



UWS Academic Portal

The role of human-pet attachment on people's mental health and wellbeing over time during COVID-19 lockdown

Hawkins, Roxanne D.; Brodie, Z.P.

Published: 04/11/2020

Document Version
Peer reviewed version

[Link to publication on the UWS Academic Portal](#)

Citation for published version (APA):

Hawkins, R. D., & Brodie, Z. P. (2020). *The role of human-pet attachment on people's mental health and wellbeing over time during COVID-19 lockdown*. NRS Mental Health 2020 Annual Scientific Meeting, United Kingdom.

General rights

Copyright and moral rights for the publications made accessible in the UWS Academic Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

If you believe that this document breaches copyright please contact pure@uws.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.

The role of human-pet attachment on people's mental health over time during COVID-19 lockdown.

Roxanne D. Hawkins¹, Brodie, Z.P.¹

¹Division of Psychology, School of Education and Social Sciences, the University of the West of Scotland, United Kingdom.

Address for correspondence: Dr Roxanne Hawkins, Division of Psychology, School of Education and Social Sciences. Elles Building East, Paisley Campus. University of West of Scotland. PA1 2BE, Scotland, United Kingdom. Email: roxanne.hawkins@uws.ac.uk.

Conflict of interest: None.

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

The role of human-pet attachment on people's mental health over time during COVID-19 lockdown.

Abstract

Due to the COVID-19 pandemic, people across the world have been in lockdown and are socially distancing, potentially impacting upon people's mental health. Given the large body of research demonstrating the potential buffering effect of pets against social isolation, this study aimed to examine whether pet presence and human-pet attachment acted as a protective factor against the negative impact of lockdown measures on human mental health over time. 86 participants completed an online survey at three time-points over lockdown, 2-weeks apart. The findings showed no difference between pet owners and non-pet owners. The findings did show that, at the beginning of lockdown, highly attached pet owners self-reported lower psychological wellbeing, and higher scores for depression, anxiety, stress, and negative affect. By time 2 and 3, these differences were no longer found, except for negative affect which was higher at time 2 as well. Highly attached pet owners displayed a reduction in anxiety from time 1 to 2, and a reduction in negative affect between time 2 and 3. Less attached pet owners displayed an increase in negative affect and anxiety from time 1 to 2, and an increase in negative affect from time 2 to 3. Taken together, these findings suggest that having a pet whom one is strongly attached to, may have caused unique hardships at the beginning of the pandemic that could have negatively influenced mental health, but over time, being highly attached to a pet may have been beneficial for reducing anxiety and negative emotions as restrictions began to lift. As the pandemic continues and local areas shift in and out of lockdown long-term, it is prudent that we continue to monitor the impact of

these restrictions and ongoing COVID-19 related stressors on the human-pet relationship as well as on both human and pet health and wellbeing.

Key words: Attachment; COVID-19; Human-animal interactions; Pets; Mental health

Introduction

Across the world, people continue to move in and out of ‘lockdown’, are socially distancing and participating in self-isolations to help prevent the spread of COVID-19. The pandemic has caused great uncertainty for many people (e.g. health, economy, employment, finances, relationships) which may be negatively impacting upon people’s mental health. Early publications have indicated possible rises in global mental health difficulties during the pandemic across several countries, such as increases in stress, depression, anxiety, insomnia, and post-traumatic stress symptoms (Liu et al., 2020; Ng et al., 2020; Özdin & Özdin, 2020; Rajkumar, 2020; Torales et al., 2020), as well as an epidemic of fear and panic (Yao et al., 2020). There were calls made to maximize existing resources and promote good mental health at home in the time of social isolation (Ng et al., 2020). Psychological distress because of the pandemic may be exacerbated in those who have been diagnosed with COVID-19, have been in ‘quarantine’, or had pre-existing psychiatric problems (Chatterjee et al., 2020). Furthermore, the psychiatric implications of a pandemic tend to be greater than the number of actual suspected cases of the virus (see Ornell et al., 2020; Yao et al., 2020).

Social connectedness is fundamental for positive mental wellbeing (Leamy et al., 2011; Saltzman et al., 2020), as is having good quality social networks for promoting resilience to adversity (Sippel et al., 2015). Yet, isolating oneself from others was key to preventing the spread of COVID-19 which is a concern for increasing loneliness (Li & Wang, 2020; Tull et al., 2020). Moreover, it is well-established that isolation and loneliness can increase risk for psychopathology (Henriksen et al., 2019; Mushtaq et al., 2014). An important social resource within the home during COVID-19 that should not be overlooked is companion animals, hereafter referred to as pets. A plethora of research provides evidence that people form strong, emotional connections to their pets, viewing them as an important and integral part of their families and social networks, which is important for wellbeing (McConnell et al., 2019). People form attachments to their animals consistent with human attachment theory (Beck & Madresh, 2008; Zilcha-Mano et al., 2011, 2012), and a positive or secure human-pet attachment has been associated with a range of positive health and wellbeing outcomes (see Teo & Thomas, 2019). There is evidence that pets have important psychosocial functions, offering social and emotional support, particularly during adversity (Carr et al., 2020; Wood et al., 2005). Pets may offer company to those feeling alone, preventing negative impacts of loneliness on mental wellbeing (*authors blinded for peer-review.*, in press), especially during COVID-19 restrictions (such as with pet dogs; Olivia & Johnston, 2020), although evidence regarding pets and loneliness is mixed (see Gilbey et al., 2020).

When examining pets and mental health, it is important to note that scientific interest remains in the early stages and is of an explorative nature. Those studies that do exist may lack in methodological rigour and rely on either qualitative data or cross-sectional data. Studies into animals and mental health have also focused on ‘therapy animals’ rather than pets and have focused on clinical populations rather than examining potential psychological benefits of pets

in the general population. Moreover, evidence of the impact of pets on mental health is mixed, with some studies either finding no effect or a negative impact on mental wellbeing (Wells & Rodi, 2000). For example, increased depression (Antonacopoulos & Pychyl, 2010), increased negative feelings such as guilt (*authors blinded for peer-review.*, in press), increased self-reported psychopathological symptoms in highly attached dog owners (Lass-Hennemann et al., 2020), and findings that caring for pets has been associated with increased negative health outcomes including depression (Parslow et al., 2005).

Despite the lack of scientific evidence, it is widely believed that pets are ‘good for us’ and so it may therefore come as no surprise that there had been a reported rise in animal adoptions and the purchasing of puppies during the outbreak of COVID-19 (Udale-Smith, 2020). The Kennel Club reported a 168% increase in people searching for puppies for sale online during 2 months of lockdown alone (The Kennel Club, 2020; Woodfield, 2020). Increased demand for pets during the pandemic, especially dogs, has raised concerns regarding increased puppy breeding, puppy farming, and dog thefts within the UK (McDonald & Otte, 2020; The Kennel Club, 2020; Woodfield, 2020). With this, there have also been concerns regarding increased pet abandonment, rehoming, and pet relinquishment as we move out of lockdown and life returns to ‘normal’ (Applebaum et al., 2020b). For these reasons, it is important to consider the question of whether there is an indeed a benefit of pet ownership and pet attachment for human psychological health and wellbeing during the COVID-19 pandemic.

Given recent findings suggesting that positive interactions with a pet is associated with emotional wellbeing, increased positive feelings, and buffers against negative feelings (Janssens et al., 2020), it is plausible to consider that pets may have provided psychological

benefit during ‘lockdown’. There is also evidence that acquiring a pet dog reduces loneliness (Powell et al., 2019), and that pets do provide psychological benefits to those experiencing mental health difficulties (Brooks et al., 2018). Emerging findings have also suggested that pet ownership may mitigate some of the detrimental psychological effects of COVID-19 lockdown (Ratschen et al., 2020).

Given the dearth of research exploring the impact of pet ownership and pet attachment on mental health and wellbeing during COVID-19 lockdown, the current study addresses this through assessing participants from the general population, both with and without a pet, and both with and without a mental health diagnosis. Given the quickly changing environment of the COVID-19 pandemic, it was important to assess mental health and wellbeing over time, and so this study aimed to assess participants at three time-points, 2-weeks apart, from the beginning of ‘full lockdown’ in most countries (April 2020). The current study aimed to address the following research question; Does human-pet attachment buffer against the negative impact of COVID-19 lockdown measures on human mental health and wellbeing over time? We hypothesised that pet presence and high human-pet attachment would be associated with fewer mental health symptoms and more positive wellbeing at all time points, thus pets will buffer against the potential negative impacts of being in ‘lockdown’ on psychological health.

Methods

Participants

158 participants (Table 1) in total completed the online survey at a single time point. 86 participants completed the survey at time 1 (T1), time 2 (T2) and time 3 (T3) and so data from those who participated in all three time-points is presented in this paper. Participants were aged 20-77 years (mean age = 41 years, SD= 14). All included countries were in 'lockdown' at the beginning of this study (mid-April 2020). Four people were displaying symptoms of COVID-19 at T1, but no participants were displaying symptoms at T2 and T3. 50% of participants were socially isolating or in 'quarantine' (restricted to house only) at T1, 28% isolating at T2, and 20% isolating at T3.

[Table 1 here]

Design and procedure

This study adopted a repeated-measures design whereby participants completed self-report measures for mental health and wellbeing at three time points, 2-weeks apart. The independent variable was pet attachment, and the dependant variables were general psychological wellbeing, depression, stress, anxiety, and positive and negative affect. Following ethical approval from the host institution, the quantitative online survey hosted on QuestionPro was distributed online through social media channels and interested participants could click a link to the survey and viewed an information sheet fully informing them about the aims of the study prior to deciding to take part. Participants were therefore self-selected and from a convenience sample. The only inclusion criteria were over the age of 18 years. Participants provided consent through an online consent form before being directed to the survey questions. Participation was optional and participants were able to withdraw from the study at any time. Given that some questions related to mental health, participants were

provided with mental health resources within the de-brief at the end of the survey, including resources specifically for supporting mental health during the pandemic. Participants were contacted twice, 2-weeks apart with the follow up surveys after they had completed survey 1. The first online survey took approximately 25 minutes to complete; surveys 2 and 3 took approximately 15 minutes to complete.

Measures

Socio-demographics: General demographic questions were collected (age, gender, location, family and relationship status, pet ownership, type of pet), along with general questions regarding mental health diagnoses, COVID-19 symptoms, whether they were in quarantine/socially isolating.

Attachment to Pets: The Lexington Attachment to Pets Scale (LAPS; Johnson, Garrity & Stallones, 1992) measures individuals' self-reported emotional attachment to their favourite pet animal. The measure, which has strong psychometric properties, is comprised of 23 items (e.g. "my pet and I have a very close relationship", "I consider my pet to be a friend") rated on a 4-point Likert scale from "strongly agree" to "strongly disagree". Scores range from 0 to 69 points, with higher scores indicating greater attachment. This measure was assessed at T1 only and overall attachment, rather than sub-measures, was examined in this paper. ($\alpha = .934$).

Psychological wellbeing: The Psychological General Well-Being Index (PGWBI) measures subjective self-reported wellbeing or distress and is a widely used and validated measure that demonstrates satisfactory internal construct validity (see Grossi et al., 2014; Lundgren-Nilsson et al., 2013). The measure is comprised of 22 polytomous items (e.g. "I was emotionally stable and sure of myself during the past two weeks", "my daily life was full

of things that were interesting to me”) measured on a 6-point Likert scale. A high score is indicative of high levels of psychological wellbeing (Grossi et al., 2014). This measure usually asks participants to think about the past month, but we wanted to capture feelings during the start of the pandemic and so the wording was altered to the past two weeks. The measure can be analysed as six separate subscales but the focus here was on global wellbeing scores where a maximum of 110 indicates the highest level of wellbeing. Cronbach’s alphas were: T1 ($\alpha = .951$), T2 ($\alpha = .950$), T3 ($\alpha = .962$).

Depression, anxiety and stress: The Depression Anxiety Stress Scales-21 (DASS-21, Lovibond & Lovibond, 1995) is a widely used and validated psychological self-report measure comprised of 21 items, 7 items per subscale: depression, anxiety and stress. Each item (e.g. “I felt down-hearted and blue”, “I felt close to panic”) is scored on a scale from 0 (did not apply to me at all) to 3 (applied to me very much). Participants are asked to rate each statement on how much it applied to them in the past week. Scores on the DASS-21 are multiplied by 2 to calculate the final score. Scores ‘above normal’ are 10 or more for depression, 8 or more for anxiety, and 14 or more for stress. Cronbach’s alphas were: T1 (Depression $\alpha=.920$, Anxiety $\alpha=.836$, Stress $\alpha=.859$), T2 (Depression $\alpha = .921$, Anxiety $\alpha = .737$, Stress $\alpha = .811$), and T3 (Depression $\alpha = .943$, Anxiety $\alpha = .930$, Stress $\alpha = .814$).

Positive and negative affect: The Positive and Negative Affect Scale (PANAS; Watson, Clark & Tellegen, 1988) is a widely used and validated psychological self-report measure, comprised of two subscales measuring positive and negative affect. Positive affect relates to positive emotions and expressions (such as joy and cheerfulness); negative affect relates to negative emotions and expressions (such as fear and sadness). Each scale is composed of 10 adjectives expressing feelings and emotions e.g. “excited,” or “distressed”, each rated on a five-point Likert scale from “1- not at all or very slightly” to “5- extremely”. Participants are asked to rate each item according to the extent that they felt at that time, or

how they felt over the past week. Cronbach's alphas were: T1 (Positive $\alpha = .909$, Negative $\alpha = .903$), T2 (Positive $\alpha = .934$, Negative $\alpha = .881$), T3 (Positive $\alpha = .921$, Negative $\alpha = .914$).

Analyses

Preliminary analyses found no impact of pet ownership alone (yes/no) or pet type, upon any mental health and wellbeing measures at any time point (all $p > .05$), and so this paper will focus on attachment (high/low) vs no pets. Two attachment categories were created with scores on or above our sample mean ($M=72.07$, range 36-87) being categorised as 'high attachment' ($n=33$) and scores below the sample mean being categorised as 'low attachment' ($n=27$) (Shore et al., 2005). Data were analysed at the individual level using the Statistical Package for the Social Sciences Statistics 25 (SPSS Inc.), with a two-tailed significance of $p < .05$. Following testing for basic assumptions prior to analysis, One-way ANOVA's tested potential differences in self-reported scores at each time point based on attachment category. Mixed ANOVA's examined whether pet attachment category (between-subjects, three levels) impacted upon potential change in scores for each measure (PGWBI, DASS-21, PANAS) over time (within-subjects with three levels; three time points). Potential confounding variables (socio-demographic questions) were first added in as co-variates in the analysis to examine if they had an impact on outcome measures, none of which were significant ($p > .05$) and so did not need to be controlled for. Significant interaction effects were followed up by simple main effects analysis (two-way repeated ANOVA's); non-significant interactions were followed up by within-subjects and between-subjects main effects analysis.

Results

Descriptive statistics

Fifty-six participants, out of seventy-two with pets, felt that their pet helped them to cope during lockdown. Examining descriptive statistics and general trends in the data (Table 2; Figures 1-6), highly attached participants demonstrated increased self-reported psychological wellbeing and positive affect scores, and decreased negative affect, depression, anxiety and stress scores between T1 and T2, and between T2 and T3. Participants who scored lower on pet attachment, demonstrated increased self-reported psychological wellbeing scores and decreased stress and negative affect scores, but increased depression and anxiety, and decreased positive affect scores between T1 and T2. Less attached participants demonstrated a decrease in psychological wellbeing and an increase in negative affect and depression, anxiety, and stress scores between T2 and T3. Participants without pets, demonstrated a slight decrease in self-reported psychological wellbeing, a decrease in positive affect, and an increase in negative affect and depression, anxiety and stress scores, between T1 and T2. Participants without pets demonstrated slightly increased scores for psychological wellbeing and positive affect, and decreased negative affect, depression and anxiety, between T2 and T3, but an increase in stress scores from T2 to T3.

Explorative analyses using paired-sample t-tests (supplementary material) examined differences in self-reported scores between T1 and T2, and between T2 and T3 individually for each attachment category. These analyses found no differences for self-reported psychological wellbeing, positive affect, nor anxiety or stress scores. However, those who scored lower on pet attachment displayed a significant increase in self-reported depression between T2 and T3 ($t(13)=-2.34, p = .036$), and a significant increase in negative affect from

T1 to T2 ($t(19)=4.04, p = .001$). Highly attached participants demonstrated significantly decreased negative affect scores between T1 and T3 ($t(24)=2.33, p = .029$).

[Table 2 here]

[Figures here]

Psychological wellbeing (PGWBI):

There was a significant difference between pet attachment category and psychological wellbeing at T1 only (Table 3); highly attached participants scored significantly lower on psychological wellbeing than those who scored lower on pet attachment ($p = .002$), with a mean difference of 16.28. There was no significant time*attachment category interaction for psychological wellbeing scores and no between-subjects main effect of attachment category (Table 4), meaning attachment to pets did not have an impact on change in self-reported psychological wellbeing over time.

Depression (DASS-21)

There was a significant difference between pet attachment category and depression scores at T1 only (Table 3); highly attached participants scored significantly higher on depression than those who scored lower on pet attachment ($p = .002$), with a mean difference of 9.38. There was a significant attachment time*attachment category interaction for depression scores (Table 4). However, following simple main effects analysis, the changes in depression scores

from T1 to T2 were not significantly dependent upon attachment category as no interaction was found ($F(2,59) = 1.01, p = .369, \eta^2 = .033$), similarly between T2 and T3 ($F(2,43)=2.5, p = .094, \eta^2 = .104$), meaning attachment to pets did not have an impact on change in self-reported depression over time.

Anxiety (DASS-21)

There was a significant difference between pet attachment category and anxiety scores at T1 only (Table 3); highly attached participants scored significantly higher on anxiety than those who scored low on attachment at T1 ($p = .008$), with a mean difference of 5.54. There was no significant time*attachment category interaction for anxiety scores (Table 4). There was a significant between-subjects main effect of attachment category (Table 4) with a significant difference between high and low attachment ($p = .019$). To find where this difference lay, a two-way repeated measures ANOVA found a significant change in scores between T1 to T2 ($p = .033$) for high vs low attachment ($p = .029$), but no significant change in scores between T2 and T3 ($p = .207$). This means that highly attached participants displaying a larger reduction in anxiety from T1 to T2 compared to those with low attachment who scored higher on anxiety from T1 to T2.

Stress (DASS-21)

There was a significant difference between pet attachment category and stress scores at T1 only (Table 3); highly attached participants scored significantly higher on stress than those who scored low on attachment at T1 ($p=.006$), with a mean difference of 6.26. There was no significant time*attachment category interaction for stress scores and no between-subjects

main effect of attachment category (Table 4), meaning attachment to pets did not have an impact on change in self-reported stress over time.

Positive Affect (PANAS):

There was a significant difference between pet attachment category and positive affect scores at T2 only (Table 3). Those who demonstrated low pet attachment scores, scored significantly higher on positive affect than those who had no pets at T2 ($p = .037$), with a mean difference of .775. There was no significant time*attachment category interaction for positive affect scores and no between-subjects main effect of attachment category (Table 4), meaning attachment category did not have an impact on change in self-reported positive affect over time.

Negative Affect (PANAS):

There was a significant difference between pet attachment category and negative affect scores at T1 and T2 (Table 3). Highly attached participants scored significantly higher on negative affect at T1 than those with low attachment ($p = .032$), with a mean difference of .497, and at T2 ($p = .030$) with a mean difference of .491. There was a significant time*attachment category interaction for negative affect scores (Table 4). Following simple main effects analysis, the changes in negative affect scores from T1 to T2 were not significantly dependent upon attachment category ($F(2,57)=2.75, p = .072, \eta^2 = .09$), but the changes at T2 to T3 marginally were ($F(2,42)=3.27, p = .048, \eta^2 = .14$), meaning attachment category had a significant impact upon change in self-reported negative affect scores from T2 to T3. Those with high attachment displayed reduced negative affect from T2 to T3 whereas those with low attachment displayed increased negative affect from T2 to T3.

[Tables 3 and 4 here]

Discussion

This study aimed to examine whether pet presence and human-pet attachment acted as a protective factor against the negative impact of lockdown measures on human mental health over time. Preliminary analyses found no impact of sociodemographic factors on mental health and wellbeing scores. We also found no impact of pet ownership (yes/no), or pet type. We did, however, find that those who were highly attached to their pet self-reported higher psychological difficulties at the beginning of lockdown. This included self-reported lower psychological wellbeing, and self-reported higher scores for depression, anxiety, stress, and negative affect. By time 2 and 3, these differences were no longer found, with the exception of negative affect which was also significantly higher at time 2. When examining change in scores over time, we found that highly attached participants displayed a significant reduction in anxiety from time 1 to time 2, and a significant reduction in negative affect between time 2 and time 3. Those who scored lower on pet attachment displayed a significant increase in anxiety from time 1 to time 2, and a significant increase in negative affect from time 2 to time 3. Taken together, these findings suggest that having a pet whom one is strongly attached to, may have caused unique hardships at the beginning of the pandemic that negatively impacted upon psychological difficulties, but over the course of lockdown, being highly attached to a pet animal may have been beneficial for reducing anxiety and negative emotions. Potential reasons for these findings are discussed below.

Firstly, we found that pet ownership alone did not impact upon self-reported psychological health during lockdown. This is in line with previous inconclusive findings when oversimplifying human-animal relationships by not considering individual differences within these relationships, such as level of the human-pet bond (Barcelos et al., 2020). For example, a recent study found that living with a pet did not influence feelings of social connectedness during the COVID-19 pandemic (Okabe-Miyamoto et al., 2020). Through examining studies into pet ownership and mental health, we find mixed evidence, such as for self-reported depression and anxiety, with some studies finding positive associations, some finding negative associations, and some finding no associations (Clark Cline, 2010; Fraser et al., 2020; Hughes et al., 2020). When going beyond simply owning a pet and examining the quality of these relationships or the level of attachment to pets, we tend to find some evidence of the benefits of pets for psychological health (e.g. Teo & Thomas, 2019). However, it should be noted that one study (Ratschen et al., 2020) found that pet ownership, but not pet attachment, was significantly associated with smaller decreases in mental health scores and smaller increases in loneliness scores during lockdown. Importantly though, this study was cross-sectional in nature, asking participants to reflect on the impact of their pet on perceived changes in mental health and loneliness, rather than directly measuring these factors across time as in the present study. It is important to consider that pets can also bring about hardship, and pet animals may have been detrimental to human wellbeing during the pandemic, with the human-pet relationship potentially being compromised as a result of stressors relating to COVID-19 (Applebaum et al., 2020b).

The current study found increased self-reported mental health difficulties at the beginning of lockdown for those who were highly attached to their pets. These findings are similar to Ratschen et al. (2020) who found that the strength of the human-animal bond was not

significantly associated with mental health and wellbeing scores since lockdown. However, Ratschen et al. did not explore potential change in these scores over time. There are several potential explanations for the reported heightened mental health difficulties in the current study. Firstly, at the beginning of lockdown, little was known about the virus, and there was global concern regarding the possibility of pet animals becoming infected with COVID-19 and transmitting the virus to others (Almendros, 2020), spreading fear amongst pet owners, and in some countries, leading to animal abuse and animal abandonment (Kim, 2020; Parry, 2020). Secondly, being highly attached to a pet, could become a barrier to health and wellbeing. For example, Applebaum et al. (2020a) found that in the U.S, pet owners, especially those highly attached to their pets, may delay or avoid both testing and treatment for COVID-19 due to concerns regarding their pets welfare, the quality of pet care in their absence, securing pet accommodation, and to avoid being separated from their pets. These worries and concerns may have potentially been present in those highly attached pet owners in our study. Across the world, there was also increased financial strain due to job losses and economic hardship. Such financial concerns could have extended to providing pet care (Parry, 2020). Previous research has indicated that worries over being able to provide for pet animals financially (such as paying for pet supplies and veterinary care) can impact negatively on mental wellbeing (Brooks et al., 2018).

At the beginning of lockdown, there were travel restrictions, and people were only allowed out of the house for one walk per day, increasing concern over prohibition of going on dog walks (Bowen et al., 2020) and potential concerns regarding limited exercise opportunities for dogs. Schools were also closed at the start of lockdown, meaning children were spending more time at home, increasing time spent with, and interactions with, animals within the home, potentially increasing risk for negative interactions and dog bites. For example, the UK

Dog's Trust (2020) found a 57% increase in dog's problem behaviours toward children such as growling and nipping, which is a source of concern for pet owning parents. Both Bowen et al. (2020) and Ratschen et al. (2020) found increased concerns over access to pet food and other pet supplies due to the closure of shops and 'panic buying' of pet food, as well as concerns over access to pet health care due to the closure of veterinary practices. Many businesses closed, including pet walking and pet sitting services, which could have put strain on those working at home who now have increased distractions and pet care responsibilities.

'Caregiver burden' in the form of increased pet care responsibilities, could have led to increased emotional distress (Christiansen et al., 2013). A report by the UK Dog's Trust (2020) showed that pet owners reported an increase in dogs' behavioural problems during lockdown due to owners change in routine and schedules and increased time at home. These behavioural problems included an 82% increase in dogs whining or barking while the owner was working or busy at home, and a 41% increase in clinginess and attention-seeking behaviours such as following owners around the house. Similar findings were found in Bowen et al. (2020) study with the addition of a reported increase in fear of loud or unexpected noises. These changes in dog behaviour and personality could have exacerbated this caregiver burden, thus intensifying mental health difficulties (Spitznagel et al., 2018), explaining our findings. Moreover, research has indicated that caring for animals with behavioural problems can take its toll on mental health, increasing stress and negative emotions (Buller & Ballantyne, 2020), which is concerning given the lack of opportunities to socialise new puppies due to social distancing, and the importance of puppy socialisation for the prevention of future behavioural problems (Howell et al., 2005). Furthermore, people have reported concern regarding their pets ability to cope once life goes 'back to normal' (Bowen et al., 2020; Ratschen et al., 2020).

The UK Dogs Trust (2020) reported that 34% of pet owners indicated feeling closer to their dog during lockdown, and 97% of pet owners reported to be happy to have the company of their dog during lockdown. In Bowen et al. (2020) study, 47% of pet owners reported that their pet had helped them “more” or “moderately more” compared to pre-lockdown and the human-pet bond strengthened during lockdown for 28.8% of dog owners. In our study, we found that 78% of pet owners believed that that their pet helped them to cope during lockdown. Perhaps pet owners were not aware of the potentially negative impact their pets were having on their mental health at the beginning of lockdown, or perhaps the perceived benefits of having a pet during lockdown outweighed the potential costs at the beginning of lockdown.

In the current study, we found changes in self-reported mental health and wellbeing over time. If the findings were due to the easing of restrictions alone, we perhaps wouldn't have expected to see these differences in patterns between the different pet attachment groups, and we would have arguably seen the same change in scores for all participants between times. This was not the case. Highly attached participants displayed significantly reduced anxiety and negative affect over time, whereas those with lower attachment, displayed a significant increase in anxiety and negative affect. Those with low attachment also displayed reduced psychological wellbeing and positive affect, and increased depression and stress overtime, but these changes were not significant. These findings therefore suggest that the restrictions at the beginning of lockdown may have had more of an impact on highly attached pet owners (note that we found the reverse when examining attachment to children with higher wellbeing seen at all time points; *authors blinded for peer-review*, under review). Once these restrictions started to lift during time 2 and 3 of the study, perhaps the benefits of pets (as indicated in other studies e.g. Ratschen et al., 2020) became more apparent. This is of course

just speculation, and further work is needed to examine whether this is indeed the case, such as through follow-up qualitative interviews, which are currently underway with our study participants. However, the findings do suggest a potential benefit of pet attachment for mental health and wellbeing during other adversities (e.g. *authors blinded for peer-review.*, in press), although it shouldn't be forgotten that scores for highly attached participants were not significantly different to those less attached or those for non-pet owners at time 2 or 3.

There is also the question of whether highly attached pet owners display certain characteristics that place them at higher risk for psychological difficulties, and whether those with pre-existing mental health problems are more likely to acquire a pet for support. If this is true, this would explain our findings because those who had pre-existing mental health difficulties are at higher risk for psychological distress due to COVID (Yao et al., 2020). One large study in Sweden, found that pet owners displayed higher rates of reported mental health problems than non-pet owners (Müllersdorf et al., 2010); in the UK, Ratschen et al. (2020) found a relationship between pre-lockdown mental health difficulties, and the strength of the human-pet bond; finally, Peacock et al. (2012) found a positive relationship between attachment to pets and psychological distress in the form of depression, anxiety, and somatoform symptoms. However, this does not explain why in our study, highly attached participants displayed reduced anxiety and negative affect over time, and those with low pet attachment self-reported higher anxiety, and negative emotions overtime. Furthermore, there is currently not enough evidence to conclude that highly attached pet owners display unique characteristics such as increased risk for psychological difficulties. Nevertheless, our findings further point to the importance of assessing the quality of the human-pet bond for mental health, rather than pet ownership alone.

A strength of the current study is that we examined the role of pet attachment in mental health overtime at several points across lockdown, whereas other cross-sectional studies only examined the impact of pets at one time point, and/or retrospectively (e.g. Ratschen et al., 2020). However, one study in Spain, examined lockdown with pets at the start of the pandemic, a similar time to our time 1, and found that 44.6% of participants reported that both their own, and their pets, quality of life had worsened during lockdown and this increased stress could have negatively impacted upon human-pet interactions. However, this study did not include measures to assess human mental health.

Whilst this study yielded important findings, there were limitations, most notably the sample size. Due to the small window of opportunity to recruit for this study at the start of lockdown, and the requirement to complete the measures every 2-weeks, our final sample size was small, was a convenience sample, and mostly comprised of females from the United Kingdom, thus limiting the generalisability of our findings and our analysis lacked statistical power. Previous studies have also highlighted problems with female biased samples, especially relating to pet ownership (Wilson & Barker, 2003). We did not find any differences between types of pet owned, which could have been due to the limited sample size and thus lack of representation of other types of pet owners (our sample consisted mostly of dog and cat owners). Further work is needed to examine whether other types of pets are helping or hindering people's wellbeing throughout the pandemic. Although a strength of our study was that we tested participants over time throughout lockdown, our study was of correlational nature and so we cannot establish causality. Local restrictions and advice throughout each timepoint would also be different for each participant depending on their

local area, which was out of our control. For example, some participants lived in areas where easing of restrictions came sooner than others, which could have impacted upon wellbeing at different timepoints, although we did control for socio-demographic factors in the analyses. Moreover, only four participants were displaying COVID-19 symptoms at time 1, and these were not confirmed cases due to lack of testing at the time; it would therefore be useful to examine the role of human-pet interactions, and the potential stressors relating to this relationship, for those who tested positive with the virus in a future study.

Conclusion

To our knowledge, this is the first study to assess pet attachment and mental health at multiple time points across COVID-19 lockdown. Although strong conclusions cannot be drawn from this study and causality cannot be established, our study shows that for some, the pandemic may have brought unique challenges and concerns for those who are highly attached to a pet animal, which negatively influenced mental health and wellbeing at the beginning of lockdown. However, overtime, when restrictions started to lift, and these concerns relaxed, being highly attached to a pet animal was beneficial for wellbeing in terms of reducing anxiety and negative emotions, although similar scores were found between the attachment groups at time three. These findings are important due to potential unrealistic high expectations of the wider public that pets bring mental wellbeing benefits, thus driving the demand for puppy breeding and purchasing during the pandemic. As the pandemic continues and local areas shift in and out of lockdown long-term, it is vital that we continue to monitor the impact of these restrictions and ongoing COVID-19 related stressors on the human-pet relationship as well as the impact on both human and pet health and wellbeing.

References

[Authors blinded for peer-review] (under review). The impact of child presence and parent-child attachment security on wellbeing during COVID-19 lockdown. Manuscript submitted for publication.

[Authors blinded for peer-review]. (in press). 'I Can't Give Up When I Have them to Care for': People's Experiences of Pets and their Mental Health. *Anthrozoös*.

Almendros, A. (2020). Can companion animals become infected with Covid-19? *Veterinary Record*, 186(12), 388-389.

Antonacopoulos, N. M. D., & 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.

Applebaum, J. W., Adams, B. L., Eliasson, M. N., Zsembik, B. A., & McDonald, S. E. (2020a). How pets factor into healthcare decisions for COVID-19: A one health perspective. *One Health*, 100176.

Applebaum, J. W., Tomlinson, C. A., Matijczak, A., McDonald, S. E., & Zsembik, B. A. (2020b). The Concerns, Difficulties, and Stressors of Caring for Pets during COVID-19: Results from a Large Survey of US Pet Owners. *Animals*, 10(10), 1882.

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(1), 1-12.

- Beck, L., & Madresh, E. A. (2008). Romantic partners and four-legged friends: An extension of attachment theory to relationships with pets. *Anthrozoös*, *21*(1), 43-56.
- 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*. Journal Pre-Proof. <https://doi.org/10.1016/j.jveb.2020.05.013>.
- Brooks, H. L., Rushton, K., Lovell, K., Bee, P., Walker, L., Grant, L., & Rogers, A. (2018). The power of support from companion animals for people living with mental health problems: a systematic review and narrative synthesis of the evidence. *BMC Psychiatry*, *18*(1), 1-12.
- Buller, K., & Ballantyne, K. C. (2020). Living with and loving a pet with behavioral problems: Pet owners' experiences. *Journal of Veterinary Behavior*, *37*. 41-47.
- Carr, D. C., Taylor, M. G., Gee, N. R., & Sachs-Ericsson, N. (2020). Psychological health benefits of companion animals following a social loss. *The Gerontologist*, *60*(3), 428-438.
- Chatterjee, S. S., Malathesh Barikar, C., & Mukherjee, A. (2020). Impact of COVID-19 pandemic on pre-existing mental health problems. *Asian Journal of Psychiatry*, *51*, 102071.
- Christiansen, S. B., Kristensen, A. T., Sandøe, P., & Lassen, J. (2013). Looking after chronically ill dogs: Impacts on the caregiver's life. *Anthrozoös*, *26*(4), 519-533.
- Clark Cline, K. M. (2010). Psychological effects of dog ownership: Role strain, role enhancement, and depression. *The Journal of Social Psychology*, *150*(2), 117-131.
- Dupuy, H. J. (1990). The Psychological General Wellbeing (PGWB) Index. In N. K. Wenger, M. E. Mattson, C. D. Furburg, & J. Elinson (Eds.), *Assessment of quality of life in clinical trials of cardiovascular therapies* (pp. 170–183). New York: Le Jacq Publishing.

- Fraser, G., Huang, Y., Robinson, K., Wilson, M. S., Bulbulia, J., & Sibley, C. G. (2020). New Zealand Pet Owners' Demographic Characteristics, Personality, and Health and Wellbeing: More Than Just a Fluff Piece. *Anthrozoös*, 33(4), 561-578.
- Gilbey, A., & Tani, K. (2020). Pets and Loneliness: Examining the Efficacy of a Popular Measurement Instrument. *Anthrozoös*, 33(4), 529-546.
- Grossi, E., Compare, A., & PGWBI, S. F. (2014). Psychological general well-being index (PGWB). *Encyclopedia of Quality of Life and Well-being*, 5152-5156.
- Henriksen, J., Larsen, E. R., Mattisson, C., & Andersson, N. W. (2019). Loneliness, health and mortality. *Epidemiology and Psychiatric Sciences*, 28(2), 234-239.
- Howell, T. J., King, T., & Bennett, P. C. (2015). Puppy parties and beyond: the role of early age socialization practices on adult dog behavior. *Veterinary Medicine: Research and Reports*, 6, 143–153.
- Hughes, M. J., Verreynne, M. L., Harpur, P., & Pachana, N. A. (2020). Companion animals and health in older populations: A systematic review. *Clinical Gerontologist*, 43(4), 365-377.
- 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.
- Johnson, T. P., Garrity, T. F., & Stallones, L. (1992). Psychometric evaluation of the Lexington attachment to pets scale (LAPS). *Anthrozoös*, 5(3), 160-175.
- Kim, A. (2020). CNN. March 15, 2020. *Cats and Dogs Abandoned at the Start of the Coronavirus Outbreak Are Now Starving or Being Killed*. Available at: <https://www.cnn.com/2020/03/15/asia/coronavirus-animals-pets-trnd/index.html>. Accessed October 21, 2020.

Lass-Hennemann, J., Schäfer, S. K., Sopp, M. R., & Michael, T. (2020). The relationship between dog ownership, psychopathological symptoms and health-benefitting factors in occupations at risk for traumatization. *International Journal of Environmental Research and Public Health*, 17(7), 2562. <https://doi.org/10.3390/ijerph17072562>.

Leamy, M., Bird, V., Le Boutillier, C., Williams, J. & Slade, M. (2011). Conceptual framework for personal recovery in mental health: systematic review and narrative synthesis. *The British Journal of Psychiatry*, 199, 445–452.

Li, L. Z., & Wang, S. (2020). Prevalence and predictors of general psychiatric disorders and loneliness during COVID-19 in the United Kingdom. *Psychiatry Research*, 113267.

Liu, N., Zhang, F., Wei, C., Jia, Y., Shang, Z., Sun, L., . . . Liu, W. (2020). Prevalence and predictors of PTSS during COVID-19 outbreak in China hardest-hit areas: Gender differences matter. *Psychiatry Research*, 287, 112921.
<https://doi.org/10.1016/j.psychres.2020.112921>

Lovibond, S.H. & Lovibond, P.F. (1995). *Manual for the Depression Anxiety & Stress Scales*. (2nd Ed.). Sydney: Psychology Foundation.

Lundgren-Nilsson, Å., Jonsdottir, I. H., Ahlborg, G., & Tennant, A. (2013). Construct validity of the psychological general well being index (PGWBI) in a sample of patients undergoing treatment for stress-related exhaustion: a rasch analysis. *Health and Quality of Life Outcomes*, 11(1), 2.

McConnell, A. R., Paige Lloyd, E., & Humphrey, B. T. (2019). We Are Family: Viewing Pets as Family Members Improves Wellbeing. *Anthrozoös*, 32(4), 459-470.

McDonald, H. & Otte, J. (2020). *One in four dogs bought during coronavirus lockdown 'could be from puppy farms'*. The Guardian, 17th August 2020. Accessed 22nd October 2020

from <https://www.theguardian.com/lifeandstyle/2020/aug/16/coronavirus-lockdown-surge-puppy-ownership-uk>

Müllersdorf, M., Granström, F., Sahlqvist, L., & Tillgren, P. (2010). Aspects of health, physical/leisure activities, work and socio-demographics associated with pet ownership in Sweden. *Scandinavian Journal of Public Health*, 38(1), 53-63.

Mushtaq, R., Shoib, S., Shah, T., & Mushtaq, S. (2014). Relationship between loneliness, psychiatric disorders and physical health? A review on the psychological aspects of loneliness. *Journal of Clinical and Diagnostic Research: JCDR*, 8(9), WE01.

Ng, Q. X., Chee, K. T., De Deyn, M. L. Z. Q., & Chua, Z. (2020). Staying connected during the COVID-19 pandemic. *International Journal of Social Psychiatry*, 0020764020926562.

Okabe-Miyamoto, K., Folk, D. P., Lyubomirsky, S., & Dunn, E. W. (2020, June 24). *Changes in Social Connection During COVID-19 Social Distancing: It's Not (Household) Size That Matters, It's Who You're With*. <https://doi.org/10.31234/osf.io/zdq6y>

Oliva, J. L., & Johnston, K. L. (2020). <? covid19?> 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*, 0020764020944195.

Ornell, F., Schuch, J. B., Sordi, A. O., & Kessler, F. H. P. (2020). "Pandemic fear" and COVID-19: mental health burden and strategies. *Brazilian Journal of Psychiatry*, 42(3), 232-235.

Parry, N. M. (2020). COVID-19 and pets: When pandemic meets panic. *Forensic Science International: Reports*, 100090. <https://doi.org/10.1016/j.fsir.2020.100090>.

- 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.
- 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.
- Powell, L., Edwards, K. M., McGreevy, P., Bauman, A., Podberscek, A., Neilly, B., ... & Stamatakis, E. (2019). Companion dog acquisition and mental well-being: a community-based three-arm controlled study. *BMC Public Health, 19*(1), 1428.
- Rajkumar, R. P. (2020). COVID-19 and mental health: A review of the existing literature. *Asian Journal of Psychiatry, 10*2066.
- Ratschen, E., Shoesmith, E., Shahab, L., Silva, K., Kale, D., Toner, P., ... & 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.
- Saltzman, L. Y., Hansel, T. C., & Bordnick, P. S. (2020). Loneliness, isolation, and social support factors in post-COVID-19 mental health. *Psychological Trauma: Theory, Research, Practice, and Policy, 12*(S1), S55-S57. <http://dx.doi.org/10.1037/tra0000703>
- Shore, E. R., Riley, M. L., & Douglas, D. K. (2006). Pet owner behaviors and attachment to yard versus house dogs. *Anthrozoös, 19*(4), 325-334.
- Sippel, L. M., Pietrzak, R. H., Charney, D. S., Mayes, L. C., & Southwick, S. M. (2015). How does social support enhance resilience in the trauma-exposed individual? *Ecology and Society, 20*(4), 10. <http://dx.doi.org/10.5751/ES-07832-200410>.

- Spitznagel, M. B., Jacobson, D. M., Cox, M. D., & Carlson, M. D. (2018). Predicting caregiver burden in general veterinary clients: contribution of companion animal clinical signs and problem behaviors. *The Veterinary Journal*, 236, 23-30.
- 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.
- The Kennel Club (2020). *The Covid-19 puppy boom - one in four admit impulse buying a pandemic puppy*. The Kennel Club website. 17 August 2020. Accessed 22nd October 2020 from <https://www.thekennelclub.org.uk/media-centre/2020/august/the-covid-19-puppy-boom-one-in-four-admit-impulse-buying-a-pandemic-puppy/>
- Torales, J., O'Higgins, M., Castaldelli-Maia, J. M., & Ventriglio, A. (2020). The outbreak of COVID-19 coronavirus and its impact on global mental health. *International Journal of Social Psychiatry*, 0020764020915212.
- Tull, M. T., Edmonds, K. A., Scamaldo, K., Richmond, J. R., Rose, J. P., & Gratz, K. L. (2020). Psychological Outcomes Associated with Stay-at-Home Orders and the Perceived Impact of COVID-19 on Daily Life. *Psychiatry Research*, 113098.
- Udale-Smith, A. (2020). *Coronavirus: Animal charities issue warning after rise in enquiries to adopt pets*. Sky News, March 23, 2020. Accessed 25/08/2020 from <https://news.sky.com/story/coronavirus-animal-charities-issue-warning-after-rise-in-enquiries-to-adopt-pets-11962246>.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063.

Wells, Y., & Rodi, H. (2000). Effects of pet ownership on the health and well-being of older people. *Australasian Journal on Ageing*, 19(3), 143-148.

Wilson, C. C., & Barker, S. B. (2003). Challenges in designing human-animal interaction research. *American Behavioral Scientist*, 47(1), 16-28.

Wood, L., Giles-Corti, B. & Bulsara, M. (2005). The pet connection: Pets as a conduit for social capital? *Social Science Medicine*, 61(6), 1159-1173.

Woodfield, A. (2020). *Coronavirus: Lockdown year 'worst ever' for dog thefts*. BBC News. 17th October 2020. Accessed 22nd October 2020 from <https://www.bbc.co.uk/news/uk-england-54372778>

Yao, H., Chen, J. H., & Xu, Y. F. (2020). Patients with mental health disorders in the COVID-19 epidemic. *The Lancet Psychiatry*, 7(4), e21.

Zilcha-Mano, S., Mikulincer, M., & Shaver, P. R. (2011). An attachment perspective on human–pet relationships: Conceptualization and assessment of pet attachment orientations. *Journal of Research in Personality*, 45(4), 345-357.

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.

Özdin, S., Özdin, Ş. B. (2020). Levels and predictors of anxiety, depression and health anxiety during COVID-19 pandemic in Turkish society: The importance of gender.

International Journal of Social Psychiatry. Advance online publication.

<https://doi.org/10.1177/0020764020927051>.