Pet Ownership and Wellbeing During the COVID-19 Pandemic: The Importance of Resilience and Attachment to Pets

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Abstract

The governmental restrictions in the early stages of the COVID-19 pandemic led to social isolation with many pet owners spending more time at home with their pets around the world. The relationships between pet ownership, pet attachment, and wellbeing were examined using two online surveys in the early stages of the pandemic (May 2020) and over one year later (September 2021). Resilience, optimism, and basic psychological need satisfaction (i.e., *autonomy*, *competence*, and *relatedness*) were examined as potential moderators. Study 1 had an international sample of 495 participants (70% pet owners), while Study 2 had a UK sample of 243 participants (57% pet owners) for a more detailed investigation. Most participants reported that their pets provided emotional comfort and had a positive impact on their lives during the early stages of the pandemic. Pet ownership and pet attachment were positively associated with wellbeing in people with low levels of resilience. Conversely, people with high resilience who were pet owners or had higher pet attachment had lower wellbeing than non-pet owners and those less attached. Optimism and basic psychological need satisfaction were not significant moderators. Although some of the associations found in Study 1 might have been specific to the beginning of the pandemic, other results were replicated a year later in the UK sample when social restrictions were eased (Study 2). The findings from the two studies suggest that higher scores on a subscale of pet attachment, which involves the pet playing a more central role than humans in the owner's life, might be directly linked to lower resilience and wellbeing and increased loneliness. The combination of high resilience and higher levels of pet attachment or pet ownership might be unfavorable.

Nonetheless, pet ownership and healthy human-animal bonds can be protective factors for people with low levels of resilience.

Keywords: pet ownership, pet attachment, wellbeing, resilience, COVID-19, human-animal interaction

Introduction

Pet ownership has been associated with many positive mental health outcomes for humans. Pet owners often report greater subjective wellbeing and lower levels of loneliness than non-pet owners (Bao & Schreer, 2016; Duvall Antonacopoulos, 2017; Powell et al., 2019). However, the findings are not conclusive, as several other studies have shown either no relationship or a negative relationship between pet ownership and wellbeing, such as higher levels of depressive symptoms in pet owners than non-pet owners (Herzog, 2011; Parslow et al., 2005; Parsons et al., 2019; Wells, 2019).

Increased wellbeing might depend on certain characteristics of human-pet relationships. Higher pet presence, human-pet interactions, and pet attachment have been linked to greater positive affect and lower psychological distress (Barcelos et al., 2020; Bennett et al., 2015; Janssens et al., 2020; Kalenkoski & Korankye, 2022; Teo & Thomas, 2019; Wu et al., 2018). Pet attachment might also be a protective factor by moderating the relationship between loneliness and depression (Krause-Parello, 2012). However, some research suggests that pet attachment might be linked to higher psychological distress, loneliness, and depression (Duvall Antonacopoulos & Pychyl,

2010; Peacock et al., 2012). It is possible that pet attachment is linked to certain individual characteristics (e.g., resilience) or that individual characteristics moderate the relationships between pet ownership and wellbeing or pet attachment and wellbeing, which could explain the mixed findings.

The relationship between pet ownership and wellbeing during the first two years of the COVID-19 pandemic remained inconclusive. Pet ownership and higher pet attachment were associated with greater emotional wellbeing (e.g., happiness) and lower depression and anxiety in several studies (Gasteiger et al., 2021; Grajfoner et al., 2021; McDonald et al., 2021; J. S. Q. Tan et al., 2021). However, among pet owners with severe mental health symptoms prior to the pandemic, those who were highly attached to their pets had poorer psychological adjustment in the beginning of the pandemic than those who were less attached (McDonald et al., 2021). Other studies found that pet owners had lower wellbeing and quality of life than non-pet owners (Amiot et al., 2022; Denis-Robichaud et al., 2022; Phillipou et al., 2021), and there was no association between pet ownership and wellbeing and loneliness in a large international sample (Clements et al., 2021).

Pet ownership research to date has mainly focused on cats and dogs, but having other types of pets is also associated with increased purpose and enjoyment in life (Langfield & James, 2009). Recent findings suggest that animal ownership, regardless of animal species, might be a protective factor for mental health during the pandemic, and similar levels of emotional closeness in human-animal relationships are observed across many species (Ratschen et al., 2020).

Resilience and Optimism

The COVID-19 pandemic has had a negative impact on wellbeing around the world (Xiong et al., 2020). It created new hardships and uncertainty about the future, which are closely linked to the individual characteristics of resilience and optimism. Resilience, broadly defined as the ability to cope with stress and recover quickly, has been strongly associated with higher wellbeing (Hu et al., 2015; Mak et al., 2011). Resilience has also been positively linked to wellbeing during the pandemic (Paredes et al., 2021; Y. Tan et al., 2021). Moreover, it was found to be a protective factor by mediating the relationships between personality factors and wellbeing and stress in the beginning of the pandemic (Zager Kocjan et al., 2021). Both the cognitive and physical presence of a pet, when combined with a healthy pet attachment style, could help humans during distress-eliciting tasks according to earlier research (Zilcha-Mano et al., 2012). Therefore, people with low resilience might benefit from pet ownership and pet attachment by having an improved ability to cope with the negative consequences of the pandemic.

Optimism, defined as having a positive outlook on life, has also been strongly associated with higher wellbeing and the use of healthy coping strategies to manage stressors (Conversano et al., 2010). Optimism has been positively linked to wellbeing during the pandemic (Hudson et al., 2021; Rotonda et al., 2021). It is possible that pet ownership and pet attachment could also benefit people with low optimism in the unique circumstances of the pandemic.

Basic Psychological Need Satisfaction

Self-determination theory (Deci & Ryan, 1985; Ryan & Deci, 2000) identifies autonomy, competence, and relatedness as distinct basic human needs that are necessary for mental health. Autonomy is related to having freedom and choice in one's actions. Competence is related to the effectiveness of one's actions as well as one's perceived capabilities. Relatedness refers to the sense of belonging with others and the presence of close relationships where there is mutual appreciation. The fulfillment of basic psychological needs is linked to greater wellbeing, including higher positive affect and lower negative affect (Ryan et al., 2010).

Reduced fulfillment of basic psychological needs was expected due to the required social isolation and substantial changes in the daily life (e.g., work duties) during the COVID-19 pandemic. Certainly, research carried out in the beginning of the pandemic showed that people had lower basic psychological need satisfaction and consequently reduced wellbeing (Avsec et al., 2021). Throughout the pandemic, higher need satisfaction has been associated with greater happiness and lower psychological distress and loneliness (Cantarero et al., 2021; Datu & Fincham, 2022; van der Goot et al., 2021). Moreover, higher human-pet relationship need support has been associated with increased wellbeing and reduced psychological distress and loneliness in pet owners (Damberg & Frömbling, 2021).

Current Research

Previous research shows that the relationships between pet ownership, pet attachment, and wellbeing are complex. The COVID-19 pandemic, particularly in the early stages

between March and June 2020, created a unique situation in which many pet owners spent more time with their pets during the day. This presented a novel opportunity to investigate the relationship between pet ownership and wellbeing in highly unusual circumstances. Moreover, to our knowledge, this is the first study to examine the possible moderating effects of resilience, optimism, and basic psychological need satisfaction in the relationships between pet ownership, pet attachment, and wellbeing. While these characteristics could also be important in the relationship between pet ownership and wellbeing under normal circumstances, they are likely to have increased relevance during the pandemic, which was investigated in two studies. In addition, these studies attempted to replicate previous findings suggesting that pet owners have lower levels of loneliness than non-pet owners, especially as loneliness is negatively associated with wellbeing (Richard et al., 2017), and it was impacted by social isolation during the pandemic (Lewis, 2020).

It was hypothesized that pet ownership and higher pet attachment would be associated with higher levels of wellbeing and lower levels of loneliness. Resilience, optimism, and basic psychological need satisfaction (*autonomy*, *competence*, and *relatedness*) were hypothesized to moderate the relationships between pet ownership and wellbeing and pet attachment and wellbeing. Specifically, when there were low levels of resilience, optimism, or basic psychological need satisfaction, people who owned pets and those who were more attached to their pets were hypothesized to have greater wellbeing than non-pet owners and those with lower pet attachment. The overall impact of the COVID-19 pandemic on pet owners was also explored in an international sample in Study 1. The relationships between the key variables were examined again over 1 year later, during a later stage of the pandemic when

vaccinations were widely available and social restrictions were eased, to replicate the findings due to the lack of literature on the moderating role of resilience in these relationships. The focus in Study 2 was on a single country (i.e., the UK) as the COVID-19 restrictions varied considerably more from one country to another in September 2021 than May 2020.

The understanding of how individual characteristics and different elements of human-pet relationships relate to wellbeing will enable a better understanding of the benefits (or challenges) of pet ownership, especially in the face of adversity. Importantly, pet ownership and attachment to pets might be protective factors for people who are psychologically vulnerable.

Study 1

Method

The study received a favorable opinion from the University Research Ethics Committee (#1532-2020).

Participants

The eligibility criteria were being at least 18 years old and fluent in English. The sample consisted of 495 participants, ranging in age from 18 to 73 years (M = 31.66, SD = 12.14), which did not differ between pet owners (M = 31.34, SD = 11.64) and non-pet owners (M = 32.40, SD = 13.22), $t_{(492)} = 0.90$, $p = 0.37$. Participant characteristics are summarized in Table 1. Most participants (70%, n = 344) were pet

owners, and 25% (n = 86) of owners had two or more types of pets. The most common pets were dogs (53%, n = 184) and cats (55%, n = 188), while 22% (n = 74) of owners had other types of pets (e.g., hamsters and birds). The length of pet ownership ranged from 1 week to 20 years (M = 5.62 years, SD = 4.48 years). Most employed participants were working from home at least some of the time due to the pandemic (69%, n = 220), and most students were receiving remote education (87%, n = 157).

Measures

The Impact of the COVID-19 Pandemic on Pet Owners

Participants with pets were asked 19 single-item questions involving a range of response options (e.g., Yes/No and Likert scale), specifically created for this study, about how the pandemic affected their work and education, routines and interactions with their pet, and their ability to provide essential care for their pet since the declaration of the pandemic (March 11, 2020) until the day of the survey. The full list of questions and response options can be found in Table S1. The link https://osf.io/j49s8/?view_only=160f908dbe7c4d819a1885d240eab136 provides access to the supplementary tables S1 to S16.

Loneliness

Participants were asked "Have you felt lonely during the last month?". They responded on a 5-point scale, ranging from "always" to "never". Recent research suggests that a single-item direct measure of loneliness might be more appropriate

than multi-item indirect measures to study the effects of pet ownership (Duvall Antonacopoulos, 2017; Gilbey & Tani, 2020).

Wellbeing

WHO-5 Well-Being Index (WHO-5; Bech et al., 2003) was used to measure wellbeing. It includes five statements, such as "I have felt calm and relaxed". Participants indicated how much each statement applied to how they had been feeling in the last two weeks on a 6-point scale, ranging from "all of the time" to "at no time". The scale has demonstrated strong internal consistency in the current study (Cronbach's alpha = 0.85).

Scale of Positive and Negative Experience (SPANE; Diener et al., 2010) was used as another measure of wellbeing. It has two subscales: *positive feelings* and *negative feelings*. The *affect balance* score is calculated by subtracting the *negative feelings* score from the *positive feelings* score. Participants indicated how much they experienced each of the six positive feelings (e.g., happy) and six negative feelings (e.g., afraid) during the last four weeks on a 5-point scale, ranging from "very often or always" to "very rarely or never". Cronbach's alpha was 0.89 for *positive feelings* and 0.84 for *negative feelings*.

Resilience

Brief Resilience Scale (BRS; Smith et al., 2008) was used to measure psychological resilience. It consists of six items, such as "I tend to bounce back quickly after hard

times". Participants rated each item on a 5-point scale, ranging from "strongly agree" to "strongly disagree". Cronbach's alpha was 0.88.

Optimism

Revised Life Orientation Test (LOT-R; Scheier et al., 1994) was used to measure optimism. It includes 10 statements, such as "In uncertain times, I usually expect the best". Participants indicated the extent of their agreement with each statement on a 5-point scale, ranging from "strongly agree" to "strongly disagree". Cronbach's alpha was 0.84.

Basic Psychological Need Satisfaction

Basic Psychological Need Satisfaction Scale (BPNS; Deci & Ryan, 2000; Gagné, 2003) was used to measure basic need fulfillment. It involves three subscales: *autonomy*, *competence*, and *relatedness*. The *autonomy* subscale contains seven statements, such as "I feel like I am free to decide for myself how to live my life". The *competence* subscale consists of six items, which include "I have been able to learn interesting new skills recently". The *relatedness* subscale has eight items, which include "I really like the people I interact with". Participants indicated how much they related to each statement on a 7-point scale, ranging from "very true" to "not at all true". Cronbach's alpha was 0.77 for *autonomy*, 0.78 for *competence*, and 0.79 for *relatedness*.

Pet Attachment

Lexington Attachment to Pets Scale (LAPS; Johnson et al.,1992) was used to measure pet attachment. It has three subscales: *general attachment*, *people substituting*, and *animal rights/animal welfare*. The *general attachment* subscale includes 11 items, such as "My pet makes me feel happy". The *people substituting* subscale consists of seven items, which include "I love my pet because he/she is more loyal to me than most of the people in my life". The *animal rights/animal welfare* subscale contains five items, which include "Pets deserve as much respect as humans do". Participants were asked to think about their current favorite pet and to indicate their agreement with each statement on a 4-point scale, ranging from "agree strongly" to "disagree strongly". The LAPS has been validated for dog and cat owners, thus only the responses of participants who completed it for a dog or cat were analyzed. Cronbach's alpha was 0.92 for total scale, 0.86 for *general attachment*, 0.81 for *people substituting*, and 0.79 for *animal rights/animal welfare*.

Procedure

Participants were recruited online via the university's research participation system and public pages on Reddit and Facebook. The recruitment posts stated that the study was investigating the relationship between wellbeing and pet ownership during the COVID-19 pandemic. Participation was voluntary and did not include compensation. Participants provided informed consent and completed the study anonymously via Qualtrics. Responses were collected from May 9 to June 1, 2020, when there were strict lockdown measures in most countries.

Data Analysis

The mean of the items that were answered was taken if the participants were missing ≤ 20% of their data on each scale or subscale (e.g., if the participant had responded to at least nine out of the 11 items on the *general attachment* subscale of LAPS). If they missed > 20%, their responses were not included in the relevant analyses. Independent samples t-tests were performed to examine the differences between pet owners and non-pet owners. Pearson's correlations were used to investigate the links between pet attachment and wellbeing. The hypotheses related to pet attachment were based on the total scale in line with previous research; however, the three subscales were also examined individually to explore differences. Moderation analyses (regression), including the Johnson-Neyman technique, were performed using the PROCESS macro (Model 1) for SPSS developed by Hayes (2013). Resilience, optimism, *autonomy*, *competence*, and *relatedness* were examined separately as moderators between pet ownership and wellbeing measures (i.e., WHO-5, *positive feelings*, *negative feelings*, and *affect balance*). The same variables were also examined as moderators between pet attachment (total scale and the subscales *general attachment*, *people substituting*, and *animal rights/animal welfare*) and wellbeing measures. Age, gender, ethnicity/race, marital status, parental status, living arrangements (alone vs. not alone), employment status, and country of residence were included as covariates in all moderation analyses.

Results

The Impact of the COVID-19 Pandemic on Pet Owners

Most pet owners (87%, $n = 295$) reported spending more time with their pets since the pandemic started, and over half of them (51%, $n = 172$) felt that the quality of time

spent with their pets had improved. Most participants (95%, n = 310) felt that their pets provided them emotional comfort, and most (88%, n = 286) reported that their pets had a positive impact on their lives during the pandemic. Concurrently, most participants (63%, n = 213) felt worried about their pets. Some participants (45%, n = 119) reported that having a pet made it more challenging to work from home or to engage in remote education. The questions and responses that were analyzed in this paper are presented in Table 2. Other questions and response frequencies can be found in Table S1 (https://osf.io/j49s8/?view_only=160f908dbe7c4d819a1885d240eab136; same link for S2-S16).

Pet Ownership and Wellbeing

Wellbeing was positively correlated with the moderator variables (Table S2). Age was positively correlated with wellbeing and most moderator variables.

Pet owners and non-pet owners did not significantly differ on any wellbeing variables, loneliness, or moderator variables (Table 3).

The single-item questions on the impact of the pandemic that included human-pet interactions (i.e., playing and walking together; Table 2) were examined. Pet owners who reported an increase in their time spent actively playing with their pets since the start of the pandemic (n = 257) had higher wellbeing (WHO-5) (M = 12.86, SD = 5.00) than those who reported no increase (n = 80, M = 11.36, SD = 4.86), $t_{(316)} = 2.31$, p = 0.02, d = 0.30. They also had more *positive feelings* (M = 20.04, SD = 4.46) than

those who reported no increase (M = 18.88, SD = 3.86), $t_{(314)}$ = 2.04, p = 0.04, d = 0.27.

Dog owners who reported an increase in the frequency and/or duration of the walks with their dogs since the start of the pandemic (n = 117) had higher wellbeing (WHO-5) (M = 13.66, SD = 4.99) than other pet owners (n = 216, M = 11.76, SD = 4.86), $t_{(312)}$ = 3.28, p = 0.001, d = 0.39. They also had more *positive feelings* (M = 20.56, SD = 4.57) than other pet owners (M = 19.27, SD = 4.17), $t_{(310)}$ = 2.51, p = 0.01, d = 0.30. Finally, they had higher *affect balance* (M = 4.57, SD = 8.24) than other pet owners (M = 2.57, SD = 7.87), $t_{(310)}$ = 2.10, p = 0.04, d = 0.25.

Moderators Between Pet Ownership and Wellbeing

Resilience

There was an interaction between pet ownership and resilience in the prediction of *positive feelings*, *negative feelings*, and *affect balance*, but not wellbeing (WHO-5) (Table 4). The significant results are illustrated in Figure 1. The Johnson-Neyman results indicated that the interaction effects were significant only at low levels of resilience for *positive feelings*, only at high levels of resilience for *negative feelings*, and both at the low and high levels of resilience (but not middle levels which indicate normal resilience) for *affect balance* (Table S3-5). Among people with low resilience, having a pet was linked to higher levels of *positive feelings* and *affect balance*. Among people with high resilience, having a pet was linked to higher levels of *negative feelings* and lower levels of *affect balance*.

Optimism and Basic Psychological Need Satisfaction

There was no interaction between pet ownership and optimism, *autonomy*, *relatedness*, or *competence* in the prediction of any wellbeing variables (Table S6-9; link above).

Pet Attachment and Wellbeing

Age was negatively correlated with total pet attachment (r = -0.17, n = 245, p = 0.008), *general attachment* (r = -0.20, n = 255, p = 0.001), and *people substituting* (r = -0.14, n = 249, p = 0.03). Because age was also significantly correlated with the wellbeing and moderator variables, partial correlations controlling for age were conducted to examine the relationships between pet attachment, wellbeing, and individual characteristics. As the length of pet ownership was significantly associated with wellbeing in some previous research (Cavanaugh et al., 2008), its relationship with wellbeing was also explored after no link was found between pet ownership and wellbeing. Contrary to the hypothesis, pet attachment was not significantly correlated with wellbeing (Table 5). The length of pet ownership was also not correlated with wellbeing. However, there was a positive correlation between *people substituting* and loneliness. In terms of the moderators, *general attachment* was positively correlated with *autonomy* and *competence*, while *people substituting* was negatively correlated with resilience and optimism, and *animal rights/animal welfare* was negatively correlated with optimism.

Moderators Between Pet Attachment and Wellbeing

Resilience

There was no interaction between total pet attachment and resilience and *people substituting* and resilience in the prediction of wellbeing (Table 4). However, there was an interaction between *general attachment* and resilience in the prediction of *positive feelings* and between *animal rights/animal welfare* and resilience in the prediction of *affect balance*, which are illustrated in Figure 2.

The Johnson-Neyman results revealed that the interaction effects were only significant at low levels of resilience for *general attachment* and only at high levels of resilience for *animal rights/animal welfare* (Table S10-11). Among pet owners with low resilience, higher *general attachment* was linked to more *positive feelings*. Among pet owners with high resilience, higher levels of *animal rights/animal welfare* were linked to lower *affect balance*.

The Johnson-Neyman results also revealed that despite the overall moderation models not being significant, the interactions between *animal rights/animal welfare* and resilience in the prediction of *negative feelings* and wellbeing (WHO-5) were significant at high levels of resilience (Table S12-13). Among pet owners with high resilience, higher levels of *animal rights/animal welfare* were linked to more *negative feelings* and lower wellbeing (WHO-5).

Optimism and Basic Psychological Need Satisfaction

The was no interaction between the pet attachment variables and optimism, *autonomy*, *relatedness*, or *competence* in the prediction of wellbeing (Table S6-9).

Study 2

Method

This study was a replication of Study 1. The method and analyses were within the same ethics application which received a favorable opinion from the University Research Ethics Committee (#1532-2020).

Participants

The eligibility criteria included being a UK resident, at least 18 years old, and fluent in English. The sample consisted of 243 participants, ranging in age from 18 to 38 years (M = 27.70, SD = 4.98), which did not differ between pet owners (M = 27.64, SD = 5.09) and non-pet owners (M = 27.78, SD = 4.85), $t_{(241)} = 0.22$, $p = 0.83$. Participant characteristics are summarized in Table 1. More than half of the participants (57%, n = 138) were pet owners, and 42% (n = 58) of owners had two or more types of pets. The most common pets were dogs (60%, n = 83) and cats (60%, n = 83), while 30% (n = 41) of owners had other types of pets (e.g., hamsters). The length of pet ownership ranged from 3 months to 20 years (M = 6.22 years, SD = 4.44 years).

Measures

The measures were the same as those used in Study 1 for loneliness (single-item direct measure), wellbeing (WHO-5 and SPANE), resilience (BRS), and pet attachment (LAPS). Optimism and basic psychological need satisfaction were not included in this study.

Procedure

Participants were recruited online via Prolific.co. The recruitment posts stated that the study was investigating the relationship between wellbeing and pet ownership. Participation was voluntary and financially remunerated. Participants provided informed consent and completed the study anonymously via Qualtrics. Responses were collected from September 7 to 21, 2021. There were no lockdown measures in the UK at this time, although there might have been varying degrees of social restrictions in different regions.

Data Analysis

The analysis techniques were the same as those used in Study 1. Age, gender, ethnicity/race, marital status, parental status, and living arrangements (alone vs. not alone) were included as covariates in all moderation analyses.

Results

Pet Ownership and Wellbeing

Pet owners and non-pet owners did not significantly differ on any wellbeing variables, loneliness, or resilience (Table 3).

Resilience as a Moderator Between Pet Ownership and Wellbeing

There was no interaction between pet ownership and resilience in the prediction of wellbeing (Table 4).

Pet Attachment and Wellbeing

Pet attachment (total scale) and the length of pet ownership were not significantly correlated with wellbeing (Table 5). However, *people substituting* was positively correlated with *negative feelings* and loneliness and negatively correlated with *affect balance* and resilience.

Resilience as a Moderator Between Pet Attachment and Wellbeing

There was no interaction between resilience and total pet attachment, *general attachment*, or *people substituting* in the prediction of wellbeing (Table 4). However, there was an interaction between *animal rights/animal welfare* and resilience in the prediction of wellbeing (WHO-5), *affect balance*, and *negative feelings* (Figure 3). The Johnson-Neyman results revealed that all interaction effects were only significant at the low and high levels of resilience, but not middle levels (Table S14-16). Among pet owners with low resilience, those who had higher *animal rights/animal welfare* had higher wellbeing (WHO-5) and *affect balance* and less *negative feelings.* Among pet owners with high resilience, those who had higher *animal rights/animal welfare* had lower wellbeing (WHO-5) and *affect balance* and more *negative feelings*.

Discussion

The relationships between pet ownership, pet attachment, wellbeing, and individual characteristics were examined at different stages of the COVID-19 pandemic. In Study 1, the responses to the questions on the impact of the pandemic indicated that pets had a mostly positive effect on the wellbeing of their owners, although this was not fully reflected in the standardized measures of wellbeing. The hypotheses that pet ownership and pet attachment would be linked to higher wellbeing were only partially supported. Having a pet and having higher levels of certain types of pet attachment (i.e., *general attachment* and *animal rights/animal welfare*) were associated with higher wellbeing only in people with low levels of resilience, which emphasizes the importance of examining the individual characteristics of pet owners. Pet ownership and some types of pet attachment might be protective factors and particularly beneficial for those who are less resilient during times of isolation, uncertainty, or stress. These findings are inconsistent with some research that found a direct link between pet ownership and wellbeing during the pandemic (Gasteiger et al., 2021; Grajfoner et al., 2021), but consistent with others that found no direct link (Clements et al., 2021). None of the previous studies examined resilience as a moderator.

The links between pet ownership, *general attachment*, resilience, and wellbeing might be specific to the unique period in the beginning of the pandemic, as they were not replicated in Study 2. This is unlikely to be due to sample differences, as similar relationships between *people substituting* and individual characteristics and wellbeing as well as interactions between *animal rights/animal welfare* and resilience in the prediction of wellbeing were found in both studies. Previous research shows that the positive association between resilience and mental health is significantly stronger for

people who are experiencing adversity than those who are not (Hu et al., 2015). Such findings support the idea that resilience could have a stronger influence during the early stages of the pandemic with higher levels of adversity. Interestingly, among people with high resilience, pet ownership and higher *animal rights/animal welfare* were linked to lower wellbeing, which could be explained by previous findings suggesting that an excessive level of resilience in the form of self-enhancing (e.g., an overly positive view of oneself) or unjustified hope is linked to negative outcomes, such as poorer social adjustment (Bonanno et al., 2005; Mahdiani & Ungar, 2021).

Consistent with the previous findings that only specific characteristics of human-pet relationships might influence wellbeing (Janssens et al., 2020; Kalenkoski & Korankye, 2022), pet owners who spent more time actively playing with their pets and dog owners who had more frequent and/or longer walks with their dogs reported higher wellbeing than other pet owners in Study 1. Pet owners did not have lower levels of loneliness than non-pet owners, which is congruous with the mixed findings in the literature (Herzog, 2011; Wells, 2019). The length of pet ownership was also not linked to wellbeing, unlike some previous research (Cavanaugh et al., 2008). Moreover, optimism and basic psychological need satisfaction did not influence the relationships between pet ownership, pet attachment, and wellbeing, suggesting that resilience is a more important factor for pet owners.

In terms of individual characteristics, *general attachment* was linked to higher *autonomy* and *competence*, while *people substituting* was associated with higher loneliness and *negative feelings* and lower resilience, optimism, and *affect balance*

across the two studies, which suggests that some forms of pet attachment might not be favorable for pet owners. However, this does not imply that pet owners whose pets have a more central role than humans in their lives have low levels of meaningful human connections, as *people substituting* was not negatively correlated with *relatedness*. Furthermore, only the *general attachment* and *animal rights/animal welfare* subscales interacted with resilience in the prediction of wellbeing, while the total scale did not, which highlights the importance of carefully examining the characteristics of different instruments. The *animal rights/animal welfare* subscale indicates that the owner deeply cares about the pet, as the statements include "I would do almost anything to take care of my pet" and "I feel that my pet is a part of my family". The findings from these two studies suggest that it might be a more consistent predictor of wellbeing than *general attachment* when examined together with resilience. Moreover, the SPANE, focusing on emotional wellbeing, might be a better measure than the WHO-5 for use in pet ownership research.

Limitations, Strengths, and Future Directions

The present studies had some limitations. Convenience sampling was used, which might impact generalizability. The samples were predominantly female, most participants did not live alone, and the participants' levels of education and income were unknown. Previous studies had mixed findings in terms of socioeconomic status (e.g., education and income), with some showing inverse associations with pet attachment (Carlisle et al., 2020; Johnson et al., 1992), and others suggesting positive associations (Calvo et al., 2016; Li et al., 2020). The strengths of the studies include the use of two different questionnaires to explore different aspects of wellbeing and

diversity of the pet types. Future research should investigate different types of pet attachment (e.g., *people substituting* and *animal rights/animal welfare*) in relation to pet owners' individual characteristics and wellbeing. The influence of different degrees and forms of resilience on the relationship between pet ownership and wellbeing should be further examined, particularly with longitudinal studies and populations who experience isolation and unpredictable circumstances, to gain a deeper understanding of how companion animals might affect humans.

Conclusions

These two studies provide valuable insights into the roles that pet ownership, pet attachment, and resilience play in terms of wellbeing during different stages of the COVID-19 pandemic. Pet ownership and general pet attachment do not seem to be directly linked to wellbeing. Individual characteristics, particularly resilience, and specific types of pet attachment are important to consider, as some attachment types (e.g., *people substituting*) might have a negative relationship with wellbeing. Pet ownership and pet attachment in general might be unfavorable for people who are highly resilient. Nonetheless, people who struggle to cope with stressful situations might benefit from having pets and forming healthy bonds with them during times of adversity.

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References

Amiot, C. E., Gagné, C., & Bastian, B. (2022). Pet ownership and psychological well-being during the COVID-19 pandemic. *Scientific Reports*, *12*, Article 6091. https://doi.org/10.1038/s41598-022-10019-z

Avsec, A., Zager Kocjan, G., & Kavčič, T. (2021). COVID-19 lockdown distress, but not the infection concerns, shape psychological functioning during the pandemic: The mediating role of basic psychological needs. *Scandinavian Journal of Psychology*, *62*(5), 717-724. https://doi.org/10.1111/sjop.12758

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

Barcelos, A. M., Kargas, N., Maltby, J., Hall, S., & Mills, D. S. (2020). A framework for understanding how activities associated with dog ownership relate to human well-being. *Scientific Reports*, *10*, Article 11363. https://doi.org/10.1038/s41598-020-68446-9

Bech, P., Olsen, L. R., Kjoller, M., & Rasmussen, N. K. (2003). Measuring well-being rather than the absence of distress symptoms: A comparison of the SF-36 mental health subscale and the WHO-Five Well-Being Scale. *International Journal of Methods in Psychiatric Research*, *12*(2), 85-91. https://doi.org/10.1002/mpr.145

Bennett, P. C., Trigg, J. L., Godber, T., & Brown, C. (2015). An experience sampling approach to investigating associations between pet presence and indicators of psychological wellbeing and mood in older Australians. *Anthrozoös*, *28*(3), 403–420. https://doi.org/10.1080/08927936.2015.1052266

Bonanno, G. A., Rennicke, C., & Dekel, S. (2005). Self-enhancement among high-exposure survivors of the September 11th terrorist attack: Resilience or social maladjustment? *Journal of Personality and Social Psychology*, *88*(6), 984–998. https://doi.org/10.1037/0022-3514.88.6.984

Calvo, P., Bowen, J., Bulbena, A., Tobeña, A., & Fatjó, J. (2016). Highly educated men establish strong emotional links with their dogs: A study with Monash Dog Owner Relationship Scale (MDORS) in committed Spanish dog owners. *PLoS ONE*, *11*(12), Article e0168748. https://doi.org/10.1371/journal.pone.0168748

Cantarero, K., van Tilburg, W. A. P., & Smoktunowicz, E. (2021). Affirming basic psychological needs promotes mental well-being during the COVID-19 outbreak.

Social Psychological and Personality Science, *12*(5), 821–828. https://doi.org/10.1177/1948550620942708

Carlisle, G. K., Johnson, R. A., Wang, Z., Brosi, T. C., Rife, E. M., & Hutchison, A. (2020). Exploring human-companion animal interaction in families of children with autism. *Journal of Autism and Developmental Disorders*, *50*, 2793-2805. https://doi.org/10.1007/s10803-020-04390-x

Cavanaugh, L. A., Leonard, H. A., & Scammon, D. L. (2008). A tail of two personalities: How canine companions shape relationships and well-being. *Journal of Business Research*, *61*(5), 469–479. https://doi.org/10.1016/j.jbusres.2007.07.024

Clements, H., Valentin, S., Jenkins, N., Rankin, J., Gee, N. R., Snellgrove, D., & Sloman, K. A. (2021). Companion animal type and level of engagement matter: A mixed-methods study examining links between companion animal guardianship, loneliness and well-being during the COVID-19 pandemic. *Animals*, *11*(8), Article 2349. https://doi.org/10.3390/ani11082349

Conversano, C., Rotondo, A., Lensi, E., Della Vista, O., Arpone, F., & Reda, M. A. (2010). Optimism and its impact on mental and physical well-being. *Clinical Practice & Epidemiology in Mental Health*, *6*, 25–29. https://doi.org/10.2174/1745017901006010025

Damberg, S., & Frömbling, L. (2021). “Furry tales”: Pet ownership’s influence on subjective well-being during Covid-19 times. *Quality & Quantity*. https://doi.org/10.1007/s11135-021-01303-7

Datu, J. A. D., & Fincham, F. D. (2022). The relational and mental health payoffs of staying gritty during the COVID-19 pandemic: A cross-cultural study in the Philippines and the United States. *Journal of Social and Personal Relationships*, *39*(3), 459–480. https://doi.org/10.1177/02654075211029380

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Plenum Press.

Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227-268. https://doi.org/10.1207/S15327965PLI1104_01

Denis-Robichaud, J., Aenishaenslin, C., Richard, L., Desmarchelier, M., & Carabin, H. (2022). Association between pet ownership and mental health and well-being of Canadians assessed in a cross-sectional study during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, *19*(4), Article 2215. https://doi.org/10.3390/ijerph19042215

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D., Oishi, S., & Biswas-Diener, R. (2010). New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Social Indicators Research*, *97*, 143-156. https://doi.org/10.1007/s11205-009-9493-y

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

Duvall Antonacopoulos, N. M., & Pychyl, T. A. (2010). An examination of the potential role of pet ownership, human social support and pet attachment in the psychological health of individuals living alone. *Anthrozoös*, *23*(1), 37-54. https://doi.org/10.2752/175303710X12627079939143

Gagné, M. (2003). The role of autonomy support and autonomy orientation in prosocial behavior engagement. *Motivation and Emotion*, *27*(3), 199–223. https://doi.org/10.1023/A:1025007614869

Gasteiger, N., Vedhara, K., Massey, A., Jia, R., Ayling, K., Chalder, T., Coupland, C., & Broadbent, E. (2021). Depression, anxiety and stress during the COVID-19 pandemic: Results from a New Zealand cohort study on mental well-being. *BMJ Open*, *11*, Article e045325. http://doi.org/10.1136/bmjopen-2020-045325

Gilbey, A., & Tani, K. (2020). Pets and loneliness: Examining the efficacy of a popular measurement instrument. *Anthrozoös*, *33*(4), 529-546. https://doi.org/10.1080/08927936.2020.1771058

Grajfoner, D., Ke, G. N., & Wong, R. M. M. (2021). The effect of pets on human mental health and wellbeing during COVID-19 lockdown in Malaysia. *Animals*, *11*(9), Article 2689. https://doi.org/10.3390/ani11092689

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach.* Guildford Press.

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

Hu, T., Zhang, D., & Wang, J. (2015). A meta-analysis of the trait resilience and mental health. *Personality and Individual Differences*, *76*, 18-27. https://doi.org/10.1016/j.paid.2014.11.039

Hudson, J., Kuroda, Y., & Morel, P. C. H. (2021). Personality and motivational predictors of well-being and coping during COVID-19: A reversal theory analysis.

Personality and Individual Differences, *175*, Article 110703. https://doi.org/10.1016/j.paid.2021.110703

Janssens, M., Eshuis, J., Peeters, S., Lataster, J., Reijnders, J., Enders-Slegers, M. J., & Jacobs, N. (2020). The pet-effect in daily life: An experience sampling study on emotional wellbeing in pet owners. *Anthrozoös*, *33*(4), 579-588. https://doi.org/10.1080/08927936.2020.1771061

Johnson, T. P., Garrity, T. F., & Stallones, L. (1992). Psychometric evaluation of the Lexington Attachment to Pets Scale (LAPS). *Anthrozoös*, *5*(3), 160-175. https://doi.org/10.2752/089279392787011395

Kalenkoski, C. M., & Korankye, T. (2022). Enriching lives: How spending time with pets is related to the experiential well-being of older Americans. *Applied Research in Quality of Life*, *17*, 489–510. https://doi.org/10.1007/s11482-020-09908-0

Krause-Parello, C. A. (2012). Pet ownership and older women: The relationships among loneliness, pet attachment support, human social support, and depressed mood. *Geriatric Nursing*, *33*(3), 194-203. https://doi.org/10.1016/j.gerinurse.2011.12.005

Langfield, J., & James, C. (2009). Fishy tales: Experiences of the occupation of keeping fish as pets. *British Journal of Occupational Therapy*, *72*(8), 349–356. https://doi.org/10.1177/030802260907200805

Lewis, K. (2020). COVID-19: Preliminary data on the impact of social distancing on loneliness and mental health. *Journal of Psychiatric Practice*, *26*(5), 400-404. https://doi.org/10.1097/PRA.0000000000000488

Li, K., Tang, F., & Rauktis, M. (2020). Commitment and attachment to pet and emotional well-being among low-income pet owners. *Innovation in Aging*, *4*(*Suppl.* 1), 114. https://doi.org/10.1093/geroni/igaa057.376

Mahdiani, H., & Ungar, M. (2021). The dark side of resilience. *Adversity and Resilience Science*, *2*, 147-155. https://doi.org/10.1007/s42844-021-00031-z

Mak, W. W. S., Ng, I. S. W., & Wong, C. C. Y. (2011). Resilience: Enhancing well-being through the positive cognitive triad. *Journal of Counseling Psychology*, *58*(4), 610–617. https://doi.org/10.1037/a0025195

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), Article 895. https://doi.org/10.3390/ani11030895

Paredes, M. R., Apaolaza, V., Fernandez-Robin, C., Hartmann, P., & Yañez-Martinez, D. (2021). The impact of the COVID-19 pandemic on subjective mental well-being: The interplay of perceived threat, future anxiety and resilience. *Personality and Individual Differences*, *170*, Article 110455. https://doi.org/10.1016/j.paid.2020.110455

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*, 40-47. https://doi.org/10.1159/000081433

Parsons, C. E., LeBeau, R. T., Kringelbach, M. L., & Young, K. S. (2019). Pawsitively sad: Pet-owners are more sensitive to negative emotion in animal distress vocalizations. *Royal Society Open Science*, *6*(8), Article 181555. https://doi.org/10.1098/rsos.181555

Peacock, J., Chur-Hansen, A., & Winefield, H. (2012). Mental health implications of human attachment to companion animals. *Journal of Clinical Psychology*, *68*(3), 292-303. https://doi.org/10.1002/jclp.20866

Phillipou, A., Tan, E. J., Toh, W. L., Van Rheenen, T. E., Meyer, D., Neill, E., Sumner, P. J., & Rossell, S. L. (2021). Pet ownership and mental health during COVID-19 lockdown. *Australian Veterinary Journal*, *99*(10), 423–426. https://doi.org/10.1111/avj.13102

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*, Article 1428. https://doi.org/10.1186/s12889-019-7770-5

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), Article e0239397. https://doi.org/10.1371/journal.pone.0239397

Richard, A., Rohrmann, S., Vandeleur, C. L., Schmid, M., Barth, J., & Eichholzer, M. (2017). Loneliness is adversely associated with physical and mental health and lifestyle factors: Results from a Swiss national survey. *PLoS ONE*, *12*(7), Article e0181442. https://doi.org/10.1371/journal.pone.0181442

Rotonda, C., Brennstuhl, M. J., Eby, E., & Tarquinio, C. (2021). Impacts of COVID-19 on population well-being: Results of a web survey conducted in France during the

first quarantine in 2020. *European Journal of Trauma & Dissociation*, *5*(2), Article 100218. https://doi.org/10.1016/j.ejtd.2021.100218

Ryan, R. M., Bernstein, J. H., & Brown, K. W. (2010). Weekends, work, and well-being: Psychological need satisfactions and day of the week effects on mood, vitality, and physical symptoms. *Journal of Social and Clinical Psychology*, *29*(1), 95–122. https://doi.org/10.1521/jscp.2010.29.1.95

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *Journal of Personality and Social Psychology*, *67*(6), 1063-1078. https://doi.org/10.1037/0022-3514.67.6.1063

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The Brief Resilience Scale: Assessing the ability to bounce back. *International Journal of Behavioral Medicine*, *15*(3), 194–200. https://doi.org/10.1080/10705500802222972

Tan, J. S. Q., Fung, W., Tan, B. S. W., Low, J. Y., Syn, N. L., Goh, Y. X., & Pang, J. (2021). Association between pet ownership and physical activity and mental health during the COVID-19 “circuit breaker” in Singapore. *One Health*, *13*, Article 100343. https://doi.org/10.1016/j.onehlt.2021.100343

Tan, Y., Huang, C., Geng, Y., Cheung, S. P., & Zhang, S. (2021). Psychological well-being in Chinese college students during the COVID-19 pandemic: Roles of resilience and environmental stress. *Frontiers in Psychology*, *12*, Article 671553. https://doi.org/10.3389/fpsyg.2021.671553

Teo, J. T., & Thomas, S. J. (2019). Psychological mechanisms predicting wellbeing in pet owners: Rogers’ core conditions versus Bowlby’s attachment. *Anthrozoös*, *32*(3), 399-417. https://doi.org/10.1080/08927936.2019.1598660

van der Goot, W. E., Duvivier, R. J., Van Yperen, N. W., de Carvalho-Filho, M. A., Noot, K. E., Ikink, R., Gans, R. O. B., Kloeze, E., Tulleken, J. E., Lammers, A. J. J., Jaarsma, A. D. C., & Bierman, W. F. W. (2021). Psychological distress among frontline workers during the COVID-19 pandemic: A mixed-methods study. *PLoS ONE*, *16*(8), Article e0255510. https://doi.org/10.1371/journal.pone.0255510

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

Wu, C. S. T., Wong, R. S. M., & Chu, W. H. (2018). The association of pet ownership and attachment with perceived stress among Chinese adults. *Anthrozoös*, *31*(5), 577-586. https://doi.org/10.1080/08927936.2018.1505269

Xiong, J., Lipsitz, O., Nasri, F., Lui, L. M. W., Gill, H., Phan, L., Chen-Li, D., Iacobucci, M., Ho, R., Majeed, A., & McIntyre, R. S. (2020). Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *Journal of Affective Disorders*, *277*, 55-64. https://doi.org/10.1016/j.jad.2020.08.001

Zager Kocjan, G., Kavčič, T., & Avsec, A. (2021). Resilience matters: Explaining the association between personality and psychological functioning during the COVID-19 pandemic. *International Journal of Clinical and Health Psychology*, *21*(1), Article 100198. https://doi.org/10.1016/j.ijchp.2020.08.002

Zilcha-Mano, S., Mikulincer, M., & Shaver, P. R. (2012). Pets as safe havens and secure bases: The moderating role of pet attachment orientations. *Journal of Research in Personality*, *46*(5), 571-580. https://doi.org/10.1016/j.jrp.2012.06.005