

# We Are Family: Viewing Pets as Family Members Improves Wellbeing

Allen R. McConnell\*, E. Paige Lloyd†, and  
Brandon T. Humphrey\*

\**Department of Psychology, Miami University, USA*

†*Department of Psychology, University of Denver, USA*

*Address for correspondence:*  
Allen R. McConnell,  
Department of Psychology,  
Miami University, Oxford,  
OH 45056, USA.  
E-mail:  
mconnar@miamioh.edu

**ABSTRACT** The current work investigated how viewing one's pet as a family member improves wellbeing. We hypothesized that including pets in a key social ingroup (i.e., family) would increase ascriptions of socially supportive traits to these animals, enhancing their perceived ability to provide social support to owners, which in turn promotes owner wellbeing. Study 1 used a correlational design and showed positive relations between viewing one's companion animal as a family member, greater perceptions of socially supportive traits, and better wellbeing as indexed by several measures of mental and physical health. Study 2 experimentally manipulated the extent to which participants viewed their pets as family members and found that inducing people to view companion animals as family members improved wellbeing. This study also provided evidence for the mediating role of socially supportive anthropomorphism, and it ruled out a mood-based alternative account. Pets can play an important role in providing social support that can improve people's mental and physical health, and the processes underlying how animals can be included in people's most important ingroup shed light on the psychology underlying how group memberships affect perceptions of humanity.

**Keywords:** anthropomorphism, human–animal interaction, pets, social support, wellbeing



Ascriptions of humanity are remarkably malleable. For instance, it has been argued that a continuum ranging from human to nonhuman animal explains when perceivers extend or deny, respectively, uniquely human characteristics such as nuanced emotions and cognitive abilities to entities (e.g., Haslam, 2006; Leyens et al., 2000; Rudman & Mescher, 2012). Just as humanity can be withheld from people (Epley & Waytz, 2010; Haslam & Loughnan, 2014), it can be extended to nonhuman agents. For example, lonely people are more likely to anthropomorphize animals by imbuing them with socially supportive traits such as “considerate” and “sympathetic,” presumably to establish social

connection with them (Epley, Akalis, Waytz, & Cacioppo, 2008). In the present research, we examined how socially supportive traits are applied to pets and how they might enhance owner wellbeing.

There has been considerable interest in the application of socially supportive attributes to nonhuman agents because they can serve people's affiliation needs (Epley, Waytz, & Cacioppo, 2007). Social connection is arguably the most powerful human motive (Baumeister & Leary, 1995), and without it, people experience poorer physical and mental health (e.g., House, Landis, & Umberson, 1988; McConnell, Strain, Brown, & Rydell, 2009; Uchino, Cacioppo, & Kiecolt-Glaser, 1996). Although there are many perspectives on anthropomorphism and on theory of mind (e.g., Gray, Gray, & Wegner, 2007; Haslam, 2006; Leyens et al., 2000; Mitchell & Hamm, 1997), in the current work we adopted the approach of Epley et al. (2008), involving the ascription of *socially supportive attributes* to entities, because we were interested in how perceptions of these qualities in companion animals impact wellbeing outcomes tied to social support. For example, people who anthropomorphize their pets by perceiving them as having more socially supportive attributes report receiving more social support from these animals and experience better mental and physical health (McConnell, Brown, Shoda, Stayton, & Martin, 2011). Moreover, people who are more likely to anthropomorphize (based on an individual difference measure) showed improved wellbeing following a social rejection experience after merely viewing animals (Brown, Hengy, & McConnell, 2016). Thus, people can use animals to enhance social connection, and perceiving socially supportive traits in these nonhuman entities (i.e., anthropomorphism) may provide wellbeing benefits.

Regardless of the actual capabilities of animals (e.g., Horowitz, 2009; Mitchell & Hamm, 1997), when people *believe* pets possess socially supportive attributes, it allows owners to experience a sense of social connection with these animals (Epley et al., 2007), promoting wellbeing (e.g., Campo & Uchino, 2013; McConnell et al., 2011). Yet, what factors lead people to view animals as psychological conspecifics? As noted, people often ascribe human qualities to animals in response to social isolation (Brown et al., 2016; Epley et al., 2008). Also, Filippi and colleagues (2010) found that vegetarians and vegans, compared with omnivores, showed similar empathetic neural activation patterns when viewing the suffering of animals and the suffering of human beings, suggesting that individuals motivated not to eat animals show comparable empathy toward people and animals. Similarly, research on moral expansiveness (e.g., Bastian, Loughnan, Haslam, & Radke, 2012; Crimston, Bain, Hornsey, & Bastian, 2016) has shown that people who include animals in their sphere of moral concern show greater prosocial motivations toward them (e.g., protecting their habitats, less interest in eating them).

In the current work, we explored another means by which greater ascription of human qualities might be triggered for animals: including them in the construal of family. The vast majority of people (96%) report that they have a "family," and 65% of people report that family is their most important ingroup (McConnell, Buchanan, Lloyd, & Skulborstad, 2019). One of the primary functions of ingroups is to provide social resources for its members (e.g., Correll & Park, 2005), and family is a key ingroup that promotes mental and physical health (McConnell et al., 2019). Further, 77% of dog and cat owners say their animals are family members despite that, by definition, pets are animals without consanguineous ties (McConnell, Lloyd, & Buchanan, 2017). We believe there are important consequences for owners extending familial status to companion animals. First, research has shown that as people include a greater diversity of entity types (e.g., neighbors, co-workers) in their personal definition of "family" (i.e., greater breadth of family inclusion), they enjoy better mental and physical health (Buchanan &

McConnell, 2017). These wellbeing benefits were observed both in correlational studies and in experimental studies where breadth of family inclusion was manipulated. Having a greater *diversity* of entities in this key ingroup provides people with more avenues for social support, which promotes resilience. Thus, as people include pets (i.e., add another entity type) in their construal of family, wellbeing benefits should follow.

Relatedly, the health benefits of animals in people's lives (e.g., pets, service animals) have been shown in many studies. For example, children growing up with a companion animal have greater self-confidence, self-esteem, and autonomy, compared with children without pets (Van Houtte & Jarvis, 1995). Also, pet owners, compared with non-owners, have greater self-esteem and are more physically fit (McConnell et al., 2011). Further, pet adopters showed a significant reduction in depression two months after doing so (McConnell et al., 2017). Finally, following heart attacks, pet owners were less likely to die one year later, compared with non-owners (1% vs. 7%, respectively; Friedmann & Thomas, 1995). To be clear, companion animals are not a panacea and some replication studies report null or mixed results (Amiot & Bastian, 2015; Herzog, 2011), but overall there is good evidence that pets can provide benefits through perceptions of enhanced social support, and these findings have been shown in several experimental studies (e.g., Allen, Shykoff, & Izzo, 2001; Brown et al., 2016; McConnell et al., 2011, 2017).

Because pet ownership can improve wellbeing, we anticipated that viewing companion animals as family members might increase ascribing them with socially supportive traits and, therefore, improve wellbeing. People ascribe greater human qualities to ingroup members compared with outgroup members (Leyens et al., 2000), and thus including a pet in a key ingroup (i.e., family) should extend socially supportive qualities to these animals (Epley et al., 2008), equipping them with more perceived capacity to offer social support that can enhance owner wellbeing (McConnell et al., 2011). Also, including a companion animal in one's construal of family diversifies the types of entities in family membership, which should improve wellbeing as well (Buchanan & McConnell, 2017). In the current work, we report two studies, one correlational and one experimental, examining this reasoning.

## Study 1

We first conducted a study to observe if there were relations between viewing one's pet as a family member, anthropomorphism, and wellbeing. We anticipated that more strongly viewing a companion animal as a family member should predict ascribing more socially supportive attributes to the pet and predict better wellbeing.

### Methods

*Participants:* Participants were recruited from Amazon's Mechanical Turk, an on-line marketplace matching paid participants with research projects (Buhrmester, Kwang, & Gosling, 2011). They were recruited for a study about people's experiences with pets, based on an approved human subjects protocol (Miami University IRB approval 01160r) and were told that individualizing information such as IP addresses would be deleted from datafiles to preserve anonymity. Power analyses, anticipating a small to medium effect size ( $|r| = 0.25$ ), indicated that a sample of 120 participants would achieve 80% power (Faul, Erdfelder, Buchner, & Lang, 2007). We collected data from 150 residents of the United States, anticipating that some would fail a reading check (Oppenheimer, Meyvis, & Davidenko, 2009) that was included to promote high-quality data (Aust, Diederhofen, Ullrich, & Musch, 2013). Indeed, 13 individuals failed the

reading check, resulting in a final sample of 137 participants ( $M_{\text{age}} = 39.25$ ,  $SD = 13.11$ ; 82 female, 54 male, 1 other).<sup>1</sup>

*Wellbeing Measures:* 1) *Psychological Needs:* First, participants completed the 17-item psychological needs scale (Zadro, Williams, & Richardson, 2004), assessing their sense of self-esteem, belonging, control, and meaningful existence. Participants rated their agreement with statements (e.g., “I feel good about myself”) responding on a scale ranging from 1 (not at all true) to 9 (completely true). Following past work (e.g., Bernstein, Sacco, Young, Hugenberg, & Cook, 2010; McConnell et al., 2011), we computed the mean response (7 items were reverse-scored) such that larger scores reflected greater psychological needs fulfillment ( $M = 6.73$ ,  $SD = 1.76$ ,  $\alpha = 0.97$ ).

2) *Self-esteem:* Participants completed a self-esteem scale (Rosenberg, 1965), rating their agreement with 10 statements (e.g., “At times, I think I am no good at all”) on a scale ranging from 1 (strongly disagree) to 4 (strongly agree). The mean response (half were reverse-scored) was computed, with larger scores indicating greater self-esteem ( $M = 3.16$ ,  $SD = 0.64$ ,  $\alpha = 0.92$ ).

3) *Depressed Affect:* Participants then completed the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) to assess depressed affect. Participants endorsed 20 statements reporting their experiences during the previous two weeks (e.g., “I felt that everything I did was an effort”) on a scale ranging from 1 (rarely or none of the time) to 4 (most or all of the time). The mean response was computed (three items were reverse-scored), with larger scores indicating more depressed affect ( $M = 1.72$ ,  $SD = 0.53$ ,  $\alpha = 0.92$ ).

4) *Stress-related Illnesses:* Afterwards, we assessed stress-related illnesses (Cohen & Hoberman, 1983) by asking participants to report whether they had been bothered by any of 33 symptoms in the previous two weeks (e.g., dizziness, muscle tension) using a “yes” or “no” response. The sum of participants’ physical symptoms was computed ( $M = 5.69$ ,  $SD = 5.94$ ,  $\alpha = 0.90$ ).

*Pet Measures:* 1) *Target Pet Identification:* Participants reported the number of animals in their immediate household ( $M = 4.20$ ,  $SD = 6.17$ ). Next, they were asked to think about their closest pet and report both the species and breed (if known) of it and to write its name. In this sample, there were 104 dogs, 43 cats, 1 bird, 1 rabbit, and 1 turtle identified as closest companion animal.<sup>2</sup> Participants were told to focus on this specific animal for all subsequent questions. They then responded to five questions about the animal (e.g., its age, how much care they gave it) to bolster the cover story that the study was interested in general pet experiences.

2) *Pet Anthropomorphism:* We then asked participants to complete the Epley et al. (2008) anthropomorphism scale. Participants indicated “to what extent does this pet exhibit the following qualities” on a scale ranging from 1 (not at all) to 9 (tremendously). We computed the mean response to items thoughtful, considerate, and sympathetic ( $M = 5.89$ ,  $SD = 2.35$ ,  $\alpha = 0.90$ ) because these three traits have been used in past work to examine socially supportive traits ascribed to animals (e.g., Epley et al., 2008; McConnell et al., 2011). We also examined the mean response to the other four items not related to social support (i.e., embarrassment, creativity, deviousness, jealousy). These items are not typically examined in work investigating animals as socially supportive agents, but we report them here for completeness ( $M = 4.02$ ,  $SD = 1.81$ ,  $\alpha = 0.63$ ).<sup>3</sup>

3) *Pet as a Family Member*: Next, participants answered the question, “When you think about a continuum of ‘being a family member,’ how do you view this pet?” using a scale ranging from 1 (not at all a family member) to 9 (completely a family member) ( $M = 8.20$ ,  $SD = 1.46$ ).

4) *Demographic Measures*: Before debriefing and payment, participants provided demographic information: gender, age, and country of origin.

## Results

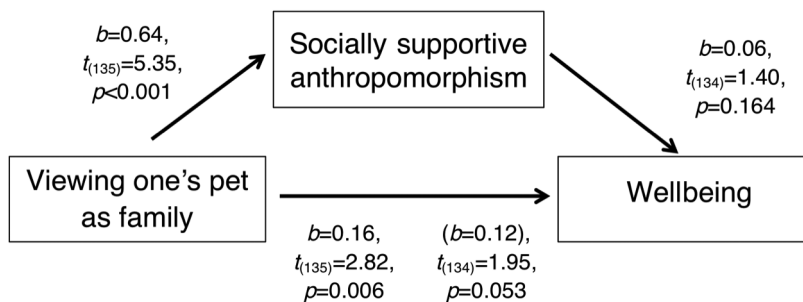
*Overall Wellbeing*: To produce an index of overall wellbeing, we calculated the mean scores for psychological needs, self-esteem, depressed affect, and stress-related illness measures, and then submitted those scores to a factor analysis, revealing a one-factor solution ( $\lambda_1 = 3.07$ , all other  $\lambda_s < 0.6$ ). Thus, a single factor score was computed for each participant—overall wellbeing—with larger scores indicating greater wellbeing (i.e., greater psychological needs fulfillment, greater self-esteem, less depressed affect, and fewer stress-related illnesses). The reduction of several converging measures of mental and physical health into a single factor score produced a reliable index of wellbeing, and this approach has been used in past work involving the health benefits of family (e.g., Buchanan & McConnell, 2017) and of pets (e.g., McConnell et al., 2011).

*Wellbeing, Pets as Family, and Anthropomorphism*: Our key prediction was that as people viewed their pet as a family member to a greater degree, they would experience greater wellbeing and ascribe more socially supportive traits to their companion animals. Participants reported greater wellbeing when they viewed their pet more strongly as a member of their family ( $r_{(136)} = 0.23$ ,  $p = 0.006$ ) and as they perceived their pet as possessing more socially supportive traits ( $r_{(140)} = 0.29$ ,  $p < 0.001$ ). In addition, viewing one’s companion animal more as a family member predicted perceptions of more socially supportive attributes ( $r_{(140)} = 0.48$ ,  $p < 0.001$ ). On the other hand, the degree to which people ascribed traits unrelated to social support to companion animals did not predict wellbeing ( $r_{(140)} = -0.07$ ,  $p = 0.421$ ), did not predict viewing the pet as a family member ( $r_{(140)} = 0.11$ ,  $p = 0.204$ ), and did not predict ascribing socially supportive traits to their pet ( $r_{(140)} = 0.09$ ,  $p = 0.314$ ). Thus, the effects of trait ascriptions to companion animals on wellbeing and family member ratings were specific to socially supportive attributes rather than to human-associated traits in general.

To test whether the effect of pet family member inclusion on wellbeing was mediated by socially supportive anthropomorphism, we conducted a mediational analysis with 5,000 bootstrapped resamples (Hayes, 2012). Results of this analysis are displayed in Figure 1. Although the once-significant direct effect between viewing one’s companion animal as more of a family member and greater wellbeing was rendered marginal when including socially supportive traits, the indirect effect was not significant, as indicated by the 95% CI including zero ( $b = 0.037$ , 95% CI =  $[-0.013, 0.101]$ ). These results suggest that perceptions of socially supportive traits did not statistically mediate the relation between viewing one’s companion animal as a family member and greater wellbeing.

## Discussion

Study 1 showed that viewing one’s pet as a family member to a greater degree predicted better wellbeing as indexed by self-esteem, psychological needs fulfillment, depressed affect, and stress-related illness. Further, seeing a companion animal as more of a family member predicted greater ascriptions of socially supportive traits to it. Although we observed these relations with anthropomorphism involving socially supportive traits, there were no relations



**Figure 1.** Mediation analysis testing whether socially supportive anthropomorphism mediates the relation between self-reports of viewing one's pet as a family member and overall wellbeing (Study 1). B-weight in parentheses reflects the effect of viewing one's pet as a family member in predicting wellbeing, while also including the mediator (socially supportive anthropomorphism) in the regression equation.

observed with traits unrelated to social support (Epley et al., 2008; McConnell et al., 2011), indicating that the links between family inclusion and health involving anthropomorphism involve the perception of socially supportive traits in particular and not just more human-associated traits across the board.<sup>4</sup>

In addition, we explored whether socially supportive traits might mediate the relation between viewing one's companion animal as family and wellbeing. Although the once-significant relation between viewing one's pet as family and greater wellbeing was rendered marginal when including the mediator in the regression equation, the bootstrap analysis did not show evidence of significant mediation. Although this outcome may cast a shadow on the possibility that socially supportive trait ascriptions underlie the relation between viewing pets as family members and greater wellbeing, relying on purely correlational variables in mediational analyses to establish causal claims is fraught (Bullock, Green, & Ha, 2010). In addition, because people's self-reports of their companion animals as family members was near the ceiling of the scale, it is possible that there was not sufficient variability in views of pets as family members in the current sample to fully evaluate the mediational model. Thus in study 2, we manipulated people's perceptions of their pet as being family members to provide an experimental test of the construct presumed to trigger greater socially supportive traits and greater wellbeing. Further, this manipulation should introduce greater variability in views of companion animals as family members than relying on pre-existing perceptions.

## Study 2

In study 2, rather than rely on people's pre-existing beliefs about the degree to which their pet was a family member, we systematically manipulated their perceptions. Specifically, participants initially completed a baseline measure of wellbeing to serve as a covariate before being randomly assigned to a condition to enhance viewing their pet as a family member (pet-is-family condition) or as an animal (pet-is-animal condition). We selected the latter as a comparison condition because of the human–animal continuum advanced by Haslam (2006) and others (e.g., Rudman & Mescher, 2012). Afterwards, participants completed a post-manipulation wellbeing measure and rated their pet's traits. Past work has used subtle writing manipulations involving one's pets (even though the animals are not present in the experimental

setting) and has shown effects on the same wellbeing outcome measure used in the current study (e.g., Brown et al., 2016; McConnell et al., 2011). We expected participants in the pet-is-family condition would show greater ascriptions of socially supportive traits and improved wellbeing. In addition, we assessed participant affect to ensure that effects of the experimental manipulation were not mood by-products (e.g., thinking about one's pet as a family member might increase positive affect, recalling a time when one's pet acted like an animal might be distressing) that could alter reports of wellbeing reports.

## Methods

*Participants:* We collected data from 165 undergraduates who attended a large university in the United States and participated for course credit, based on an approved human subjects protocol (Miami University IRB approval 01160r).<sup>5</sup> Participants were told that the study was examining experiences with pets and that the study required them to have a companion animal either at their campus household or at their parents' household. Similar to study 1, a reading check item was included, and 13 individuals failed it, resulting in a final sample of 152 participants ( $M_{\text{age}} = 18.76$ ,  $SD = 0.85$ ; 98 female, 53 male, and 1 who did not report gender). The study took approximately 20 minutes to complete.

*Procedure:* 1) *Baseline Wellbeing:* First, participants completed the subjective happiness scale (Lyubomirsky & Lepper, 1999) to provide a baseline measure of wellbeing to be used later as a covariate. This approach of using an initial wellbeing measure to serve as a covariate to detect modest shifts in end-of-study wellbeing was modeled after past published work (e.g., Buchanan & McConnell, 2017; McConnell et al., 2019), and this particular measure has been shown to correlate strongly with the wellbeing measures used in study 1 among pet owners (McConnell et al., 2011). The measure revealed good reliability ( $\alpha = 0.90$ ), and larger mean scores indicated better initial wellbeing ( $M = 5.09$ ,  $SD = 1.33$ ). There was no effect of experimental condition on the measure ( $F_{(1,150)} = 0.32$ ,  $p = 0.574$ ,  $\eta_p^2 = 0.00$ ).

2) *Target Pet Identification:* As in study 1, participants reported on the number of animals they had ( $M = 2.34$ ,  $SD = 2.46$ ). Next, they identified their closest companion animal and reported its species, breed, and name. In this sample, there were 125 dogs, 22 cats, 3 fish, 1 horse, and 1 rabbit identified as closest pet. Participants were told to focus on this specific animal for all subsequent questions. After responding to the same five questions about the companion animal for the cover story, they reported the extent to which they viewed their pet as "being a family member" on a scale ranging from 1 (not at all a family member) to 9 (completely a family member) ( $M = 8.41$ ,  $SD = 1.40$ ). Afterwards, they reported the extent to which they viewed their pet as a "pure animal" on a scale ranging from 1 (not at all a pure animal) to 9 (completely an animal) ( $M = 4.97$ ,  $SD = 1.85$ ). We used the latter scale because of the human-to-animal continuum outlined by Haslam (2006). As expected, these two items confirmed that there were no pre-existing differences in views of their pets before random assignment to conditions ( $t_s < 0.2$ ,  $p_s > 0.8$ ,  $d_s < 0.03$ ).

3) *Manipulation of Pet as Family:* Next, participants were told that the experimenters were "collecting real stories that people have about their pets" and that they would write about a real event involving their companion animal for use in future studies. They wrote for about 3–5 minutes before moving to the subsequent measures. Based on random assignment, participants in the pet-is-family condition wrote "about a real event involving your pet where your pet really seemed like a family member rather than an animal." An example of this is a story about

a dog who sat by the participant's mom for days after her brother died from cancer because the dog knew she was sad. For those in the pet-is-animal condition, participants wrote "about a real event involving your pet where your pet really seemed like an animal rather than a family member." An example of this is a story about a dog that killed a rabbit in the backyard and brought it to the participant.<sup>6</sup>

4) *Post-manipulation Wellbeing*: Following the manipulation, participants completed the Zadro et al. (2004) psychological needs scale, used in study 1, to provide a measure of final wellbeing ( $M = 6.98$ ,  $SD = 1.48$ ,  $\alpha = 0.94$ ).

5) *Pet Anthropomorphism*: Participants completed the Epley et al. (2008) anthropomorphism scale, used in study 1, with respect to their closest companion animal. Once again, we focused on their mean response to socially supportive items ( $M = 6.80$ ,  $SD = 2.00$ ,  $\alpha = 0.92$ ).<sup>7</sup>

6) *Mood Measure*: Finally, participants completed the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), which asks participants to consider 10 positive (e.g., inspired, proud) and 10 negative (e.g., upset, distressed) traits, rating each on the extent to which they felt them on a scale ranging from 1 (very slightly or not at all) to 5 (extremely). Following past work (e.g., Buchanan & McConnell, 2017), we reverse-scored the negative items and computed the mean overall scores, with larger scores reflecting more positive affect ( $M = 1.42$ ,  $SD = 1.07$ ,  $\alpha = 0.84$ ). The PANAS was included as a covariate to rule out general mood effects, and there was no effect of experimental condition on it ( $F_{(1,150)} = 0.86$ ,  $p = 0.391$ ,  $\eta_p^2 = 0.01$ ).

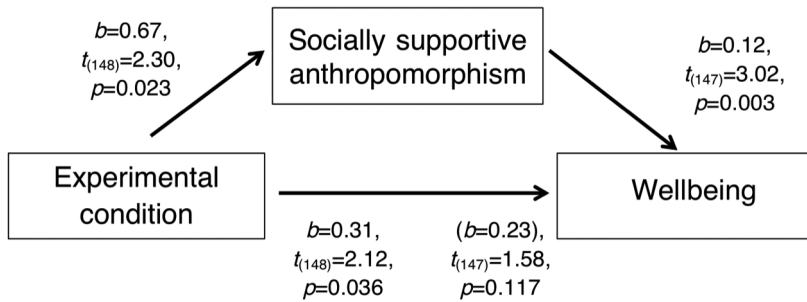
## Results

A one-way analysis of covariance (ANCOVA) was conducted on final wellbeing scores (psychological needs), with experimental condition as the between-subjects factor and initial wellbeing (subjective happiness) as the covariate. A main effect of condition was observed ( $F_{(1,149)} = 6.48$ ,  $p = 0.013$ ,  $\eta_p^2 = 0.04$ ), indicating that participants had greater wellbeing in the pet-is-family condition ( $M = 7.14$ ,  $SD = 1.36$ , 95% CI [6.96, 7.42]) than in the pet-is-animal condition ( $M = 6.83$ ,  $SD = 1.58$ , 95% CI [6.55, 7.01]). Further, the effect of condition persisted after an ANCOVA that included both baseline wellbeing and the mood measure as covariates ( $F_{(1,148)} = 4.50$ ,  $p = 0.036$ ,  $\eta_p^2 = 0.03$ ), indicating that the effect of experimental manipulation on post-manipulation wellbeing cannot be explained as a mood by-product.

Next, we conducted an ANCOVA to assess the effect of experimental condition on viewing one's companion animal as possessing socially supportive qualities, controlling for baseline wellbeing for comparability with the previous analysis. Once again, a main effect of condition was observed ( $F_{(1,149)} = 6.56$ ,  $p = 0.011$ ,  $\eta_p^2 = 0.04$ ), showing that participants ascribed more socially supportive attributes in the pet-is-family condition ( $M = 7.16$ ,  $SD = 1.80$ , 95% CI [6.76, 7.62]) than in the pet-is-animal condition ( $M = 6.42$ ,  $SD = 2.13$ , 95% CI [5.97, 6.82]). This effect of experimental condition persisted after an ANCOVA that included the mood measure as a covariate as well ( $F_{(1,148)} = 5.30$ ,  $p = 0.023$ ,  $\eta_p^2 = 0.04$ ).

To assess the potential mediating role of socially supportive trait ascriptions in accounting for the effect of experimental condition on wellbeing, a multiple regression was used predicting psychological needs (outcome) from subjective happiness (covariate), experimental condition (dummy coded), and ratings of socially supportive traits (mediator). We conducted the mediational analysis with 5,000 bootstrapped resamples (Hayes, 2012). The indirect effect was significant, indicated by 95% CIs not including zero ( $b = 0.136$ , 95% CI [0.030, 0.319]),





**Figure 2.** Mediation analysis testing whether socially supportive anthropomorphism mediates the relation between experimental condition (pet-is-family vs. pet-is-animal manipulation, dummy coded) and post-manipulation wellbeing, controlling for baseline wellbeing and PANAS (Study 2). B-weight in parentheses reflects the effect of experimental condition in predicting wellbeing, while also including the mediator (socially supportive anthropomorphism) in the regression equation.

suggesting that perceptions of socially supportive traits statistically account for the relation between experimental condition and post-manipulation wellbeing.

To rule out a mood effect alternative explanation, we conducted an additional mediation analysis in which we included PANAS as an additional covariate. As Figure 2 shows, the previous mediation findings were reconfirmed even when including mood in the model. That is, the indirect effect remained significant ( $b = 0.080$ , 95% CI [0.012, 0.217]). These results suggest that ascribing socially supportive traits to one's companion animal can statistically account for the relation between experimental condition and wellbeing improvement, and that this outcome does not appear to be a mood by-product.

### Discussion

Study 2 revisited the primary finding of study 1 to examine whether views of pets as family members affect wellbeing. Specifically, an experimental manipulation systematically altered views of companion animals such that focusing participants on viewing their pet as a family member (compared with an animal) improved wellbeing, and this enhancement was mediated by socially supportive trait ascriptions. Whereas study 1 relied on pre-existing views of pets as family members, study 2 used an experimental manipulation that presumably increased the variability in people's pet-as-family perceptions. Overall, thinking about pets as family members compared with animals led people to imbue their pets with socially supportive qualities, which led to enhanced wellbeing. Additional analyses considered, but ruled out, an alternative account based on mood effects.

### General Discussion

It is striking that so many people bestow their most positive ingroup membership status—family member—on pets, entities that are not human. In so doing, these animals are moved up the continuum of humanness and seen as having greater socially supportive qualities that, in turn, enhance owners' wellbeing. These findings complement work in the dehumanization literature, which show that people strip humanity away from outgroup members (e.g., Harris & Fiske, 2006; Leyens et al., 2000). Rather than viewing people as animals (e.g., Haslam, 2006), the current work shows that people extend their most sacrosanct ingroup member

status to animals, perceiving them as agents of social support that facilitate wellbeing (Epley & Waytz, 2010; McConnell et al., 2011).

Although there may be debate about the qualities and capability of animals (Horowitz, 2009; Mitchell & Hamm, 1997), the current work focused on owners' *perceptions* of their pets because these beliefs, regardless of veridicality, provide the experience of social support from companion animals that can promote wellbeing. The concept of family appears to impart considerable psychological capacity to entities that are not people. Recent work on families shows they are meaningful ingroups that enhance wellbeing because they provide social resources, identity, and coherence to family members (McConnell et al., 2019), and future work should consider whether these dimensions apply equally to pets. Further, when families are composed of many different types of entities, people's mental and physical health benefit (Buchanan & McConnell, 2017). The current findings add to this growing body of work, showing that "family member" status enhances perceptions of socially supportive traits in pets in particular and not just "more human-associated traits" in general.

In sum, pets can be seen as family members, allowing them to serve as social resources that in turn promote health and wellbeing for ingroup members (e.g., Correll & Park, 2005; Greenaway, Cruwys, Haslam, & Jetten, 2016). The case of pets highlights the flexibility of the human mind to perceive attributes in others to serve social connection. Although viewing non-consanguine people as family members (e.g., neighbors, co-workers) undoubtedly elevates the perceived capacities of such individuals to provide social support, the ascription of enhanced socially supportive traits to nonhuman agents provides a compelling demonstration of these motivated processes.

## Acknowledgements

This research supported by NICHD grant HD095132. We appreciate the helpful comments of three anonymous reviewers who provided feedback on earlier drafts of this paper.

## Conflicts of Interest

The authors declare there are no conflicts of interest.

## Notes

1. We had no predictions regarding gender effects, and we observed no gender effects on the dependent variables in either study ( $t_s < 1.41$ ,  $p_s > 0.160$ ,  $d_s < 0.25$ ).
2. We had no predictions regarding effects of pet species, and analyses investigating whether type of species (dogs vs. cats, where sufficient observations existed) showed no effects of pet type on the dependent variables in either study ( $t_s < 1.48$ ,  $p_s > 0.142$ ,  $d_s < 0.28$ ). The lack of species effects is consistent with past work examining the wellbeing benefits of pets (e.g., McConnell et al., 2011, 2017).
3. A factor analysis conducted on the 7-item measure revealed a 2-factor solution, with the three socially supportive items loading on the first factor ( $\lambda_1 = 2.68$ ) and the other four items loading on the second factor ( $\lambda_2 = 1.92$ ). In other words, the socially supportive attributes were strongly related to each other but distinct from the other four items, consistent with Epley et al. (2008).
4. One might wonder if viewing companion animals as family members is merely another measure of anthropomorphism. Although our predictions assume that greater perceptions of family member status for pets will increase ascribing socially supportive traits to these animals, the current findings argue against this alternative interpretation. First, although the relations between viewing pets as family and socially supportive trait ascriptions were significant, they were far from redundant (23% shared variance). Second, views of companion animals as family members were unrelated to ascribing non-supportive attributes, suggesting that viewing pets as family does not automatically apply human-associated traits across the board. Finally, if views of companion animals as family members and ascriptions of socially supportive traits were identical, there would be complete mediation in the analysis presented, which there was not.

5. Using assumptions guiding study 1, power analyses suggested a sample size of 128 participants for our ANCOVA design in study 2. Study 1 correlations involving viewing pets as family ranged from 0.20 to 0.42, however study 2 used a novel experimental manipulation that made comparisons with study 1 difficult. In the end, we simply collected as much data as possible for the remainder of the semester given that our study was restricted to subject pool participants with pets. We switched from an on-line sample to undergraduate participants in on-campus laboratories to have greater control over study conditions involving our experimental manipulation.
6. There were no differences between the pet-as-family and pet-as-animal conditions in number of cats ( $n = 11$  and  $n = 11$ ) and dogs ( $n = 62$  and  $n = 63$ ), respectively ( $\chi^2 = 0.002$ ,  $p = 0.972$ ).
7. There was no effect of experimental condition on mean ratings of non-supportive traits in ANCOVAs that paralleled the primary analyses (to be presented) ( $F_{(1,149)} = 0.42$ ,  $p = 0.519$ ,  $\eta_p^2 = 0.00$ ).

## References

- Allen, K., Shykoff, B. E., & Izzo, J. L. (2001). Pet ownership, but not ACE inhibitory therapy, blunts home blood pressure responses to mental stress. *Hypertension*, *38*, 815–820.
- Amiot, C. E., & Bastian, B. (2015). Toward a psychology of human–animal relations. *Psychological Bulletin*, *141*, 6–47.
- Aust, F., Diedenhofen, B., Ullrich, S., & Musch, J. (2013). Seriousness checks are useful to improve data validity in online research. *Behavior Research Methods*, *45*, 527–535.
- Bastian, B., Loughnan, S., Haslam, N., & Radke, H. R. (2012). Don't mind meat? The denial of mind to animals used for human consumption. *Personality and Social Psychology Bulletin*, *38*, 247–256.
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, *117*, 497–529.
- Bernstein, M. J., Sacco, D. F., Young, S. G., Hugenberg, K., & Cook, E. (2010). Being “in” with the in-crowd: The effects of social exclusion and inclusion are enhanced by the perceived essentialism of ingroups and outgroups. *Personality and Social Psychology Bulletin*, *36*, 999–1009.
- Brown, C. M., Hengy, S. M., & McConnell, A. R. (2016). Thinking about cats and dogs provides relief from social rejection. *Anthrozoös*, *29*, 47–58.
- Buchanan, T. M., & McConnell, A. R. (2017). Family as a source of support under stress: Benefits of greater breadth of family inclusion. *Self and Identity*, *16*, 97–122.
- Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's Mechanical Turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science*, *6*, 3–5.
- Bullock, J. G., Green, D. P., & Ha, S. E. (2010). Yes, but what's the mechanism? (Don't expect an easy answer). *Journal of Personality and Social Psychology*, *98*, 550–558.
- Campo, R. A., & Uchino, B. N. (2013). Humans' bonding with their companion dogs: Cardiovascular benefits during and after stress. *Journal of Sociology and Social Welfare*, *40*, 237–259.
- Cohen, S., & Hoberman, H. M. (1983). Positive events and social supports as buffers of life change stress. *Journal of Applied Social Psychology*, *13*, 99–125.
- Correll, J., & Park, B. (2005). A model of the ingroup as a social resource. *Personality and Social Psychology Review*, *9*, 341–359.
- Crimston, D., Bain, P. G., Hornsey, M. J., & Bastian, B. (2016). Moral expansiveness: Examining variability in the extension of the moral world. *Journal of Personality and Social Psychology*, *111*, 636–653.
- Epley, N., Akalis, S., Waytz, A., & Cacioppo, J. T. (2008). Creating social connection through inferential reproduction: Loneliness and perceived agency in gadgets, gods, and greyhounds. *Psychological Science*, *19*, 114–120.
- Epley, N., & Waytz, A. (2010). Mind perception. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of social psychology* (5th ed., pp. 498–541). Hoboken, NJ: John Wiley & Sons, Inc.
- Epley, N., Waytz, A., & Cacioppo, J. T. (2007). On seeing human: A three-factor theory of anthropomorphism. *Psychological Review*, *114*, 864–886.
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G\*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175–191.
- Filippi, M., Riccitelli, G., Falini, A., Di Salle, F., Vuilleumier, P., Comi, G., & Rocca, M. A. (2010). The brain functional networks associated to human and animal suffering differ among omnivores, vegetarians and vegans. *PLoS ONE*, *5*(5): e10847. doi:10.1371/journal.pone.0010847.

- Friedmann, E., & Thomas, S. A. (1995). Pet ownership, social support, and one-year survival after acute myocardial infarction in the Cardiac Arrhythmia Suppression Trial (CAST). *The American Journal of Cardiology*, *76*, 1213–1217.
- Gray, H. M., Gray, K., & Wegner, D. M. (2007). Dimensions of mind perception. *Science*, *315*, 619.
- Greenaway, K. H., Cruwys, T., Haslam, S. A., & Jetten, J. (2016). Social identities promote well-being because they satisfy global psychological needs. *European Journal of Social Psychology*, *46*, 294–307.
- Harris, L. T., & Fiske, S. T. (2006). Dehumanizing the lowest of the low: Neuroimaging responses to extreme out-groups. *Psychological Science*, *17*, 847–853.
- Haslam, N. (2006). Dehumanization: An integrative review. *Personality and Social Psychology Review*, *10*, 252–264.
- Haslam, N., & Loughnan, S. (2014). Dehumanization and infrahumanization. *Annual Review of Psychology*, *65*, 399–423.
- Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling. Retrieved from <http://www.afhayes.com/public/process2012.pdf>
- Herzog, H. (2011). The impact of pets on human health and psychological well-being: Fact, fiction, or hypothesis? *Current Directions in Psychological Science*, *20*, 236–239.
- Horowitz, A. (2009). *Inside of a dog: What dogs see, smell, and know*. New York, NY: Scribner.
- House, J. S., Landis, K. R., & Umberson, D. (1988). Social relationships and health. *Science*, *241*, 540–545.
- Leyens, J.-P., Paladino, P. M., Rodriguez-Torres, R., Vaes, J., Demoulin, S., Rodriguez-Perez, A., & Gaunt, R. (2000). The emotional side of prejudice: The attribution of secondary emotions to ingroups and outgroups. *Personality and Social Psychology Review*, *2*, 186–197.
- Lyubomirsky, S., & Lepper, H. S. (1999). A measure of subjective happiness: Preliminary reliability and construct validation. *Social Indicators Research*, *46*, 137–155.
- McConnell, A. R., Brown, C. M., Shoda, T. M., Stayton, L. E., & Martin, C. E. (2011). Friends with benefits: On the positive consequences of pet ownership. *Journal of Personality and Social Psychology*, *101*, 1239–1252.
- McConnell, A. R., Buchanan, T. M., Lloyd, E. P., & Skulborstad, H. M. (2019). Families as ingroups that provide social resources: Implications for well-being. *Self and Identity*, *18*, 306–330.
- McConnell, A. R., Lloyd, E. P., & Buchanan, T. M. (2017). Animals as friends: Social psychological implications of human–pet relationships. In M. Hojjat & A. Moyer (Eds.), *Psychology of friendship* (pp. 157–174). Oxford: Oxford University Press.
- McConnell, A. R., Strain, L. M., Brown, C. M., & Rydell, R. J. (2009). The simple life: On the benefits of low self-complexity. *Personality and Social Psychology Bulletin*, *35*, 823–835.
- Mitchell, R. W., & Hamm, M. (1997). The interpretation of animal psychology: Anthropomorphism or behavior reading? *Behaviour*, *134*, 173–204.
- Oppenheimer, D. M., Meyvis, T., & Davidenko, N. (2009). Instructional manipulation checks: Detecting satiscing to increase statistical power. *Journal of Experimental Social Psychology*, *45*, 867–872.
- Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, *1*, 385–401.
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.
- Rudman, L. A., & Mescher, K. (2012). Of animals and objects: Men's implicit dehumanization of women and likelihood of sexual aggression. *Personality and Social Psychology Bulletin*, *38*, 734–746.
- Uchino, B. N., Cacioppo, J. T., & Kiecolt-Glaser, J. K. (1996). The relationship between social support and physiological processes: A review with emphasis on underlying mechanisms and implications for health. *Psychological Bulletin*, *119*, 488–531.
- Van Houtte, B. A., & Jarvis, P. A. (1995). The role of pets in preadolescent psychosocial development. *Journal of Applied Developmental Psychology*, *16*, 463–479.
- 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*, 1063–1070.
- Wu, C. (2009). The relationship between attachment style and self-concept clarity: The mediation effect of self-esteem. *Personality and Individual Differences*, *47*, 42–46.
- Zadro, L., Williams, K. D., & Richardson, R. (2004). How low can you go? Ostracism by a computer is sufficient to lower self-reported levels of belonging, control, self-esteem, and meaningful existence. *Journal of Experimental Social Psychology*, *40*, 560–567.