavior, 40*, 75-91. https://doi.org/10.1016/j.jveb.2020.05.013

Bussolari, C., Currin-McCulloch, J., Packman, W., Kogan, L., & Erdman, P. (2021). "I couldn't have asked for a better quarantine partner!": Experiences with companion dogs during Covid-19. *Animals, 11*(2), 330. https://doi.org/10.3390/ani11020330

Carr, D., Friedmann, E., Gee, N. R., Gilchrist, C., Sachs-Ericsson, N., & Koodaly, L. (2021). Dog walking and the social impact of the COVID-19 pandemic on loneliness in older adults. *Animals, 11*(7), 1852. https://doi.org/10.3390/ani11071852

Christley, R. M., Murray, J. K., Anderson, K. L., Buckland, E. L., Casey, R. A., Harvey, N. D., Harris, L., Holland, K. E., McMillan, K. M., Mead, R., Owczarczak-Garstecka, S. C., & Upjohn, M. M. (2021). Impact of the first COVID-19 lockdown on management of pet dogs in the UK. *Animals, 11*(1), 5. https://doi.org/10.3390/ani11010005

Coleman, J. A., Green, B., Garthe, R. C., Worthington, E. L., Barker, S. B., & Ingram, K. M. (2016). The Coleman Dog Attitude Scale (C-DAS): Development, refinement, validation, and reliability. *Applied Animal Behaviour Science, 176*, 77-86. https://doi.org/10.1016/j.applanim.2016.01.003

Cromer, L. D., & Barlow, M. R. (2013). Factors and convergent validity of the Pet Attachment and Life Impact Scale (PALS). *Human-Animal Interaction*

Bulletin, 1(2), 34-56. https://www.apa-hai.org/haib/download-info/factors-of-pet-attachment/

Crossman, M. K., & Kazdin, A. E. (2018). Perceptions of animal-assisted interventions: The influence of attitudes toward companion animals. *Journal of Clinical Psychology, 74*(4), 566-578. https://doi.org/10.1002/jclp.22548

Duvall Antonacopoulos, N. M. (2017). A longitudinal study of the relation between acquiring a dog and loneliness. *Society & Animals, 25*(4), 319-340. https://doi.org/10.1163/15685306-12341449

Ein, N., Hadad, M., Reed, M. J., & Vickers, K. (2019). Does viewing a picture of a pet during a mental arithmetic task lower stress levels? *Anthrozoös, 32*(4), 519-532. https://doi.org/10.1080/08927936.2019.1621524

Foreman, A. M., Allison, P., Poland, M., Jean Meade, B., & Wirth, O. (2019). Employee attitudes about the impact of visitation dogs on a college campus. *Anthrozoös, 32*(1), 35-50. https://doi.org/10.1080/08927936.2019.1550280

Gee, N. R., & Mueller, M. K. (2019). A systematic review of research on pet ownership and animal interactions among older adults. *Anthrozoös, 32*(2), 183-207. https://doi.org/10.1080/08927936.2019.1569903

Gee, N. R., Rodriguez, K. E., Fine, A. H., & Trammell, J. P. (2021). Dogs supporting human health and well-being: A biopsychosocial approach. *Frontiers in Veterinary Science, 8*, 630465. https://doi.org/10.3389/fvets.2021.630465

Gustafsson, E., Alawi, N., & Andersen, P. N. (2020). Companion animals and religion: A survey of attitudes among Omani students. *Society & Animals, 29*(2), 132-152. https://doi.org/10.1163/15685306-bja10005

Guthrie, M. F., Marshall, P. H., Hendrick, S. S., Hendrick, C., & Logue, E. (2018). Human love styles and attitudes toward pets. *Anthrozoös, 31*(1), 41-60. https://doi.org/10.1080/08927936.2018.1406200

Halbreich, E. D., & Mueller, M. K. (in press). Profiles of family pet ownership during the COVID-19 pandemic. *Current Psychology*.

Hawkins, R. D., Hawkins, E. L., & Tip, L. (2021). "I can't give up when I have them to care for": People's experiences of pets and their mental health. *Anthrozoös, 34*(4), 543-562. https://doi.org/10.1080/08927936.2021.1914434

Herzog, H. (2011). The impact of pets on human health and psychological well-being: Fact, fiction, or hypothesis? *Current Directions in Psychological Science, 20*(4), 236-239. https://doi.org/10.1177/0963721411415220

Ho, J., Hussain, S., & Sparagano, O. (2021). Did the COVID-19 pandemic spark a public interest in pet adoption? *Frontiers in Veterinary Science, 8*, 647308. https://doi.org/10.3389/fvets.2021.647308

Hoffman, C. L. (2021). The experience of teleworking with dogs and cats in the United States during COVID-19. *Animals, 11*(2), 268. https://doi.org/10.3390/ani11020268

Holland, K. E., Mead, R., Casey, R. A., Upjohn, M. M., & Christley, R. M. (2021). "Don't bring me a dog...I'll just keep it": Understanding unplanned

dog acquisitions amongst a sample of dog owners attending canine health and welfare community events in the United Kingdom. *Animals, 11*(3), 605. https://doi.org/10.3390/ani11030605

Holland, K. E., Owczarczak-Garstecka, S. C., Anderson, K. L., Casey, R. A., Christley, R. M., Harris, L., McMillan, K. M., Mead, R., Murray, J. K., Samet, L., & Upjohn, M. M. (2021). "More attention than usual": A thematic analysis of dog ownership experiences in the UK during the first COVID-19 lockdown. *Animals, 11*(1), 240. https://doi.org/10.3390/ani11010240

Ikeuchi, T., Taniguchi, Y., Abe, T., Seino, S., Shimada, C., Kitamura, A., & Shinkai, S. (2021). Association between experience of pet ownership and psychological health among socially isolated and non-isolated older adults. *Animals, 11*(3), 595. https://doi.org/10.3390/ani11030595

Kavin, K. (2020, August 12). Dog adoptions and sales soar during the pandemic. *The Washington Post*. https://www.washingtonpost.com/nation/2020/08/12/adoptions-dogs-coronavirus/

Kelemen, T. K., Matthews, S. H., Wan, M., & Zhang, Y. (2020). The secret life of pets: The intersection of animals and organizational life. *Journal of Organizational Behavior, 41*(7), 694-697. https://doi.org/10.1002/job.2465

Kogan, L. R., Currin-McCulloch, J., Bussolari, C., Packman, W., & Erdman, P. (2021). The psychosocial influence of companion animals on positive and

negative affect during the COVID-19 pandemic. *Animals, 11*(7), 2084. https://doi.org/10.3390/ani11072084

Kogan, L. R., Erdman, P., Bussolari, C., Currin-McCulloch, J., & Packman, W. (2021). The initial months of COVID-19: Dog owners' veterinary-related concerns. *Frontiers in Veterinary Science, 8*, 629121. https://doi.org/10.3389/fvets.2021.629121

Kogan, L. R., Erdman, P., Currin-McCulloch, J., Bussolari, C., & Packman, W. (2021). The impact of COVID on cat guardians: Veterinary issues. *Animals, 11*(3), 603. https://doi.org/10.3390/ani11030603

Love, H. A. (2021). Best friends come in all breeds: The role of pets in suicidality. *Anthrozoös*, *34*(2), 175-186. https://doi.org/10.1080/08927936.2021.1885144

Luong, R., & Lomanowska, A. M. (2021). Evaluating Reddit as a crowdsourcing platform for psychology research projects. *Teaching of Psychology*, 1-9. https://doi.org/10.1177/00986283211020739

Matijczak, A., McDonald, S. E., Tomlinson, C. A., Murphy, J. L., & O'Connor, K. (2020). The moderating effect of comfort from companion animals and social support on the relationship between microaggressions and mental health in LGBTQ+ emerging adults. *Behavioral Sciences, 11*, 1. https://doi.org/10.3390/bs11010001

McDonald, S. E., O'Connor, K. E., Matijczak, A., Murphy, J., Applebaum, J. W., Tomlinson, C. A., Wike, T. L., & Kattari, S. K. (2021). Victimization and psychological wellbeing among sexual and gender minority emerging

adults: Testing the moderating role of emotional comfort from companion animals [Preprint]. *Journal of the Society for Social Work and Research*. https://doi.org/10.1086/713889

McDonald, S. E., O'Connor, K. E., Matijczak, A., Tomlinson, C. A., Applebaum, J. W., Murphy, J. L., & Zsembik, B. A. (2021). Attachment to pets moderates transitions in latent patterns of mental health following the onset of the COVID-19 pandemic: Results of a survey of U.S. Adults. *Animals, 11*(3), 895. https://doi.org/10.3390/ani11030895

Meehan, M., Massavelli, B., & Pachana, N. (2017). Using attachment theory and social support theory to examine and measure pets as sources of social support and attachment figures. *Anthrozoös, 30*(2), 273-289. https://doi.org/10.1080/08927936.2017.1311050

Mlcochova, P., Kemp, S. A., Dhar, M. S., Papa, G., Meng, B., Ferreira, I. A. T. M., Datir, R., Collier, D. A., Albecka, A., Singh, S., Pandey, R., Brown, J., Zhou, J., Goonawardane, N., Mishra, S., Whittaker, C., Mellan, T., Marwal, R., Datta, M., … Gupta, R. K. (2021). SARS-COV-2 B.1.617.2 Delta variant replication and immune evasion. *Nature, 599*, 114-119. https://doi.org/10.1038/s41586-021-03944-y

Morgan, L., Protopopova, A., Birkler, R. I. D., Itin-Shwartz, B., Sutton, G. A., Gamliel, A., Yakobson, B., & Raz, T. (2020). Human–dog relationships during the COVID-19 pandemic: Booming dog adoption during social isolation. *Humanities and Social Sciences Communications, 7*, 155. https://doi.org/10.1057/s41599-020-00649-x

Morrison, R., Maust-Mohl, M., & Charlton, K. (2021). Friend, foe, or food: What influences students' attitudes toward animals? *Anthrozoös*, *34*(2),187-200. https://doi.org/10.1080/08927936.2021.1885137

Mueller, M. K. (2014). The relationship between types of human–animal interaction and attitudes about animals: An exploratory study. *Anthrozoös, 27*(2), 295-308. https://doi.org/10.2752/175303714x13903827487728

Mueller, M. K., Gee, N. R., & Bures, R. M. (2018). Human-animal interaction as a social determinant of health: Descriptive findings from the health and retirement study. *BMC Public Health, 18*, 305. https://doi.org/10.1186/s12889-018-5188-0

Mueller, M. K., Richer, A. M., Callina, K. S., & Charmaraman, L. (2021). Companion animal relationships and adolescent loneliness during COVID-19. *Animals, 11*(3), 885. https://doi.org/10.3390/ani11030885

Munsell, K. L., Canfield, M., Templer, D. I., Tangan, K., & Arikawa, H. (2004). Modification of the Pet Attitude Scale. *Society & Animals, 12*(2), 137-142. https://doi.org/10.1163/1568530041446580

NCIRD. (2021). *COVID-19 vaccinations in the United States,jurisdiction* [Data set]. CDC. https://data.cdc.gov/Vaccinations/COVID-19-Vaccinations-in-the-United-States-Jurisdi/unsk-b7fc

Ogunwole, S. U., Rabe, M. A., Roberts, A. W., & Caplan, Z. (2021, August 12). *Population under age 18 declined last decade*. United States Census Bureau. https://www.census.gov/library/stories/2021/08/united-states-

adult-population-grew-faster-than-nations-total-population-from-2010-to-2020.html

Oliva, J. L., & Johnston, K. L. (2020). Puppy love in the time of Corona: Dog ownership protects against loneliness for those living alone during the COVID-19 lockdown. *International Journal of Social Psychiatry, 67*(3), 232-242. https://doi.org/10.1177/0020764020944195

Owczarczak-Garstecka, S. C., Graham, T. M., Archer, D. C., & Westgarth, C. (2021). Dog walking before and during the COVID-19 pandemic lockdown: Experiences of UK dog owners. *International Journal of Environmental Research and Public Health, 18*(12), 6315. https://www.mdpi.com/1660-4601/18/12/6315

Parslow, R. A., Jorm, A. F., Christensen, H., Rodgers, B., & Jacomb, P. (2005). Pet ownership and health in older adults: Findings from a survey of 2,551 community-based Australians aged 60–64. *Gerontology, 51*(1), 40-47. https://doi.org/10.1159/000081433

Phillips, C. J. C., Izmirli, S., Aldavood, S. J., Alonso, M., Choe, B. I., Hanlon, A., Handziska, A., Illmann, G., Keeling, L., Kennedy, M., Lee, G. H., Lund, V., Mejdell, C., Pelagic, V. R., & Rehn, T. (2012). Students' attitudes to animal welfare and rights in Europe and Asia. *Animal Welfare, 21*(1), 87-100. https://doi.org/10.7120/096272812799129466

Pierce, M., Hope, H., Ford, T., Hatch, S., Hotopf, M., John, A., Kontopantelis, E., Webb, R., Wessely, S., McManus, S., & Abel, K. M. (2020). Mental health before and during the COVID-19 pandemic: A longitudinal

probability sample survey of the UK population. *The Lancet Psychiatry, 7*(10), 883-892. https://doi.org/10.1016/s2215-0366(20)30308-4

Powell, L., Edwards, K. M., McGreevy, P., Bauman, A., Podberscek, A., Neilly, B., Sherrington, C., & Stamatakis, E. (2019). Companion dog acquisition and mental well-being: A community-based three-arm controlled study. *BMC Public Health, 19*(1), 1428. https://doi.org/10.1186/s12889-019-7770-5

R Core Team. (2019). R: A language and environment for statistical computing. R Foundation for Statistical Computing. https://www.R-project.org/

Ratschen, E., Shoesmith, E., Shahab, L., Silva, K., Kale, D., Toner, P., Reeve, C., & Mills, D. S. (2020). Human-animal relationships and interactions during the Covid-19 lockdown phase in the UK: Investigating links with mental health and loneliness. *PLoS One, 15*(9), e0239397. https://doi.org/10.1371/journal.pone.0239397

Reeder, J. (2020, October 2). *Americans are starting to give up their pets because of COVID-19 hardships*. Today. https://www.today.com/pets/americans-are-starting-give-pets-during-covid-19-crisis-t192819

Rodriguez, K. E., Herzog, H., & Gee, N. R. (2021). Variability in human-animal interaction research. *Frontiers in Veterinary Science, 7*, 619600. https://doi.org/10.3389/fvets.2020.619600

Rowan, A. (2021, February 26). *Companion animal demographics: When are they good enough?* Wellbeing International. https://wellbeingintl.org/companion-animal-demographics/

Taylor, N., & Signal, T. D. (2015). Pet, pest, profit: Isolating differences in attitudes towards the treatment of animals. *Anthrozoös, 22*(2), 129-135. https://doi.org/10.2752/175303709x434158

Templer, D. I., & Arikawa, H. (2011). The Pet Attitude Scale. In C. Blazina, G. Boyraz, & D. Shen-Miller (Eds.), *The psychology of the human-animal bond*. Springer. https://doi.org/10.1007/978-1-4419-9761-6_20

Templer, D. I., Salter, C. A., Dickey, S., Baldwin, R., & Veleber, D. M. (1981). The construction of a Pet Attitude Scale. *The Psychological Record, 31*(3), 343-348. https://doi.org/10.1007/bf03394747

Tomlinson, C. A., Pittman, S. K., Murphy, J. L., Matijczak, A., & McDonald, S. E. (2021). Psychometric evaluation of the Comfort from Companion Animals Scale in a sexual and gender minority sample. *Anthrozoös*, 1-21. https://doi.org/10.1080/08927936.2021.1963548

Tulloch, J. S. P., Minford, S., Pimblett, V., Rotheram, M., Christley, R. M., & Westgarth, C. (2021). Paediatric emergency department dog bite attendance during the COVID-19 pandemic: An audit at a tertiary children's hospital. *BMJ Paediatrics Open, 5*(1), e001040. https://doi.org/10.1136/bmjpo-2021-001040

U.S. Bureau of Labor Statistics. (2021, July 22). *American time use survey summary* [Press release]. https://www.bls.gov/news.release/atus.nr0.htm

Wake, A. D. (2021). The willingness to receive COVID-19 vaccine and its associated factors: "Vaccination refusal could prolong the war of this

pandemic" - a systematic review. *Risk Management and Healthcare Policy, 14*, 2609-2623. https://doi.org/10.2147/RMHP.S311074

Wells, D. L. (2019). The state of research on human–animal relations: Implications for human health. *Anthrozoös, 32*(2), 169-181. https://doi.org/10.1080/08927936.2019.1569902

Wickham, H. (2016). Ggplot2: Elegant graphics for data analysis. Springer-Verlag New York. https://ggplot2.tidyverse.org

Wilson, C. C., & Netting, F. E. (2015). The status of instrument development in the human–animal interaction field. *Anthrozoös, 25*(sup1), s11-s55. https://doi.org/10.2752/175303712x13353430376977

Wu, H., Bains, R. S., Morris, A., & Morales, C. (2021). Affordability, feasibility, and accessibility: Companion animal guardians with (dis)abilities' access to veterinary medical and behavioral services during COVID-19. *Animals, 11*(8), 2359. https://doi.org/10.3390/ani11082359

Young, J., Pritchard, R., Nottle, C., & Banwell, H. (2020). Pets, touch, and COVID-19: Health benefits from non-human touch through times of stress. *Journal of Behavioral Economics for Policy, 4*(S2), 25-33. https://ideas.repec.org/a/beh/jbepv1/v4y2020is2p25-33.html

Table 1

Participant Demographic Information

	IS Participants	**FS Participants**
	n = 63	*n* = 23
	m (*SD*)	*m* (*SD*)
Age (years)	47.62 (16.83)	46.76 (16.71)
Age Range (years)	22 – 77	22 – 78
Gender Identity*	*n* (%)	*n* (%)
Agender	2 (3)	0 (0)
Cisgender Men (i.e., assigned male at birth and identify as a man)	12 (19)	5 (22)
Cisgender Women (i.e., assigned female at birth and identify as a woman)	45 (71)	17 (74)
Genderfluid	1 (2)	0 (0)
Genderqueer	0 (0)	0 (0)
Nonbinary	2 (3)	0 (0)
Transgender Men	1 (2)	1 (4)
Transgender Women	0 (0)	0 (0)
Multiple Identifications	0 (0)	1 (4)
Not Sure/Questioning/Prefer to Self-Describe	0 (0)	0 (0)
Racial/Ethnic Identity*	*n* (%)	*n* (%)
Arab/Arab American	0 (0)	0 (0)
Asian/Asian American	4 (6)	3 (13)
Black/African American	1 (2)	1 (4)
Latina/Latino/Latinx	6 (10)	1 (4)
Multiracial/Mixed Race	3 (5)	0 (0)
South Asian/Pacific Islander	0 ()	0 (0)
White	57 (90)	21 (91)
Prefer to self-describe	1 (2)	0 (0)
Pet Type*	*n* (%)	*n* (%)
Dog	86 (58)	20 (50)
Cat	46 (31)	18 (45)
Small Mammal	4 (3)	0 (0)
Bird	0 (0)	0 (0)
Fish (Aquariums)	3 (2)	0 (0)
Reptile or Amphibian	1 (0.6)	1 (2.5)
Horse or Pony	2 (1)	1 (2.5)
Farm Animal (e.g., goat, pig, etc.)	7 (5)	0 (0)
Other	0 (0)	0 (0)

	IS Participants	**FS Participants**
Animal Role*	*n* (%)	*n* (%)
Service Animal	1 (2)	0 (0)
Therapy Animal	6 (10)	0 (0)
Emotional Support Animal	5 (8)	4 (10)
Other Form of Working Animal	6 (10)	1 (2.5)
None of the Above	49 (78)	18 (45)
Household Size	*m* (*SD*)	*m* (*SD*)
Number of People Living in Household	2.44 (1.09)	2.35 (1.03)
Number of Adults (18+) Living in Household	2.16 (0.95)	2.13 (0.87)

*These groups are not mutually exclusive

Table 2

COVID-19 Vaccination and Isolation Information

	IS Participants	**FS Participants**
	n = 63	*n* = 23
Current Isolation Status	*n* (%)	*n* (%)
Currently Self-Isolated	0 (0)	0 (0)
Leave House Only for Essential Activities (e.g., grocery shopping, exercise including dog walking, etc.)	44 (70)	10 (43)
Leave House to Travel to Work	8 (13)	3 (13)
Not Currently Self-Isolating	10 (16)	9 (39)
Other	1 (2)	1 (4)
Household Isolation During COVID-19*	*n* (%)	*n* (%)
Has Self-Isolated	19 (30)	8 (35)
Has Not Self-Isolated	8 (13)	5 (22)
One or More Adults in House Have Self-Isolated	27 (43)	10 (43)
One or More Adults in House Have Not Self-Isolated	21 (33)	5 (17)
COVID-19 Vaccination Status*	*n* (%)	*n* (%)
Has Been Vaccinated	14 (22)	16 (70)
Has Not Been Vaccinated	22 (35)	1 (4)
One or More Adults in House Have Been Vaccinated	16 (25)	18 (78)
One or More Adults in House Have Not Been Vaccinated	25 (40)	0 (0)

*These groups are not mutually exclusive

Table 3

PALS Responses by Factor

	Unpaired IS Participants	**Paired IS Participants**	**Paired FS Participants**	**Paired Wilcoxon Tests**	**Wilcoxon Rank Sum Tests**
PALS Factors	*m* (*SD*)	*m* (*SD*)	*m* (*SD*)	*v* (*p*)	*w* (*p*)
Love	4.14 (0.7)	4.18 (0.6)	4.24 (0.54)	104.5 (.32)	480 (.78)
Regulation	3.42 (1.07)	3.27 (0.93)	3.31 (0.94)	102 (.65)	418 (.55)
Personal Growth	3.7 (0.88)	3.59 (0.75)	3.50 (0.7)	130 (.92)	403 (.42)
Negative Impact	4.61 (0.34)	4.64 (0.26)	4.55 (0.31)	46 (.05)	469.5 (.89)

Note. Paired samples Wilcoxon signed rank tests were used to assess change from IS to FS in participants who completed the FS. Wilcoxon rank sum tests were used to assess differences in results between IS participants who completed the FS and IS participants who did not complete the FS.

Table 4

PAC-19 Responses

Questions	Unpaired IS Participants *m* (*SD*)	Paired IS Participants *m* (*SD*)	Paired FS Participants *m* (*SD*)	Paired Wilcoxon Tests *v* (*p*)	Wilcoxon Rank Sum Tests *w* (*p*)
1. I have been able to spend more time with my pet because of the COVID-19 pandemic	6.43 (1.36)	6.61 (0.66)	6.61 (0.72)	18.5 (1)	443 (.76)
2. I worry that my pet could become infected with COVID-19	2 (1.4)	2.22 (1.44)	2.26 (1.51)	25 (.83)	510 (.45)
3. I worry that my pet could infect me with COVID-19	1.43 (0.75)	1.87 (1.25)	1.43 (0.51)	43 (.11)	546.5 (.15)
4. I have been turning to my pet for social support and companionship since the beginning of the COVID-19 pandemic	4.5 (2.06)	5.26 (1.6)	4.61 (1.9)	88 (.11)	551 (.19)
5. I feel more certain of the future because I have my pet with me	4.08 (1.95)	4.3 (1.33)	4.48 (1.41)	27 (.62)	469 (.90)
6. I feel that my days have more structure because of my pet	5.2 (1.84)	5 (1.6)	5.43 (1.2)	46 (.15)	403 (.41)
7. I feel less lonely because of my pet	5.55 (1.47)	5.74 (1.6)	5.65 (1.64)	39.5 (1)	516 (.41)
8. Playing with my pet is comforting	5.98 (1.14)	6.17 (0.89).	6.22 (1.67)	36 (.84)	499.5 (.55)
9. I have bought more toys than usual for my pet during the COVID-19 pandemic	3.93 (2.04)	3.26 (1.71)	3.57 (1.59)	38 (.37)	376.5 (.23)
10. I have found it difficult to afford caring for my pet as a result of the COVID-19 pandemic	1.78 (1.1)	1.52 (0.59)	1.57 (0.51)	12 (.78)	446 (.83)
11. I have found it difficult to provide my pet with an adequate amount of exercise as a result of the COVID-19 pandemic	2.25 (1.85)	1.87 (1.49)	2.26 (1.63)	24.5 (.46)	428 (.62)
12. I feel that having a pet has increased my risk of being infected with COVID-19	1.35 (1)	1.35 (0.88)	1.39 (0.5)	27.5 (.63)	458 (.98)

Figure 1

Paired PAS-M Scores

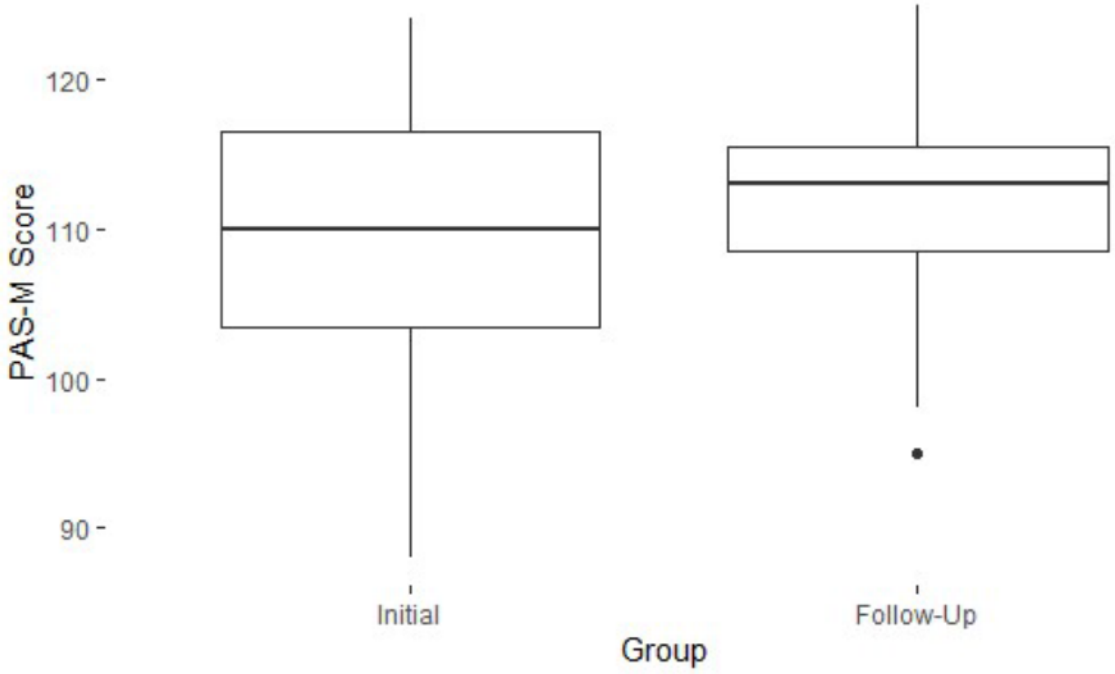


Figure 2

Paired PALS Scores

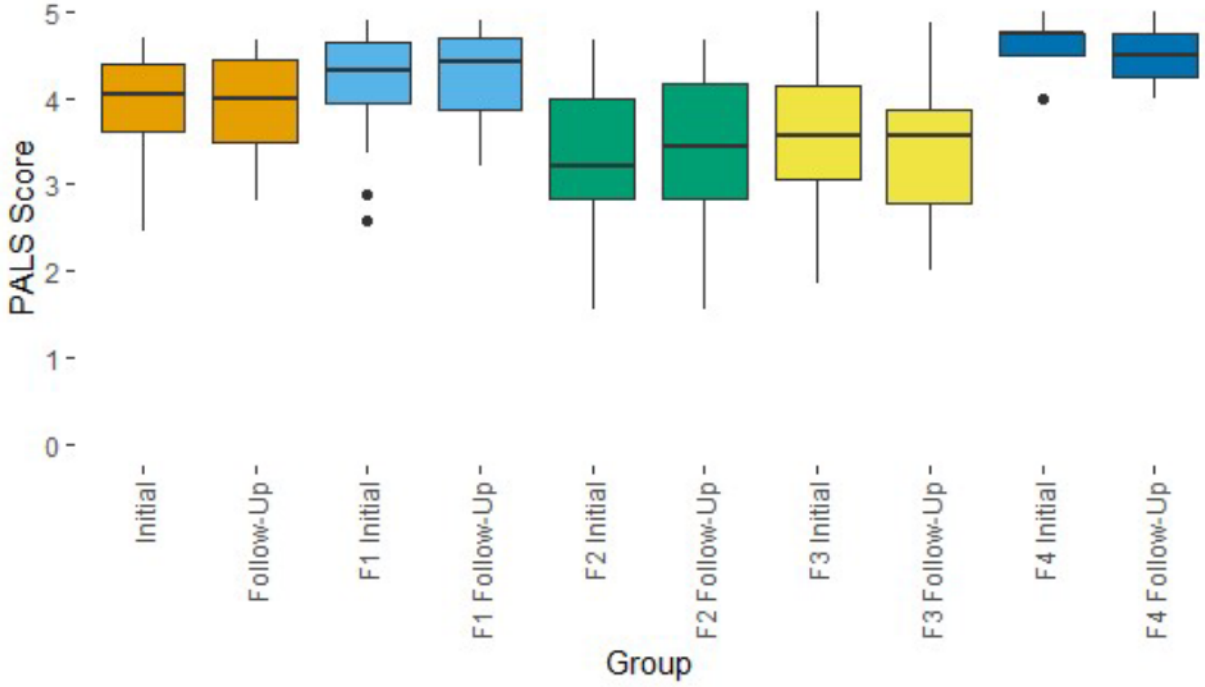


Figure 3

Spearman's Rank Correlation Between PAS-M and PALS (IS)

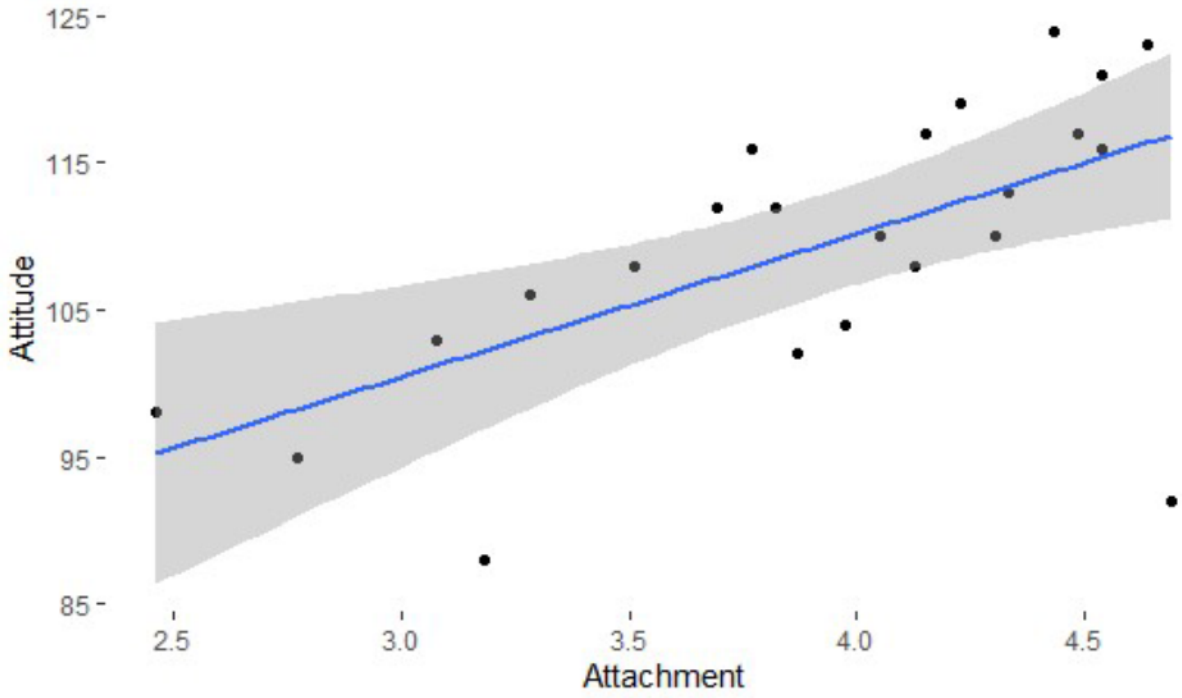


Figure 4

Spearman's Rank Correlation Between PAS-M and PALS (FS)

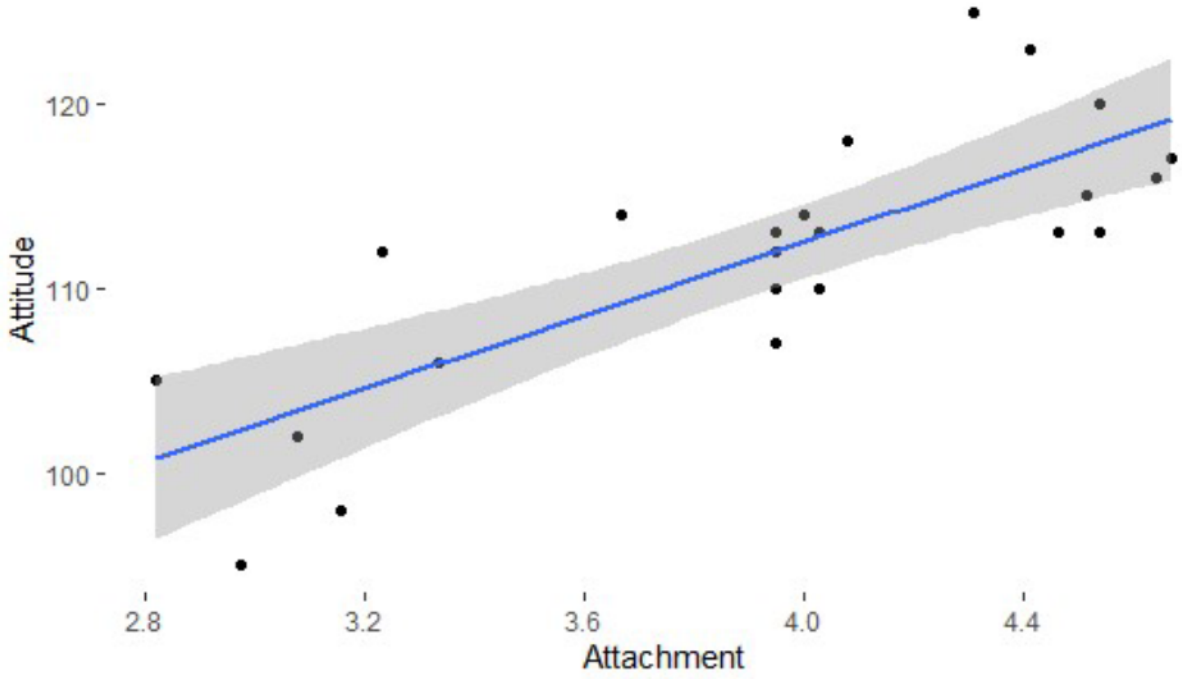


Figure 5

Pets and COVID-19 (IS)

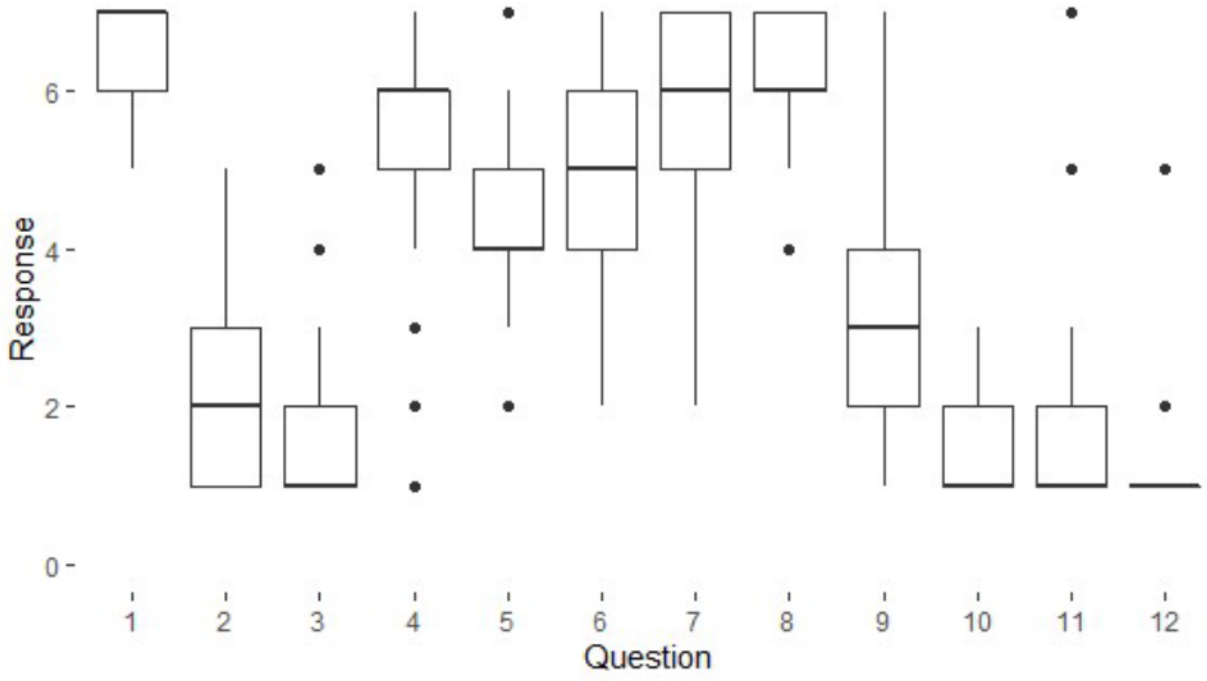
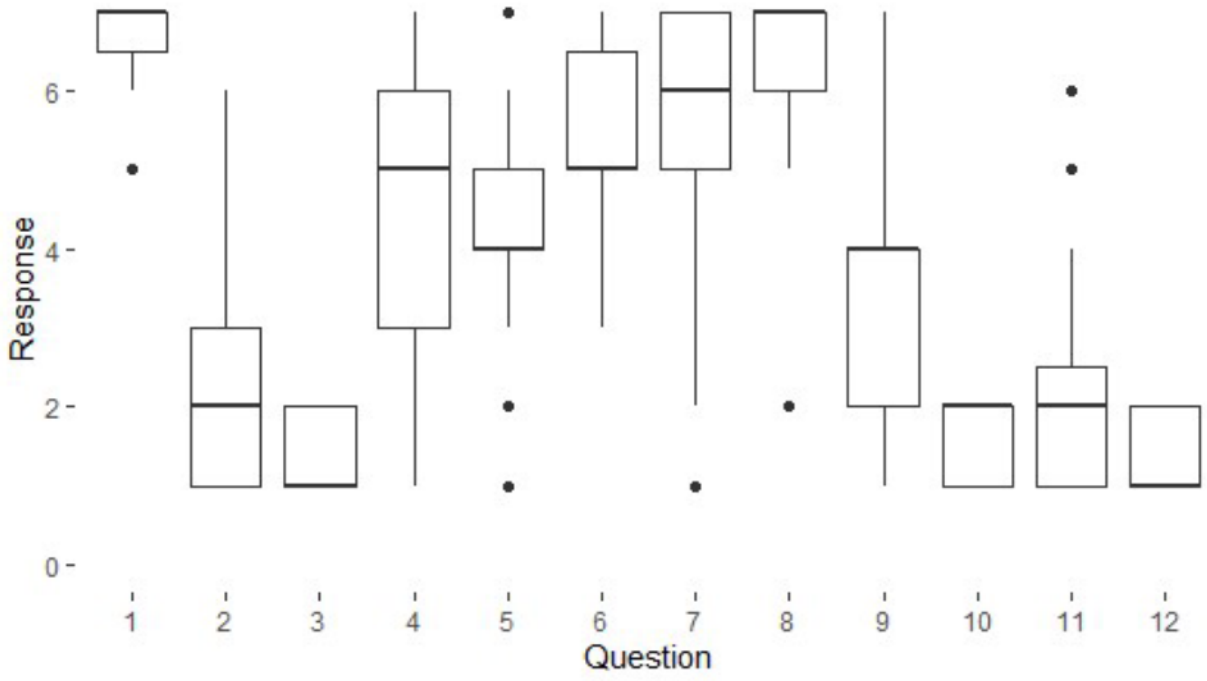


Figure 6

Pets and COVID-19 (FS)



Appendix A

Demographic Items

Question Text	Response Form	Response Options (If Any)	
How old are you? Enter age here:	Text entry		
Are you currently in the United States?	Radio buttons	(1) (2)	Yes No
Do you have any animals that live with you, and that you or anyone in your household are the main caretaker of? If so, please enter the name(s) of each pet in the text box next to their species. Please do not include animals kept as livestock (e.g. farm sheep, cattle).	Check boxes	(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)	Dog [text entry] Cat [text entry] Small mammal [text entry] Bird [text entry] Fish [text entry] Reptile or amphibian [text entry] Horse or pony [text entry] Farm animal (e.g., goat, pig, etc.) [text entry] Other [text entry] No
In which state do you currently reside?	Dropdown list	The 50 U.S. states, including D.C. and Puerto Rico. Participants could also select: "I would prefer not to say"	
In which city do you currently reside?	Radio buttons	(1) (2)	City: [text entry] I would prefer not to say
How would you describe your racial/ethnic identity?	Check boxes	(1) (2) (3) (4) (5) (6) (7) (8)	Arab/Arab American Asian/Asian American Black/African American Latina/Latino/Latinx Multiracial/Mixed Race South Asian/Pacific Islander White Prefer to self-describe: [text entry]
How would you describe your gender identity?	Check boxes	(1) (2) (3) (4) (5)	Agender Cisgender man (i.e., assigned male at birth and identify as a man) Cisgender woman (i.e., assigned female at birth and identify as a woman) Genderfluid Genderqueer

		(6)	Nonbinary
		(7)	Transgender man
		(8)	Transgender woman
		(9)	Multiple Identifications
		(10)	Not sure/questioning/prefer to self-describe: [text entry]
For IS: Have you acquired any of the previously listed pets within the past year (Since February 1st, 2020)? *For FS*: Have you acquired any of the previously listed pets within the last six months (Since March 1st, 2021)?	Radio buttons	(1) (2)	Yes (If so, which pets have you acquired within the past year/last six months?) [text entry] No
For IS: Have you had to give up a pet within the last year (Since February 1st, 2020)? *For FS*: Have you had to give up a pet within the last six months (Since March 1st, 2021)?	Radio buttons	(1) (2)	Yes No
Do any of the animals listed above hold any of these roles?	Check boxes	(1) (2) (3) (4) (5)	Service animal Therapy animal Emotional support animal Other form of working animal None of the above
How many people, including yourself, are currently living in your household?	Text entry		
Of the people currently in your household, how many are adults (i.e., 18 years of age or older)?	Text entry		
How would you describe your own current isolation status as a result of the COVID-19 pandemic?	Radio buttons	(1) (2)	I am currently self-isolating, and I do not leave the house at all I leave the house for one or more of the currently recommended essential

			reasons (e.g., grocery shopping, exercise including dog walking, etc.)
		(3)	I leave the house to travel to work
		(4)	I am not currently self-isolating
		(5)	Other: [text entry]
Have you, or anyone with which you live, been in social isolation since the onset of the COVID-19 pandemic?	Check boxes	(1)	Yes, I have self-isolated
		(2)	No, I have not self-isolated
		(3)	Yes, one or more adults in my house have self-isolated
		(4)	No, one or more adults in my house have not self-isolated
Have you, or anyone with which you live, received a COVID-19 vaccination?	Check boxes	(1)	Yes, I have been vaccinated
		(2)	No, I have not been vaccinated
		(3)	Yes, one or more adults in my house have been vaccinated
		(4)	No, one or more adults in my house have not been vaccinated

Appendix B

Modified Pet Attitude Scale (PAS-M) Items

For this measure, if you are living with more than one pet, please respond with your favorite or most important pet in mind. Please enter the name of this pet in the text box below.

1. I really like seeing pets enjoy their food (+)
2. My pet means more to me than any of my friends (+)
3. I like having a pet in my home (+)
4. Having pets is a waste of money (-)
5. House pets add happiness to my life (+)
6. I feel that pets should always be kept outside (-)
7. I spend time every day playing with my pet (+)
8. I have occasionally communicated with my pet and understood what it was trying to express (+)
9. The world would be a better place if people would stop spending so much time caring for their pets and started caring more for other human beings instead (-)
10. I like to feed animals out of my hand (+)
11. I love pets (+)
12. Animals belong in the wild or in zoos, but not in the home (-)
13. If you keep pets in the house you can expect a lot of damage to furniture (-)
14. I like house pets (+)
15. Pets are fun but it's not worth the trouble of owning one (-)
16. I frequently talk to my pet (+)
17. I hate animals (-)
18. You should treat your house pets with as much respect as you would a human member of your family (+)

Appendix C

Pet Attachment and Life Impact Scale (PALS) Items

For this measure, please respond with the same pet you chose previously in mind. Please indicate how strongly each statement reflects how your pet has impacted your life.

1. Having a pet has helped my health (F3)
2. My pet is part of my family (F1)
3. My pet is more loyal than most people (F3)
4. My pet has the same privileges a family member (F1)
5. A pet completes the family (F1)
6. Having a pet is stressful (F4)
7. I am more affectionate because of my pet (F3)
8. I have learned compassion from my pet (F3)
9. Having a pet has helped me to understand loss and letting go (F3)
10. My pet gives me unconditional love (F1)
11. My pet gives me something to love (F1)
12. My pet gives me something that I can form a close emotional bond with (F1)
13. Having a pet has negatively impacted me emotionally (F4)
14. My pet is my companion (F1)
15. My pet and I have a special relationship (F1)
16. My pet is loyal (F1)
17. My pet provides comfort for me (F1)
18. I am worse off because I have a pet (F4)
19. I like to cuddle with my pet (F1)
20. I like my pet mostly because it is cute (F1)
21. It's worth giving up other things in life in order to have a pet (F1)
22. Pets take a lot of time but it is worth it (F1)
23. My pet teaches me to be more loving (F3)
24. My pet is my friend (F1)
25. My pet teaches me to trust (F2)
26. My pet calms me down (F2)
27. My pet cheers me up (F1)
28. I take my pet with me to visit people (F2)
29. I keep a picture of my pet with me (F1)
30. I am affected by the way others react to my pet (F1)
31. My pet teaches me responsibility (F3)
32. My pet is fun and entertaining (F1)
33. My pet is a financial hardship (F4)
34. My pet allows me to feel needed (F2)
35. My pet is someone to lean on and be with me when no one else is there for me (F2)
36. My pet provides stability for me (F2)

37. My pet understands me like no one else has (F2)
38. Talking to my pet makes me feel better (F2)
39. My pet offers protection/safety. (F2)

Appendix D

Pets and COVID-19 Scale (PAC-19) Items

For this measure, please respond with the same pet you chose previously in mind. Please rate the extent to which you agree with the following questions.

1. I have been able to spend more time with my pet because of the COVID-19 pandemic
2. I worry that my pet could become infected with COVID-19
3. I worry that my pet could infect me with COVID-19
4. I have been turning to my pet for social support and companionship since the beginning of the COVID-19 pandemic
5. I feel more certain of the future because I have my pet with me
6. I feel that my days have more structure because of my pet
7. I feel less lonely because of my pet
8. Playing with my pet is comforting
9. I have bought more toys than usual for my pet during the COVID-19 pandemic
10. I have found it difficult to afford caring for my pet as a result of the COVID-19 pandemic
11. I have found it difficult to provide my pet with an adequate amount of exercise as a result of the COVID-19 pandemic
12. I feel that having a pet has increased my risk of being infected with COVID-19