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Nature's Best Friend: Viewing Pets as Having Greater Emotional Experience Increases Ecological Concern

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ABSTRACT

Human-caused environmental problems, such as climate change, affect the lives of both human and nonhuman animals, underscoring the importance of increasing pro-environmental action. The "Pets-As-Ambassadors" hypothesis proposes that care for companion animals may lead to concern for other animals and for nature more generally, but little research has examined the attributional processes underlying this effect or how these mechanisms may increase one's commitment to protecting nature. In two studies using American student samples, we investigated how perceiving companion animals as having greater capacities for emotional experience (e.g., feeling pain, pleasure) is beneficial for pro-environmental outcomes. Study 1 ($n = 179$) found that greater perceived pet emotional experience uniquely predicted greater nature-centered environmental motivations and pro-environmental behavioral intentions, whereas greater perceptions of pet agency (e.g., pets can plan, think) did not. Study 2 ($n = 182$) experimentally manipulated perceived pet emotional experience by having pet owners read articles describing companion animals as having either high or low capacities for emotional experience. Participants who read the high emotional experience article showed greater desire to help the environment compared with those who read the low-experience article, and this effect was mediated by greater nature-centered environmental motivations (when controlling for trait empathy). In addition to identifying attributional factors underlying the "Pets-As-Ambassadors" hypothesis, our findings support the two-dimensional model of mind attribution by showing how perceptions of emotional experience inspire biospheric concern and helping intentions, and they suggest a novel pathway for increasing pro-environmental outcomes by persuading people to see their companion animals as having sophisticated emotional lives.

The deleterious impacts of anthropogenic climate change on humanity are vast and growing, with more infectious diseases, forced migration of millions of people, growing food and economic insecurity, and more misery resulting from declines in mental and

physical health in the years ahead (Crimmins et al., 2016; Rigaud et al., 2018; Thomas et al., 2014). Further, climate change will greatly impact other animals, decreasing biodiversity (Arneth et al., 2020), producing the extinction of species (Román-Palacios & Wiens, 2020), and compromising the health of companion animals (Calderón-Garcidueñas et al., 2008; Lin et al., 2018). Climate change is an existential threat to all species, and we must respond to this crisis with greater pro-environmental motivation (Korach & McConnell, 2021; Van Vugt, 2009).

Although animals, human and nonhuman, are at grave risk from unsustainable behaviors that harm the environment, it may be possible to leverage human–animal bonds to encourage conservation action. Relationships with companion animals, in particular, offer one opportunity. Like other animals, pets are considered part of nature. However, pets are distinct from non-companion animals because they are social entities important to owner self-concepts (McConnell et al., 2011; Serpell & Paul, 1994). For example, companion animals are typically viewed as family members (McConnell et al., 2019; cf., Topolski et al., 2013) and are included in people's self-concepts as strongly as people's siblings (McConnell et al., 2011). Thus, the close connections that people experience with companion animals suggests that pet relationships might provide a powerful motivator for pro-environmental action.

The idea that pets are simultaneously natural entities and beloved family members inspired the "Pets-as-Ambassadors" hypothesis, which proposes that the positive attitudes people have toward pets may serve as a bridge in fostering positive attitudes toward animals and toward nature more broadly (Serpell & Paul, 1994). In support of this hypothesis, Auger and Amiot (2019a) found that more frequent contact with pets predicts greater inclusion of animals in one's self-concept, moral concern for animals, and behavioral intentions to act prosocially toward animals (see also Auger & Amiot, 2019b; Dhont & Hodson, 2014). However, past work examined only contact with pets rather than examining people's attributions about the qualities these companion animals possess (e.g., mind ascription), and it only examined how pets increased care for other animals rather than concern for nature as a whole. Concern for animal welfare might extend to nature more broadly, which is demonstrated by past research finding that greater concern for animals is associated with concern for the environment more generally (Crimston et al., 2016), suggesting that concern for animals and nature are linked.

The current work explored how relationships with companion animals could foster greater concern for the biosphere, and it examined how attributional processes involving one's pets may be critical in how companion animals foster greater concern for nature. Specifically, we focused on how people ascribe mind to their pets as a conduit for developing greater concern about nature. The two-dimensional model of mind perception (Gray et al., 2007; Waytz et al., 2010) describes how people attribute abilities to entities along two different dimensions: agency (i.e., capacity for deliberate action and self-control) and experience (i.e., capacity to feel bodily sensations and emotions). Generally, entities perceived as being more capable of emotional experience are treated with more moral concern and are deemed worthy of protection from harm, whereas ascriptions of agency are associated with moral blameworthiness and do not encourage safeguarding the entity (Gray & Wegner, 2009). Because pets are typically viewed as both part of nature and people's self-concepts (Serpell & Paul, 1994) and because concern toward

pets can spread to other entities (Auger & Amiot, 2019a, 2019b), we hypothesized that perceiving companion animals as experiencing feelings and emotions (i.e., pet experience) would elicit protective responses toward nature (but not pet agency, which is tied to blameworthiness).

If ascriptions of greater pet experience produce more concern about nature, this could be particularly beneficial for promoting pro-environmental orientations. Schultz (2001) found that environmental concerns fall into three clusters: *biospheric concerns* (e.g., how climate change affects plants and animals), *altruistic concerns* (e.g., how climate change affects other people), and *egoistic concerns* (e.g., how climate change affects oneself). Biospheric concern has been shown to be the strongest predictor of pro-environmental behavior, with altruistic concern only weakly predicting sustainable outcomes and egoistic concern sometimes predicting less pro-environmental behavior (Jacobs & McConnell, 2022; McConnell & Jacobs, 2020; Schultz, 2001; Schultz et al., 2004). Thus, the increased concern for nature itself (i.e., biospheric concern) that results from seeing pets as more capable of experience should promote protecting the environment.

Current Work

In two studies, we investigated how perceptions of companion animal capacities affect people's motivations to help the environment. Study 1 used a correlational approach exploring how ascriptions of pet experience (but not agency) are associated with pro-environmental outcomes. Applying the "Pets-as-Ambassadors" hypothesis (Serpell & Paul, 1994) and the two-dimensional model of mind perception (Gray et al., 2007), we hypothesized that seeing one's companion animal as having greater experience would predict greater biospheric concern (i.e., the form of environmental concern most strongly associated with positive conservation action) and greater behavioral intentions to help the environment.

Study 2 experimentally manipulated perceptions of emotional experience in companion animals. Specifically, participants were randomly assigned to read one of two fabricated news articles, a common manipulation in psychology research (e.g., Chiu et al., 1997; Levy & Stroessner, 1998; Ng & Tong, 2013; Plaks & Halvorson, 2013). In these articles, pets were described as possessing either greater or lower amounts of experience. It was hypothesized that being induced to believe that pets have relatively greater experience would produce more pro-environmental behavioral intentions and that this effect would be statistically mediated by greater biospheric concern. We anticipated this mediation because viewing pets as having more emotional experience should increase biospheric concern because pets are viewed to be natural entities (Serpell & Paul, 1994), and greater biospheric concern predicts more pro-environmental behavior (McConnell & Jacobs, 2020; Schultz, 2001).

Study 1: Perceptions of Pets' Minds and Environmental Outcomes

We hypothesized that seeing pets as having greater emotional experience, but not greater agency, would uniquely predict greater biospheric concern and pro-environmental behavioral intentions. We also considered the role of empathic concern, a

feeling of warmth and perspective taking toward suffering others (Davis, 1983), because it influences both pro-environmental behavior (Berenguer, 2007) and mind perception (Seyfarth & Cheney, 2013). These relations suggest that empathic concern could act as a third variable that could provide an alternative explanation for why experience predicts pro-environmental behavior. Further, we wanted to see if experience uniquely predicts pro-environmental outcomes above and beyond the known effects of empathy. Controlling for trait empathy in this way is common in research on prosocial behavior (e.g., Berry et al., 2018; Bruneau et al., 2017; Masten et al., 2011). For all these reasons, we made the *a priori* decision to include empathic concern as a covariate.

Methods

Participants

Data were collected from undergraduates who participated for course credit, based on an approved human-subjects protocol (#01805r). The study was described as examining human–pet relationships, and participants were required to have a companion animal either at their campus housing or at their parent's household. Sample size was determined using an *a priori* power analysis using the *pwr2ppl R* package (Aberson, 2019), assuming a small-to-medium effect size ($r = 0.21$) based on the average effect size in social psychology (Richard et al., 2003). A sample size of 175 was determined to achieve 80% power, and we recruited 187 participants anticipating that some people might fail a reading check included to ensure data quality (Aust et al., 2013). Indeed, eight participants failed the reading check, resulting in a final sample of 179 participants ($M_{age} = 18.77$, $SD = 1.38$; 145 women, 29 men, 5 other or preferred not to answer).

Measures

Trait Empathy. Participants completed a measure of trait empathic concern used as a covariate in later analyses. Specifically, they completed the 7-item Empathic Concern Scale (Davis, 1983), reporting the degree to which they react emotionally to others' suffering (e.g., "I often have tender, concerned feelings for people less fortunate than me") on a 1 (does not describe me) to 7 (describes me very well) scale. After reverse scoring relevant items, the mean response was computed ($M = 3.96$, $SD = 0.59$, $\alpha = 0.76$), with larger scores indicating greater trait empathy.

Target Pet Identification. Participants provided the name of their closest companion animal, its species, and the importance of their pet on a 1 (not at all important) to 7 (very important) scale ($M = 6.48$, $SD = 0.96$).

Perceptions of Pets' Minds. Next, participants completed measures of pet agency and experience, based on eight items from H. M. Gray et al.'s (2007) theory of mind model.[1] The measure included four items ($M = 5.40$, $SD = 1.04$, $\alpha = 0.75$) assessing pet agency (e.g., it can exercise self-control, has good memory) and four items ($M = 6.17$, $SD = 0.74$, $\alpha = 0.68$) measuring emotional experiences (e.g., it is capable of feeling fear, feeling pleasure), each on a scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Environmental Concern. Participants then responded to Schultz's (2001) 12-item Environmental Concern Scale, rating the importance of different concerns about environmental issues on a scale from 1 (not important) to 7 (supreme importance) for egoistic concerns (e.g., effects on my health, my lifestyle; $M = 5.87$, $SD = 1.02$, $α = 0.86$), altruistic concerns (e.g., effects on future generations, people in my community; $M = 6.00$, $SD = 1.16$, $α = 0.77$), and biospheric concerns (e.g., effects on plants, marine life; $M = 5.37$, $SD = 1.16$, $α = 0.82$).

Pro-environmental Behavioral Intentions. Finally, participants completed a commonly used measure (Pan et al., 2018) to assess their intentions to enact four different types of pro-environmental behavior in the future (e.g., household behaviors, consumer behaviors) on a 1 (strongly disagree) to 7 (strongly agree) scale. The mean response was computed ($M = 5.36$, $SD = 1.19$, $α = 0.86$), with larger values indicating greater intentions to perform pro-environmental behaviors.

Results

Partial Correlations

Partial correlations controlling for trait empathy are presented in Table 1.[2] First, perceived pet experience and agency were related with each other, showing that these ascriptions of pet mind were correlated though not at levels to question discriminant validity (i.e., *r*s > 0.80; Brown, 2006). As hypothesized, greater perceptions of pet experience predicted greater biospheric concern and greater pro-environmental behavioral intentions, but they were unrelated to egoistic concern or altruistic concern. Greater perceptions of pet agency were associated with greater egoistic concern and greater pro-environmental behavioral intentions. Also, greater biospheric concern predicted greater pro-environmental behavioral intentions and altruistic concern. Finally, greater altruistic concern was associated with greater egoistic concern, but altruistic and egoistic concern were not associated with greater pro-environmental behavioral intentions.

Multiple Regressions Analyses

Next, to assess the unique predictive utility of ascriptions of pet experience and agency in predicting environmental concern and behavioral intentions, multiple regression analyses were conducted where perceived pet experience and agency were entered simultaneously as predictors along with trait empathy as a covariate in predicting the three

Table 1. Partial correlations (controlling for trait empathic concern) between perceptions of pet's minds and environmental outcomes in study 1.

	Experience	Agency	BC	AC	EC
Perceived experience	–				
Perceived agency	0.59**	–			
Biospheric concern (BC)	0.22**	0.15	–		
Altruistic concern (AC)	0.03	0.03	0.25**	–	
Egoistic concern (EC)	0.02	0.18*	−0.04	0.52**	–
Pro-environmental intentions	0.26*	0.20**	0.40**	0.08	−0.04

*$p < 0.05$, **$p < 0.01$.

forms of environmental concern (i.e., biospheric, altruistic, egoistic) and pro-environmental intentions, with each outcome assessed in a separate regression analysis. As Table 2 reports, greater perceived pet experience uniquely predicted greater biospheric concern and more pro-environmental behavioral intentions. On the other hand, perceived pet agency did not uniquely predict either of those outcomes, but instead, it predicted greater egoistic concern.

Discussion

We observed that ascriptions of pet experience, but not pet agency, uniquely predicted pro-conservation outcomes (i.e., greater biospheric concern, stronger intentions to perform pro-environmental behaviors). Although people's perceptions of pets possessing experience and agency were related, the multiple regression analyses demonstrated that companion animal experience makes a distinct, unique contribution to pro-environmental outcomes, suggesting that perceiving one's pets as having the capacity for greater feelings might support people performing more pro-environmental actions. However, because study 1 was correlational in nature, study 2 was conducted to directly manipulate people's beliefs about pet experiences to provide stronger causal support for our predictions.

Study 2: Manipulating Pet Experience

Study 2 featured an experimental design to test causal effects of perceived companion animal experience on pro-environmental behavioral intentions. To better understand the mechanism underlying this anticipated effect, we examined two mediators. First, we measured biospheric concern (Schultz, 2001) because, according to the "Pets-As-Ambassadors" hypothesis (Serpell & Paul, 1994), viewing pets as having more experience should lead to greater concern about nature as a whole. We did not test this hypothesis in study 1 because mediation analyses can be problematic for purely correlational data (Trafimow, 2015). Nonetheless, the finding that perceived pet experience, biospheric concern, and behavioral intentions were intercorrelated in study 1 supports the possibility of mediation (Hayes, 2021). Although biospheric concern was the primary mechanism of interest, we also considered another potential mediator suggested by past research (Auger & Amiot, 2019a), moral circle size, which is the degree to which people deem a greater number of animals as being worthy of moral concern (Laham, 2009). We hypothesized that effects would be driven by greater concern for nature as a whole rather than

Table 2. Multiple regressions for unique predictive utility of perceived pet experience and perceived pet agency controlling for trait empathic concern (Study 1).

	Experience		Agency		Empathy		
	β	SE	B	SE	β	SE	R^2
Biospheric concern	0.20*	0.14	0.02	0.14	0.17*	0.15	0.09**
Altruistic concern	0.02	0.10	0.02	0.01	0.34**	0.10	0.12**
Egoistic concern	−0.14	0.13	0.26**	0.09	0.07	0.13	0.05*
Pro-environmental intentions	0.20*	0.14	0.06	0.10	0.35**	0.14	0.20**

*$p < 0.05$, **$p < 0.01$.

just concern for animals in particular, but it is plausible that seeing companion animals as greater in experience could lead to greater moral circle size and in turn to more pro-environment intentions. Finally, we made the *a priori* decision to include empathic concern as a covariate to be consistent with study 1 and because individual differences in empathy could obscure meaningful effects of the manipulation.

Methods

Participants
Data were collected from undergraduates who participated for course credit, based on an approved human-subjects protocol (#01805r), and participants were again required to have a companion animal either at their campus housing or in their parent's household. We conducted an *a priori* power analysis for mediation (Monte Carlo Power Analysis; Schoemann et al., 2017) using a desired power of 80% and effect size estimates from previously conducted research when available and assuming small-to-medium-sized effects ($r = 0.27$) elsewhere, which specified a target sample of 186 participants. We recruited 236 participants, anticipating that some of them might fail comprehension checks that were included to ensure data quality (Aust et al., 2013). These comprehension checks consisted of four items asking about factual information from the experimental manipulation article, and *a priori*, we determined that participants needed to answer at least three of these questions correctly for inclusion. Two participants were excluded for reporting that they did not have a companion animal, and 52 participants failed to correctly answer at least three of the four comprehension check items, producing a final sample of 182 participants ($M_{age} = 18.74$, $SD = 1.00$, 49 men, 133 women).[3]

Procedure
Target Pet Identification. First, participants identified their pet, its species, and rated its importance on a 1 (not at all important) to 7 (very important) scale ($M = 6.55$, $SD = 0.86$).

Trait Empathic Concern. Participants then completed the same measure of trait empathic concern from study 1 ($M = 4.03$, $SD = 0.62$, $a = 0.79$).

Manipulation of Perceived Pet Experience. Next, participants performed a "reading comprehension task," which asked them to carefully read a news article from *Psychology Today*. In actuality, participants were randomly assigned to read one of two fabricated articles designed to manipulate perceptions of pet experience (see online Supplemental Materials), each one entitled "Does your pet have emotional experiences?" Both articles were two-pages long (approximately 500 words) with identical formatting, including fabricated advertisements to increase realism. In the high (low) experience condition, the article described an interview with a fictional animal cognition expert who described how neuroimaging studies have decisively concluded that animals such as pets are (not) capable of high degrees of emotional experience. In the articles, identical observations (e.g., dog wagging its tail) were either described as evidence of strong emotional experiences within pets or not reflecting emotional experiences at all.

Manipulation Check. After reading the article, participants responded to the question "How much capacity for emotional experience do you believe pets have?" on a 1 (none at all) to 5 (a great deal) scale ($M = 3.85$, $SD = 1.00$) to ensure that the manipulation altered participants' perceptions of pet experience as intended.

Moral Circle Size. Next, participants completed a measure of moral circle size (Laham, 2009), reporting the degree to which different entities are deemed worthy of moral concern. Specifically, participants read a list of 20 different animals, ranging from wild animals, to livestock, to companion animals, and indicated which ones they felt morally obligated to protect. The total number of animals selected was used as the moral circle size ($M = 11.64$, $SD = 5.86$).

Environmental Concern. Next, participants completed the same Environmental Concern Scale used in study 1 to assess participant egoistic ($M = 5.83$, $SD = 1.03$, $\alpha = 0.85$), altruistic ($M = 6.16$, $SD = 0.91$, $\alpha = 0.85$), and biospheric ($M = 5.60$, $SD = 1.05$, $\alpha = 0.89$) concerns.

Pro-environmental Behavioral Intentions. Finally, participants completed the same measure of behavioral intentions used in study 1 ($M = 5.30$, $SD = 1.16$, $\alpha = 0.83$).

Results

Manipulation Check

To ensure that the articles affected perceptions of pet experience as expected, a one-way analysis of covariance (ANCOVA) was conducted on the manipulation check item, with experimental condition as the between-subjects factor and trait empathic concern as the covariate. There was a significant difference between groups ($F_{(1,179)} = 84.99$, $p < 0.001$, $\eta_p^2 = 0.32$, 95% CI [0.89, 1.38]), such that participants in the high-experience condition ($M = 4.39$, $SD = 0.99$) perceived companion animals as having greater experience than participants in the low-experience condition ($M = 3.25$, $SD = 0.71$).

Primary Analyses

A series of one-way ANCOVAs were conducted, with experimental condition as the between-subjects factor and trait empathic concern as the covariate.[4] As hypothesized, there was an effect of condition on pro-environmental behavioral intentions ($F_{(1,179)} = 10.59$, $p = 0.002$, $\eta_p^2 = 0.05$, 95% CI [0.19, 0.79]), such that participants in the high-experience condition ($M = 5.45$, $SD = 1.08$) had greater intentions to perform pro-environmental actions compared with those in the low-experience condition ($M = 5.12$, $SD = 1.08$).

Similar ANCOVAs were conducted on moral circle size and biospheric concern. There was no effect of condition on moral circle size ($F_{(1,179)} = 0.11$, $p = 0.740$, $\eta_p^2 < 0.01$). However, there was an effect of condition on biospheric concern ($F_{(1,179)} = 4.64$, $p = 0.033$, $\eta_p^2 = 0.03$, 95% CI [0.03, 0.62]), such that participants in the high-experience condition ($M = 5.71$, $SD = 0.95$) reported greater concern for protecting nature compared with participants in the low-experience condition ($M = 5.43$, $SD = 1.13$). Secondary analyses also found a significant effect of condition on altruistic concern ($F_{(1,179)} = 4.52$, $p = 0.035$, $\eta_p^2 = 0.03$, 95% CI [0.02, 0.49]), such that participants in the high-experience condition ($M = 6.22$, $SD = 0.78$) reported

greater concern about environmental issues for reasons related to people compared with those in the low-experience condition ($M = 6.10$, $SD = 1.03$). There was no significant effect on egoistic concern ($F_{(1,179)} = 3.86$, $p = 0.051$, $\eta_p^2 = 0.02$).

Mediation

Finally, as illustrated in Figure 1, we tested the hypothesis that increased biospheric concern mediates the effect of greater perceptions of pet experience to produce stronger pro-environmental behavioral intentions. The multiple regression analysis was conducted using Model 4 of the Hayes (2021) SPSS PROCESS macro using 5,000 bootstrapped samples with experimental condition as the focal predictor, biospheric concern as the mediator, behavioral intentions as the outcome, and trait empathic concern as a covariate. A significant indirect effect was found for biospheric concern because the bootstrapped 95% confidence intervals did not contain zero ($b = 0.13$, $SE = 0.07$, 95% CI [0.01, 0.28]), indicating that increases in biospheric concern can statistically account for the relation between the manipulation of greater pet experience and stronger pro-environmental behavioral intentions. In a secondary analysis, the indirect effect of altruistic concern was not significant because the bootstrapped confidence intervals contained zero ($b = 0.04$, 95% CI [−0.01, 0.13]).

Discussion

People's perceptions of pet experience were manipulated in study 2 to evaluate its causal effects on pro-environmental outcomes. Reading about how companion animals have greater levels of emotional experience led to stronger intentions to help the environment, and this effect was mediated by increases in nature-centered (i.e., biospheric) environmental concern. Greater perceptions of pet experience did not lead participants to expand their moral circle to include more animals, suggesting that perceiving greater levels of pet experience led to stronger pro-environmental behavioral intentions because of greater concern for nature in general rather than just broader concern for animals. These findings expanded on study 1 by demonstrating causal effects of
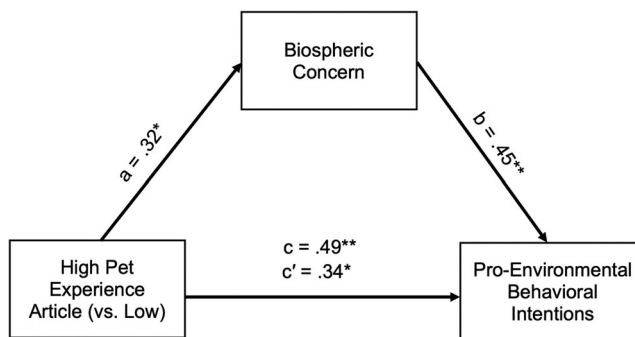

Figure 1. Mediation model of the indirect effect of the perceived pet experience article on pro-environmental behavioral intentions via biospheric concern while controlling for trait empathy. *p < 0.05, ** p < 0.01.

companion animal experience on pro-environmental intentions that were statistically explained by greater biospheric concern.

General Discussion

The "Pets-As-Ambassadors" hypothesis argues that leveraging people's companion animal relationships is a potential route to addressing environmental issues (Serpell & Paul, 1994), yet little research has examined how social cognitive processes involved in how relationships with pets can spur pro-environmental outcomes. In two studies, we explored how viewing one's pet as having greater emotional experience may encourage greater nature-centered environmental motivations and pro-environmental behavioral intentions. Study 1 found that greater perceived pet experience uniquely predicted greater biospheric concern and more pro-environmental intentions. Study 2 experimentally manipulated perceived pet experience, finding that pet owners who were induced to believe that animals have high levels of emotional experience displayed greater levels of biospheric concern, which in turn led to more pro-environmental behavioral intentions.

Past research on the "Pets-As-Ambassadors" hypothesis primarily focused on how contact with companion animals predicts greater concern for other animals (Auger & Amiot, 2019a, 2019b). We complement and extend this past work by demonstrating that the theory of mind people hold for companion animals (and specifically, perceptions of pet experience) supports greater environmentalism. Interestingly, study 1 found that greater perceived pet agency did not distinctly predict biospheric concern or pro-environmental intentions, indicating that it is not greater anthropomorphism of pets in general but rather specific attributions about pets' ability to have emotional experiences that support greater commitment to nature. These different effects for pet experience and agency are consistent with the two-dimensional model of mind perception, which theorizes that entities ascribed as having high levels of experience are deemed worthy of concern and protection, whereas entities perceived as having high levels of agency are instead attributed with moral blameworthiness (Gray & Wegner, 2009).

In study 2, our experimental induction of viewing pets as having greater levels of emotional experience did not lead participants to expand their moral circles to include a greater number of animals. This outcome may be surprising for some readers because past research on the "Pets-As-Ambassadors" hypothesis found that moral concern for pets can act as a bridge to moral concern for other animals (Auger & Amiot, 2019a). One explanation for the differences between these findings could be that the current work focused on people's mind attributions about their pets whereas past work examined the role of contact with pets. Thus, it is possible that having contact with pets leads to greater concern for other animals, whereas viewing pets as having more emotional capacity increases concern for nature more generally. Accordingly, these studies explored different antecedents (contact vs. theory of mind) and different outcomes (concern for animals vs. concern for nature). Regardless, more research is needed to better understand these differences and why they emerge. Further, the null findings for moral circle size somewhat differ from past research finding that seeing animals as having greater mental capabilities leads to more moral concern for animals (Leach et al., 2021). One possible explanation is that the moral

circle size measure used in study 2 was not normally distributed, as indicated by Shapiro–Wilk and Kolmogorov–Smirnov normality tests ($p < 0.05$), which violates the assumptions of ANCOVA. Despite the issues with this measure, moral concern for animals theoretically should be affected by mind attribution, and future research should explore whether it can serve a mediating role in these outcomes.

Some readers may also wonder if the current findings are driven by general mind attribution rather than by the specific ascription of experience. This thought may arise because some past research using the H. M. Gray et al. (2007) measure observed a one-factor solution when analyzed at the participant level (Piazza et al., 2014). Similarly, Leach et al. (2021) found ascribing animals the capacity for empathy was related to both greater experience and agency. However, we believe it is unlikely that our findings are driven by general mind attribution rather than by experience. First, a confirmatory factor analysis found a two-factor solution was better than a one-factor solution (see online Supplemental Materials; Table S1). Second, our study 2 manipulation specifically targeted experience, although future work could explore whether it also affected agency. Third, study 1 multiple regression analyses found that perceptions of pet experience, controlling for pet agency, predicted pro-environmental commitment. Finally, treating experience and agency independently is supported by diverse streams of research finding that mind perception is based on two dimensions (e.g., Fiske et al., 2007; Gray et al., 2007; Gray & Wegner, 2009; Matsui & Yamada, 2017; Todorov et al., 2008). Nonetheless, future work should consider the number of dimensions necessary to capture animal mind perception and how manipulating these dimensions might have broader impacts.

Although the current work provides compelling preliminary evidence for the role of pet mind perception in motivating pro-environmental beliefs, there are remaining questions that should be addressed in future work. First, the current studies measured self-reported pro-environmental behavioral intentions, which do not always correspond to real-world conservation behavior (Lange & Dewitte, 2019). Future work should measure actual pro-environmental behavior, such as recycling behavior or writing letters to political leaders regarding pro-environmental policies (Jacobs et al., 2021). Another issue is that both studies used student samples from the same country; future work should use more diverse, international samples to improve external validity (Henrich et al., 2010) and to consider characteristics of college student populations such as possessing greater environmental concern (Clements, 2012). Finally, the current work only examined pet owners because personal companion animals are usually included in one's self-concept (McConnell et al., 2019), and thus perceiving one's personal companion animal as having more emotional experience should be particularly motivating. Nonetheless, because mere contact with a companion animal can be sufficient to elicit greater concerns for other animals (Auger & Amiot, 2017), it is possible that viewing any animal as having more emotional experience could lead to greater biospheric concern.

In addition to addressing these limitations, new directions for future work are suggested by these findings. For example, much past work explored the implications of companion animal anthropomorphism, especially with respect to health benefits for pet guardians (e.g., Brown et al., 2016; McConnell et al., 2011, 2019), yet the current work demonstrates that ascribing elements of humanity to animals is more nuanced (i.e., agency and experience have different effects). Thus, in situations where social

connectedness is the route by which pets promote owner wellbeing, it may be ascriptions of experience in particular that drive wellbeing benefits (McConnell et al., 2017).

Conclusion

In sum, viewing companion animals as having greater capacities to feel emotions and sensations can lead to greater ecological concern and spur people to help nature. The current work connects diverse literatures (i.e., "Pets-As-Ambassadors" hypothesis, mind attribution, environmental psychology) to understand how human–companion animal relationships support sustainability and to develop potential interventions for addressing crucial environmental issues that affect all animals, human and nonhuman.

Notes

1. Table S1 in the online Supplemental Materials reports a confirmatory factor analysis finding that a two-factor solution provides a significantly better fit than a one-factor solution, although neither model provides a great fit.
2. Zero-order correlations including trait empathic concern can be found in the online Supplemental Materials (Table S2), and analyses that include participants who failed attention checks can be found in Tables S3 and S4.
3. Analyses that include participants who failed multiple comprehension checks can be found in the online Supplemental Materials (Table S5); there are no significant effects if these inattentive participants are included.
4. Analyses without the covariate can be found in the online Supplemental Materials (Table S6); we note that the effects on intentions and biospheric concern are not significant without the covariate.

Disclosure Statement

No potential conflict of interest was reported by the authors.

Funding

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