

# Thinking about Cats or Dogs Provides Relief from Social Rejection

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**ABSTRACT** Past research shows that anthropomorphizing animals and non-human objects is correlated with unmet social needs (e.g., loneliness), and momentary feelings of social rejection can be soothed by thinking about a pet or by having a dog nearby. The current work tested whether thinking of names for cats and dogs improves wellbeing after social rejection, as well as whether this phenomenon occurs because of a unique quality of animals or because of anthropomorphism more generally. In three studies, participants relived a past experience of social rejection, social acceptance, or a physical injury (a control condition), after which they reported their current wellbeing. Next, participants named either cats or dogs (studies 1, 2, 3), people (study 2), or plastic toys (study 3) before reporting their current wellbeing for a second time. Across all three studies, naming cats or dogs reduced feelings of social rejection. Naming anthropomorphic plastic toys, however, produced a similar effect. To test the role of anthropomorphism in this phenomenon, study 3 also measured participants' chronic tendency to anthropomorphize and included a condition in which participants only viewed animals or toys. Rejected participants who simply viewed photos of cats or dogs (without naming them) experienced improved wellbeing if they were already dispositionally inclined to engage in anthropomorphism. Collectively, these results suggest that briefly thinking about cats or dogs is an effective strategy for improving feelings of social rejection and that general processes involving anthropomorphism can produce this ameliorative effect.

**Keywords:** anthropomorphism, ostracism, pets, social rejection



People who adopt animals as pets face significant financial and emotional costs. For example, the United States Bureau of Labor (Henderson 2013) estimates the average annual cost of pets to US households is \$500. Emotionally, the inevitable death of these companions can evoke profound grief (e.g., Gosse and Barnes 1994; Wrobel

and Dye 2003). Yet between half to three-quarters of American households have a pet (Henderson 2013), suggesting the benefits of pet ownership outweigh the costs.

One of the primary benefits of pet ownership is companionship. There is a long history of pet owners viewing their pets as family members (e.g., Cain 1985; Albert and Bulcroft 1987; Bonas, McNicholas and Collis 2000). Indeed, recent work within the US shows that approximately 77% of pet owners consider their pet to be “family” (McConnell, Lloyd and Shoda in press), and pet owners report that pets provide social support comparable to that received from their friends (McConnell et al. 2011). Although companionship with a pet generally does not come at the cost of having supportive relationships with other humans (McConnell et al. 2011), there is a weak relationship between chronic loneliness and a greater tendency to see human-like qualities in animals (i.e., anthropomorphism of animals; e.g., Epley, Schroeder and Waytz 2013). In addition, experimental inductions of loneliness increase anthropomorphism of animals (as well as of gadgets, plants, and other nonhuman stimuli; e.g., Epley et al. 2008a), suggesting that relationships with pets may sometimes be used as a substitute for insufficient companionship with other humans.

### *Animals as a Treatment for Social Rejection*

People who connect with animals to cope with their own loneliness are actually using an effective emotion regulation strategy, as animals have been found to offset feelings of rejection caused by other humans. For example, when college students are asked to relive the pain of past social rejection, subsequently writing about their pet reduces feelings of rejection as effectively as writing about their best friend, both of which alleviate rejection more than drawing a map of their campus (McConnell et al. 2011). This shows that an animal with whom one shares a connection can offset feelings of social rejection, and related research identifies anthropomorphism as a primary mechanism by which animals comfort humans (e.g., Epley et al. 2008a, b; Epley, Schroeder and Waytz 2013).

On the other hand, the mere presence of a dog may be sufficient to erase hurt feelings caused by other humans. Specifically, participants who are induced to feel social rejection report better mental health if they subsequently sit in a room with a dog present, relative to a control condition with no dog (Aydin et al. 2012). In the study in which this effect was observed, participants did not interact with the dog nor did they have a prior emotional connection with it. This suggests the mere presence of a dog can provide comfort, but there are alternative explanations. First, the dog may have been distracting, as the presence of a dog in an academic building is usually a novelty. Second, the dog was introduced to participants as “Lili,” which may have encouraged participants to anthropomorphize her. As mentioned previously, anthropomorphism in general, not just anthropomorphism of animals, reduces feelings of loneliness (Epley et al. 2008a).

Because the mere-presence study did not include control conditions with non-animal distractions for comparison, it remains possible that there is nothing “special” about animals in repairing post-rejection negativity per se. For example, perhaps the presence of a human baby, robot, or plant reduces feelings of rejection just as effectively if all three are either distracting or trigger anthropomorphism. Indeed, in a study that followed people who adopted a dog or a cat from an animal shelter, those who anthropomorphized their newly-adopted pet to a greater degree (i.e., imbued their pet with human-like qualities like considerateness and thoughtfulness) were the ones who reported the most satisfaction with their pet and also showed significant reductions in depression two months after the adoption (McConnell, Lloyd and Shoda in press).

## The Current Research

The purpose of the current research was to identify how animals reduce painful feelings that follow from social rejection. Are animals unique in their ability to comfort people, or are they simply an effective distraction from social pain because they are easily anthropomorphized? Also, do animals only provide comfort if the person engages with them in some way, or does the mere thought of them offer solace? Further, do individual differences in people's tendency to anthropomorphize give some people additional opportunities to spontaneously recover from a social rejection experience?

We conducted three studies to address these questions. In all studies, we experimentally manipulated social rejection, after which we measured participants' current feelings. We then had participants engage with animals by thinking of names for them, after which we measured participants' feelings a second time. Naming an animal ascribes a unique identity to it, which may facilitate anthropomorphism. Indeed, people who perform medical research on animals are often discouraged from naming these animals because names are thought to promote emotional bonds (Bayne 2002; Sanders 2003).

Study 1 assessed whether naming animals is capable of reducing negative feelings resulting from social rejection. Studies 2 and 3 then compared the effectiveness of animal naming to other tasks (e.g., naming toys, viewing animals) to determine if mentally engaging with animals is necessary to reduce feelings of social rejection and to examine if this phenomenon is unique to animals or if it occurs with any stimuli that can be assigned a name.

## Study 1

### Methods

*Participants:* Participants ( $n = 121$ ) were recruited through Amazon's Mechanical Turk (MTurk) website (see Buhrmester, Kwang and Gosling 2011). Fifteen participants were excluded for not following instructions on the essay task.<sup>1</sup> Two judges read each essay and indicated whether it followed instructions, and a third judge resolved disagreements. Thus, the final sample contained 106 participants (77% female, mean age of 36.13 years,  $SD = 12.81$ ).

*Measures:* To test whether naming animals reduces feelings of social rejection, we first measured participants' feelings immediately after the social rejection manipulation (Time 1) and again after the animal-naming task (Time 2). Because very little time elapsed between the two measures, we used two different but highly correlated measures of current wellbeing at each time point to prevent participants from trying to replicate their previous answers, as well as to avoid drawing participants' attention to the purpose of the study (i.e., testing whether naming animals makes them feel better).

1) *Basic Needs Scale:* At Time 1, participants reported their current feelings on the 20-item Basic Needs Scale (BNS; Garczynski and Brown 2014; Wirth and Williams 2009). The BNS captures four dimensions of self-worth, including belongingness, self-esteem, perceptions of personal control, and sense of meaningful existence. Participants indicated the extent to which each statement (e.g., "I feel disconnected," "I feel good about myself") described how they currently felt on a scale ranging from 1 (not at all) to 7 (extremely). The BNS was a reliable measure of current feelings ( $\alpha = 0.97$ ).

2) *State Self-esteem Scale:* Participants reported their current feelings at Time 2 using the 16-item state self-esteem scale (SSES; Leary et al. 1995; Kavanaugh, Robins and Ellis 2010).

This scale contains 16 pairs of opposing adjectives (e.g., good-bad, competent-incompetent), and participants indicated which of the two scale anchors currently described them more, using the same 7-point scale as the BNS. The SSES scale was coded such that larger scores indicated greater state self-esteem ( $\alpha = 0.96$ ).

Past research by Garczynski and Brown (Study 2; 2014) found strong correspondence between the SSES and BNS. Critically, like this study, Garczynski and Brown also used an MTurk sample and the rejection essay manipulation, making it a relevant comparison. Their data revealed that present-tense (i.e., “How do you currently feel?”) forms of the SSES and BNS were significantly related ( $r_{(63)} = 0.85, p < 0.001$ ).

Given the strong correspondence between the BNS and SSES, it was reasonable to use them as Time 1 and Time 2 measures of current wellbeing, respectively. Although using different measures in a pre-post design has limitations, completing the same measure twice within a span of approximately one or two minutes could arouse suspicion in participants. Therefore, we judged the benefits of using different measures to outweigh the costs. However, to address this possible limitation, we used the BNS for both time points in Study 3.

*Procedure:* After providing their informed consent, participants indicated whether they preferred cats or dogs as pets. This question was used to arrange the survey so participants would name animals from the species they preferred. Next, participants were randomly assigned to write one of three essays (our experimental manipulation). Specifically, they wrote about a time in their lives when they felt rejected or excluded (rejection condition), accepted or included (acceptance condition), or had a minor physical injury (a control condition used in past work). This essay task is a reliable manipulation of social rejection (e.g., Brown et al. 2009; McConnell et al. 2011; Garczynski and Brown 2014). Participants then completed the BNS to provide a Time 1 measure of wellbeing.

Next, all participants were asked to name animals. In this task, they were shown 14 photos of different cats or dogs (based on their preference). For the first four animals, they were asked to generate names with these instructions:

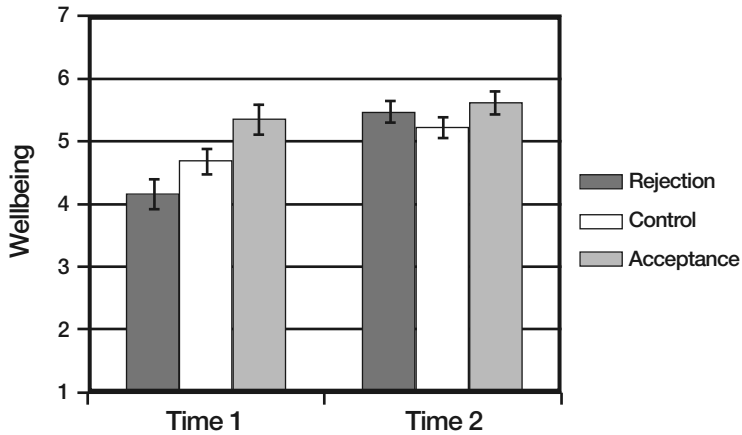
You will see four animal photos (2 female, 2 male). Please name each animal, imagining that it was your pet and you could name it whatever you wanted. There is a box below each photo for you to type a name for that animal.

Participants were next shown 10 photos of different animals (5 female, 5 male), but this time they were asked to pick a name for each animal from a list of 10 names. There was one list of 10 names for male animals, and a second list of 10 names for female animals (pre-testing established whether a given name would be applied to a male or female pet). For each list of animal names, five were human-like (e.g., Andrew, Amy) and five were not (e.g., Buddy, Pumpkin). The names were presented in a list, and participants could pick the same name for more than one animal if they wished.<sup>2</sup>

After the animal-naming task, participants completed the SSES, providing a Time 2 measure of wellbeing. Lastly, participants answered demographic questions before being debriefed and thanked for their participation.

## Results

A 3 (essay)  $\times$  2 (time) mixed-design ANOVA (with time as a within-subjects variable) revealed significant main effects of both time and condition, which were qualified by a significant interaction ( $F_{(2,103)} = 9.26, p < 0.001, \eta_p^2 = 0.15$ ; see Figure 1). Simple effects revealed that at



**Figure 1.** Wellbeing after rejection (Time 1) and later after naming animals (Time 2) in study 1 (error bars indicate standard errors).

Time 1, which was immediately after the essay task, rejected participants ( $M = 4.14$ ,  $SD = 1.62$ ) felt significantly worse than accepted participants ( $M = 5.34$ ,  $SD = 1.07$ ;  $p = 0.001$ , Cohen's  $d = 0.87$ ) and marginally worse than injury participants ( $M = 4.68$ ,  $SD = 1.31$ ;  $p = 0.091$ ,  $d = 0.37$ ). Yet at Time 2, which immediately followed the animal-naming task, the rejected participants no longer felt worse, as none of the essay conditions significantly differed from each other (rejection  $M = 5.47$ ,  $SD = 1.12$ ; acceptance  $M = 5.61$ ,  $SD = 0.91$ ; injury  $M = 5.21$ ,  $SD = 1.04$ ; all  $ps > 0.104$ ).

### Discussion

Study 1 found that naming animals improved the feelings of rejected participants to the point that they resembled participants in the acceptance and control conditions. Therefore, just as writing about one's own pet (McConnell et al. 2011) and having a dog in the room (Aydin et al. 2012) improves wellbeing, so too does generating names for animals. However, is mentally engaging with animals a unique source of positive feelings, or is it simply an effective form of distraction from feelings of rejection? In studies 2 and 3, we had participants name other stimuli—people (study 2) and toys (study 3)—to determine the relative effectiveness of naming animals compared to engaging with other stimuli. In addition, study 3 compared naming animals to simply viewing animals, to assess if the mental engagement and anthropomorphism involved in naming animals is essential to reduce feelings of rejection.

## Study 2

### Methods

**Participants:** Participants were recruited from MTurk. The original sample had 142 participants, but the data of 29 participants were excluded because they did not follow the essay instructions (as before, two judges read each essay and a third judge resolved disagreements). The final sample contained 113 participants (60% female, mean age of 34.35 years,  $SD = 12.45$ ).

**Procedure:** Study 2 differed from study 1 in a few ways. First, participants were either induced to reflect on a social rejection experience or a minor injury (the control condition from study 1). After this initial manipulation to reduce wellbeing (i.e., rejection vs. control), participants were

asked to name either animals or humans. Thus, the overall design was a 2 (essay: rejection vs. control)  $\times$  2 (naming: pets vs. humans) between-subjects factorial. The order of experimental tasks was writing an essay (either about a rejection or control memory), completing the BNS to assess post-essay wellbeing ( $\alpha = 0.97$ ), naming either animals or humans, and then completing the SSSES ( $\alpha = 0.98$ ) to measure post-naming wellbeing.

For the naming manipulation, participants in the humans condition saw 10 photos (5 male, 5 female) of people with neutral expressions (drawn from the Radboud Faces Database; Langner et al. 2010). Participants were told, "Research has shown that sometimes a name can 'fit' a person (i.e., the name seems to match the person's appearance). We would like you to think of a name that fits the person. Please write the name in the space below the person's picture." Participants in the pets conditions viewed 10 photos of their preferred species (which they indicated at the beginning of the survey, as in study 1) and were asked to type a name for each animal. Half of the animals were described as male and the other half as female.

### Results

A 2 (essay)  $\times$  2 (naming)  $\times$  2 (time) mixed-design ANOVA revealed only significant effects of time ( $F_{(1,109)} = 47.29, p < 0.001, \eta_p^2 = 0.30$ ) and essay ( $F_{(1,109)} = 6.41, p = 0.013, \eta_p^2 = 0.06$ ). The predicted three-way interaction trended toward significance ( $F_{(1,109)} = 2.64, p = 0.107, \eta_p^2 = 0.02$ ). Although the interaction was not significant, we examined the simple effects to test our a priori comparison of naming animals and naming humans to alleviate negative feelings that follow from rejection (see Figure 2).

At Time 1, immediately after writing their essay, rejected participants felt significantly worse than control participants, regardless of whether they would later be assigned to name animals (rejection  $M = 4.23, SD = 1.41$ ; control  $M = 5.01, SD = 1.36$ ;  $p = 0.04, d = 0.56$ ) or humans (rejection  $M = 4.25, SD = 1.58$ ; control  $M = 5.02, SD = 1.22$ ;  $p = 0.047, d = 0.55$ ). In contrast, following the naming task at Time 2, rejected participants' wellbeing was significantly worse than control participants' after naming humans (rejection  $M = 4.69, SD = 1.63$ ; control  $M = 5.45, SD = 1.07$ ;  $p = 0.04, d = 0.55$ ), whereas naming animals led rejected participants to report wellbeing equivalent to that of control participants (rejection  $M = 5.10, SD = 1.30$ ; control  $M = 5.37, SD = 1.47$ ;  $p = 0.472, d = 0.19$ ).

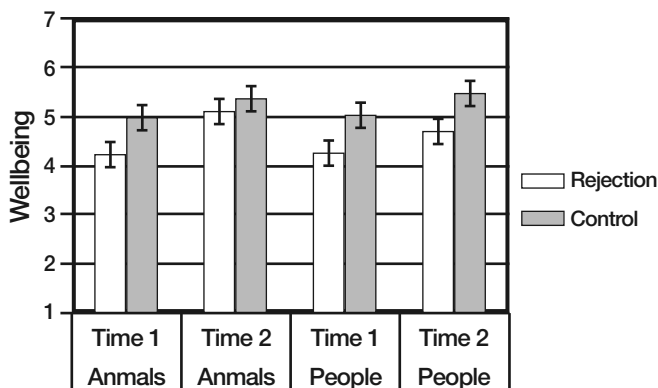


Figure 2. Wellbeing after rejection (Time 1) and naming animals or humans (Time 2) in study 2 (error bars indicate standard errors).

## Discussion

As in study 1, naming animals led rejected participants' feelings to resemble those of participants in the control condition, whereas rejected participants continued to feel worse than control participants after naming humans. This suggests that animals may provide something beyond simple distraction when they alleviate social rejection. Of course, naming people may not be particularly comforting because other humans are a common source of social rejection. Therefore, in study 3 we included a condition in which participants named other novel, nonhuman stimuli (unusual-looking toys) to determine if naming animals has a unique ability to offset negativity following rejection.

In addition, we included a control condition where participants simply viewed photos of animals or toys. Generating a name encourages anthropomorphism, and any type of anthropomorphism might soothe hurt feelings (e.g., Epley et al. 2008a, 2008b, 2013). Aydin et al. (2012) suggested the mere presence of dogs alleviates rejection, but they confounded presence with anthropomorphism by introducing the dog with its name. Study 3 allowed us to test if merely looking at photos of animals (and toys) reduces rejected feelings just as effectively as naming them. Unlike naming these stimuli, simply viewing them does not promote anthropomorphism.

Lastly, study 3 also included a measure of participants' dispositional tendency to anthropomorphize. Naming animals and toys encourages anthropomorphism, so perhaps everyone benefits from this task. On the other hand, simply viewing these stimuli might only benefit people who are already prone to anthropomorphize because these people do not need external encouragement to ascribe human-like traits to these stimuli.

## Study 3 Methods

*Participants:* MTurk was used to recruit 303 participants. Forty-five participants were excluded for not following instructions on the essay task, based on the judgment of two raters (a third rater resolved disagreements). The final sample was 258 participants (50% female, mean age of 34.90 years,  $SD = 12.55$ ).

*Measures: Anthropomorphism:* The Individual Differences in Anthropomorphism Questionnaire (IDAQ; Waytz, Cacioppo and Epley 2010) was used to assess the degree to which participants imbue animals, objects, or features of the environment with human-like traits. The measure contains 16 items, and responses are expressed on a scale ranging between 0 (not at all) and 10 (very much). Sample items from the scale include, "To what extent does the ocean have consciousness?" and "To what extent do cows have intentions?" The scale revealed good reliability ( $\alpha = 0.87$ ).

*Procedure:* The procedure was similar to study 2. After providing informed consent and selecting their preferred animal, participants completed the IDAQ and were randomly assigned to write either a rejection or acceptance essay (see study 1). The essay was followed by the BNS ( $\alpha = 0.96$ ) to assess Time 1 wellbeing. Participants were then randomly assigned to target condition (animals or toys) and activity condition (naming or viewing). The animal-naming condition was identical to study 2. In the toy-naming condition, participants saw 10 photos of small plastic anthropomorphic toys (sold in US stores as "Crazy Bones") and were asked to "come up with a name for each figure." Participants in both viewing conditions were told simply to "look at the pictures below" and then "proceed to the next page of the survey." The same photos

**Table 1.** Mean Basic Needs Scale scores by essay, activity, target, and time in study 3.

	Naming		Viewing	
	Rejection	Acceptance	Rejection	Acceptance
<i>Animals</i>				
Time 1	4.91 (1.32)	5.07 (1.17)	4.27 (1.23)	5.06 (1.01)
Time 2	5.33 (1.17)	5.20 (1.07)	4.60 (1.34)	5.07 (1.10)
<i>Toys</i>				
Time 1	4.39 (1.27)	5.29 (1.04)	4.52 (1.48)	5.41 (0.91)
Time 2	4.60 (1.24)	5.32 (1.03)	4.87 (1.43)	5.54 (0.84)

Note: Values in parentheses are standard deviations.

(10 dogs, cats, or toys) from the naming conditions were used in the viewing conditions. The naming or viewing activity was followed by a second administration of the BNS to assess Time 2 wellbeing (post-activity;  $\alpha = 0.96$ ), which was followed by demographic questions.

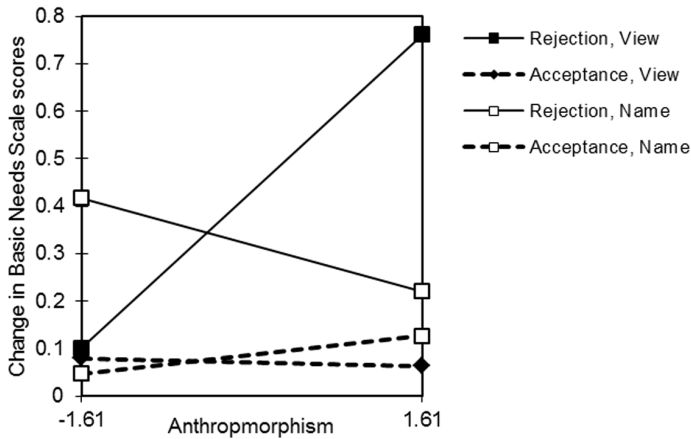
### Results

*Basic Needs:* We conducted a 2 (essay)  $\times$  2 (activity)  $\times$  2 (target)  $\times$  2 (time) mixed-design ANOVA on BNS scores (see Table 1 for *M*s and *SD*s). There were significant main effects of essay and time, which were qualified by an essay  $\times$  time interaction ( $F_{(1,250)} = 12.03, p = 0.001, \eta_p^2 = 0.05$ ). At Time 1, rejected participants ( $M = 4.54, SD = 1.33$ ) had poorer wellbeing than accepted participants ( $M = 5.21, SD = 1.04, p < 0.001, d = 0.56$ ). At Time 2, the difference between rejected ( $M = 4.87, SD = 1.31$ ) and accepted ( $M = 5.29, SD = 1.01$ ) participants' wellbeing was still significant ( $p = 0.003, d = 0.34$ ), but it was substantially smaller (as demonstrated by the two-way interaction). Essay and time did not produce three-way interactions with either target ( $p = 0.490$ ) or activity ( $p = 0.767$ ), nor was the four-way interaction significant ( $p = 0.932$ ).

These null effects indicate that naming or viewing either animals or toys significantly reduced hurt feelings after the rejection prime. Specifically, the difference between rejected participants' Time 1 and Time 2 scores was significant for viewing toys ( $p = 0.001, d = 0.55$ ), viewing animals ( $p = 0.001, d = 0.40$ ), and naming animals ( $p < 0.001, d = 0.53$ ), and it was marginal for naming toys ( $p = 0.054, d = 0.49$ ). In contrast, accepted participants' feelings did not significantly change from Time 1 to Time 2, regardless of activity and target conditions (all  $p$ s  $> 0.195$ ).

*Individual Differences in Anthropomorphism:* We subtracted BNS scores at Time 1 from Time 2 (such that greater difference scores indicated improved wellbeing at the end of the study) and regressed this difference score onto anthropomorphism (mean centered), the three independent variables (effects coded), and all possible interactions. There was a significant interaction between anthropomorphism and activity ( $\beta = -0.16, p = 0.008$ ), but this was qualified by a significant three-way interaction between anthropomorphism, activity, and essay ( $\beta = 0.20, p = 0.001$ ; see Figure 3). The four-way interaction with target was not significant ( $\beta = 0.05, p = 0.379$ ), indicating that animals and toys produced similar patterns of results.





**Figure 3.** Improvement in wellbeing by essay condition, naming condition, and dispositional anthropomorphism in study 3. Anthropomorphism is mean centered, and the range illustrated is  $\pm 1$  SD from the mean.

To decompose the three-way interaction, we regressed the wellbeing difference score onto anthropomorphism, activity, and their two-way interaction separately for each of the two essays conditions. The interaction between anthropomorphism and activity was only significant in the rejection condition ( $\beta = -0.29$ ,  $p = 0.001$ ) and not in the acceptance condition ( $\beta = 0.04$ ,  $p = 0.682$ ). Among rejected participants who viewed animals and toys, greater anthropomorphism predicted more positive feelings ( $r_{(64)} = 0.40$ ,  $p = 0.001$ ), whereas anthropomorphism and change in feelings were unrelated among rejected participants who named animals and toys, ( $r_{(64)} = -0.15$ ,  $p = 0.228$ ). In other words, viewing either animals or toys improved wellbeing to a greater degree as participants' tendency to anthropomorphize increased.

### Discussion

Both naming and viewing either animals or toys offset feelings of social rejection. Interestingly, chronic anthropomorphism was only related to recovery from rejection in the viewing condition. Our interpretation of this finding is that the naming task encouraged anthropomorphism among all participants, thus alleviating rejection as it did in studies 1 and 2. In contrast, people who possessed a general predisposition to anthropomorphize did so without outside encouragement, leading them to feel better following social rejection. On the other hand, people who did not possess a strong predisposition to engage in anthropomorphism did not show these benefits from the viewing task, presumably because they did not anthropomorphize the stimuli.

The three-way interaction depicted in Figure 3 shows that the greatest improvement in wellbeing after rejection occurred among participants who viewed stimuli and had a strong tendency to anthropomorphize. This finding is surprising, as naming encourages anthropomorphism more than viewing and therefore we expected it to alleviate rejection to a greater extent. One possibility is that participants high in anthropomorphism enjoyed the viewing task more than the naming task because the opportunity to anthropomorphize was carefree and spontaneous. Although the naming task did significantly alleviate social rejection, it is a more constrained and cognitively demanding task than simply viewing photos.

## General Discussion

Across three studies, generating a name for a cat or dog improved wellbeing after reliving social rejection. Naming humans did not produce the same effect, but naming toys did. Collectively, these results suggest that rejected feelings can be soothed by anthropomorphizing any interesting nonhuman stimuli (like animals or toys) in the form of giving those stimuli names. In other words, animals are not unique in their ability to make humans feel better. However, anthropomorphism—as opposed to simple distraction—seems to be an essential part of this effect, as viewing animals or toys only improved feelings among people who had a greater predisposition to engage in anthropomorphism (i.e., people who are likely to ascribe human-like qualities to nonhuman entities spontaneously).

Overall, the current findings indicate that anthropomorphism, whether it occurs deliberately or spontaneously, can offset the negativity that results from social rejection. As noted previously, increased anthropomorphism is observed among people who feel socially isolated, indicating that people may automatically seek connections with nonhuman entities to improve their sense of social belonging (e.g., Epley et al. 2008a). Moreover, we know from other work that people anthropomorphize pets to a greater degree when their pets are more integrated into their self-concept and when they report that their pets provide more social support (McConnell et al. 2011). Thus, people who are closer to animals (either because they rely on them for social support or because they are a more integral part of their self-concept) may be more capable of deriving psychological comfort from a variety of subtle experiences (e.g., merely viewing animals) than other people (e.g., pet owners who feel less closeness with and support from their animals). Further, pet owners who reported greater anthropomorphism for a newly-adopted dog or cat showed significant reductions in depression two months after adoption (McConnell et al. in press), presumably because pet social support was stronger for people who can imbue them with more human-like qualities. Thus, the current study provides another demonstration of the power of anthropomorphism in combating the negative feelings that result from social rejection, and it breaks new ground by showing that people who are more predisposed to view entities as possessing human-like characteristics may benefit from even relatively minimal engagement with animals. Future work should further explore the minimal conditions required for the operation of anthropomorphism and identify the individual differences and situational factors that moderate these effects.

There are, however, some limitations to the current study that should be noted. For example, we used an online sample and induced feelings of social rejection with an autobiographical essay prime, which cannot be compared to circumstances involving intense, in-the-moment feelings of ostracism and exclusion. Many studies, both conducted in the lab and online, have used similar autobiographical inductions to study the implications of social rejection (e.g., Brown et al. 2009; Garczynski and Brown 2014), but admittedly, the experiences triggered by such manipulations are relatively mild. However, although the rejection manipulation was brief and not as intense as most real-life rejection experiences, the naming and viewing tasks used in the current study were also subtle, yet these activities offset the negativity of social rejection. We expect that opportunities to interact with animals in a more substantial way (e.g., petting, playing) would produce even stronger benefits. Overall, these results speak to the power of anthropomorphism in influencing current social feelings.

We also did not assess whether participants owned or liked animals, so it remains possible that anthropomorphizing animals does not improve wellbeing among everyone. As found in study 3, the strongest ameliorative effects of viewing animals following social rejection was

observed in people who were especially prone to engage in anthropomorphism. However, some people seem relatively unable (or unwilling) to project human-like qualities on nonhuman entities, and this is an area that deserves further study. In addition, it is possible that people who are more predisposed to anthropomorphism may also possess other personality characteristics involving social connection that extend well beyond their views of animals, robots, deities, and other nonhuman entities (Epley et al. 2008a), such as greater empathy, interdependence, or nonconventional thinking. Yet, across all of these studies, we found consistent evidence that most people can soothe feelings of rejection by engaging with animals in a very simple way, and that for people high in anthropomorphism, merely viewing animal photos was sufficient to boost feelings of belonging and self-esteem in the wake of social rejection.

Lastly, while it is clear that thinking about cats or dogs soothes feelings of rejection, we cannot say how this effect differs from the comfort derived from other positive experiences. For example, watching a humorous video, imagining a pleasant vacation, or eating ice cream may produce similar outcomes. Study 3 suggests that anthropomorphism contributes to the observed reduction in rejection, a finding that is consistent with other research on anthropomorphism and loneliness (e.g., Epley et al., 2008a,b). However, anthropomorphism is unlikely to be the sole factor at work. Positive distraction may occur simultaneously, and we suspect both positive distraction and the emotional connection derived from anthropomorphism explain unique variance in reduced feelings of rejection.

In conclusion, some animals (e.g., cats and dogs) can undoubtedly provide a reliable source of comfort when relationships with people are unsatisfying. The current findings add to a growing body of work demonstrating that part of the power of relationships with certain animal species involves the degree to which people can project human-like qualities on them in the service of social support. Finally, although anthropomorphism may be an essential part of this process, it also appears to be the case that animals may not be unique in the solace they provide. Even when social comfort is secured through other nonhuman targets, anthropomorphism may be the central mechanism for mitigating feelings of distress following social rejection.

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## Notes

1. Some participants in the control condition wrote about an injury caused by their pet. Excluding them does not change the results, so we retained their responses for data analyses.
2. Condition did not significantly affect proportion of human-like names chosen by participants ( $F_{(2,103)} = 0.34$ ,  $p = 0.681$ ) (rejection  $M = 0.40$ ,  $SD = 0.18$ ; injury  $M = 0.43$ ,  $SD = 0.19$ ; acceptance  $M = 0.40$ ,  $SD = 0.18$ ).

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