

Testing and Extending the Pets as Ambassadors Hypothesis: The Role of Contact with Pets and Recategorization Processes in Predicting Positive Attitudes toward Animals

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According to the pets as ambassadors hypothesis (Serpell & Paul, 1994), contact with pets can promote more positive attitudes toward animals in general and serve as a springboard toward concerns for a broader range of animals. Building on intergroup contact theory and the common ingroup identity model, the current research aimed to test and extend the pets as ambassadors hypothesis as well as investigate its underlying mechanisms. Specifically, two studies aimed to test whether contact with pets – as a specific type of cross-group friendship – can predict more positive attitudes toward animals in general through recategorization and self-expansion processes. Extending the pets as ambassadors hypothesis, we also verified if inclusion of a favorite pet in the self could predict identification with nature. Two correlational studies conducted at the University of Quebec in Montreal tested these associations. In Study 1 ($N=148$ university students, 109 women; mean age of 24.96 years old; 103 pet owners), mediation analyses revealed that contact with pets predicted greater moral concern toward animals and lower speciesism; these links were mediated by the inclusion of animals in the self. Study 2 ($N=157$ university students, 108 women; mean age of 23.26 years old; 95 pet owners) extended these findings by showing that inclusion of a favorite pet in the self predicted identification with nature; this link was mediated by inclusion of animals in the self. Categorizing humans and animals into the same superordinate group also mediated the associations between inclusion of a favorite pet in the self, on the one end, and inclusion of animals in the self as well as identification with nature on the other. These results stress the importance of recategorization processes in our relations with animals and with nature. Furthermore, they reveal the applicability of the intergroup contact, cross-group friendship, and common ingroup identity models to the realm of human-animal relations.

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The ways humans relate to animals vary greatly across contexts (Serpell, 2009): We sometimes go to great lengths to protect animals (i.e., risking our life for our pets), but other times use animals for instrumental purposes and even kill them (i.e., in the meat or fur industry; Grandin, 1988; Singer, 2009). One particular factor that seems to be affecting how we interact with animals is

how we categorize them (Waldau, 2011; see also Amiot & Bastian, 2015, for a review). Farm animals, wild animals, and domestic animals receive very different treatments: dogs are friends not food, and pigs are food not friends (Herzog, 2010; Joy, 2011; Merz-Perez, Heide, & Silverman, 2001; Serpell, 2009; Singer, 2009). Pets – animals we live with and that have no obvious function

(Serpell, 1989) – represent one category of animals that seem to have been assigned a special status by humans. Whereas the value we attribute to most animals stands on economic and practical considerations, the importance ascribed to pets comes from the benefits of the relationship itself (Serpell & Paul, 1994). People put great significance on their relationships with their pets, with most people considering their pets as integral members of the family (Carlisle-Frank & Frank, 2006; Cohen, 2002).

In contrast, many non-pet animals are mistreated and can be considered victims of negative attitudes and behaviors (Humane Society of the United States, 2015; Regan, 1987). For example, more than 10 billion farm animals are killed every year in the United States (Joy, 2010). Animals which are considered edible (e.g., cows, sheep, fish, chickens) are often viewed as possessing less moral qualities (i.e., intelligence, spirit, etc.; Bastian, Loughnan, Haslam, & Radke, 2012) compared to animals viewed as non edible (e.g., dogs, cats, horses, dolphins). Those negative attitudes and behaviors toward animals based on their species are referred to as *speciesism* (Ryder, 2006). They are said to be discriminatory because they rely on the subjective categorization of animals into different groups. This categorization then triggers subsequent bias in favor of one/some groups over others (i.e., farm animals are edible, companion animals are inedible; Herzog, 2010; Plous, 2003; Singer, 2009). Yet, very little empirical research to our knowledge has investigated how our contact and sense of closeness with pets may also predispose us *positively* toward a broader range of animal types. The pets as ambassadors hypothesis accounts for the special status that pets hold in our lives and proposes that our close relations with pets can have beneficial repercussions for how we relate to other animals more generally. Therefore, the current research aims to test

and extend the pets as ambassadors hypothesis. Precisely, this research aims to explore the positive associations between how we relate to pets and our relations with animals, and, even more broadly, how our relations with animals have implications for how we relate to nature as well. This research also aims to test underlying cognitive and relational processes through which contact with pets may predict positive attitudes toward animals in general, and even toward nature. Doing so also aligns with a growing social movement in favor of promoting a more humane treatment to a wider range of animals (Harper & Makatouni, 2002; Singer, 2009; Waldau, 2011) and in capturing how broad moral concerns that go beyond the human ingroup develop (Pinker, 2008).

The pets as ambassadors hypothesis

When reviewing historical and cross-cultural evidence pertaining to the history of our relations with animals, Serpell and Paul (1994) observed a general trend: Pet keeping often co-occurs with more humane and compassionate attitudes toward species of animals who are not pets. For example, the majority of hunter-gatherer societies who were practicing pet-keeping also showed deep respect for all animal life, killing animals only when necessary and expressing gratitude for the animal's sacrifice. In contrast, in the medieval times, pet keeping was often regarded as highly heterodox and was frowned upon, and people were also generally driven by a desire to preserve human's superiority and dominance over all other animals (Serpell & Paul, 1994). Based on these observations, Serpell and Paul suggested that the nature of our interactions with pets could reverberate to also predict our attitudes and moral concerns toward animals more generally – i.e., the pets as ambassadors hypothesis.

The pets as ambassadors hypothesis has received preliminary empirical support. In a correlational study conducted among 385 university students, childhood pet keeping was found to be (retrospectively) associated with more positive attitudes toward animals (in general) later in life (Paul & Serpell, 1993). People who had pets during their childhood were also more likely to report participating in organizations that advocate in favor of animal's welfare, to avoid meat products out of ethical or moral reasons (i.e., vegetarianism, veganism, etc.), and to endorse more positive attitudes toward farm, wild, and laboratory animals.

Other findings support the association between pet ownership and positive attitudes toward animals. Serpell (2005) reported that veterinary students tended to perceive that their interactions with animals, and especially with pets, had an important impact on the development of their values regarding animals. Paul (2000) also reported that pet ownership during childhood, as well as current ownership of pets, was a significant predictor of empathy toward animals more broadly. Miura, Bradshaw, and Tanida (2002) reported that pet ownership during childhood predicted more interest for animal welfare later in life, both amongst US and Japanese participants, suggesting that this link can be observed across cultures. Lastly, Bjerke, Kaltenborn, and Odegardstuen (2001), as well as Wells and Hepper (1997), reported that, compared to non pet owners, pet owners reported liking of farm and wild animals more. Wells and Hepper (1997) also reported that pet owners tended to disagree significantly more with the use of animals (e.g., in research and hunting). Whereas these results support the association between pet ownership and more positive attitudes toward animals in general, they also raise additional questions concerning the pets as ambassadors hypothesis: Beside pet ownership, can general contact with pets predict attitudes

toward animals? And what mechanisms underpin the pets as ambassadors effect? Can the effect extend even beyond groups of animals? Providing answers to these questions will improve our understanding of the pets as ambassadors hypothesis.

In this research, we aim to deepen our comprehension of the pets as ambassadors hypothesis and go above existing empirical evidence, which pertains mainly to the association between pet ownership and attitudes toward animals, by focusing on a broader test of the hypothesis in three new ways. First, we aim to go beyond the question of pet ownership by exploring specifically how contact with pets can predict attitudes toward animals in general. Second, we aim to uncover the cognitive processes (i.e., mediators) that operate when pets become a springboard toward increased concerns and more positive attitudes toward animals in general. Third, we aim to extend the pets as ambassadors effect by testing if contact with pets may even predict our sense of connection with nature. These questions are investigated through the lens of social psychological models, namely intergroup contact theory (Allport, 1954; Pettigrew, 1997), and the common ingroup identity model (Gaertner, Dovidio, Anastasio, Bachman, & Rust, 1993).

Intergroup Contact Theory

Intergroup contact theory is highly relevant for the pets as ambassadors hypothesis, as human-animal relations can be seen as a particular type of intergroup contact (Plous, 1993, 2003). Intergroup contact theory (Allport, 1954; Pettigrew, 1997; Pettigrew & Tropp, 2006) states that intergroup contact can reduce intergroup prejudice. A meta-analytical review of years of research on intergroup contact showed that, indeed, intergroup contact typically reduces intergroup prejudice (Pettigrew &

Tropp, 2006). This effect has been replicated in many studies and across a variety of contexts, situations, and groups (i.e., artificial vs natural settings; with cultural, religious, linguistic groups). For example, contact has been found to improve attitudes between Germans and Turks (Pettigrew, 1997), between Catholics and Protestants (Paolini, Hewstone, Cairns, & Voci, 2004), and between homosexuals and heterosexuals (Sakalsh & Ugurlu, 2002). Moreover, the improvement of attitudes following intergroup contact tends to generalize beyond group members involved in the contact situation to reach other members of this specific group (Pettigrew, 2008; Van Laar, Levin, Sinclair, & Sidanius, 2005). Theoretically, the contact effect should be especially strong when the groups who interact with one another have equal statuses, common goals, and strive to cooperate with one another, and when authorities support this contact (i.e., laws, norms; Allport, 1954). However, these conditions have been found not to be necessary for the general positive effect of contact on attitudes to occur (Pettigrew & Tropp, 2006).

The literature also shows that not all intergroup contacts are equally efficient: Direct contact with outgroup members is more efficient and durable than extended contact, which is a form of indirect contact that operates vicariously through a third person, such as the friend of a friend (e.g., Wright, Aron, McLaughlin-Volpe, & Ropp, 1997). Cross-group friendship has also been found to be efficacious in reducing intergroup prejudice (Davies, Tropp, Aron, Pettigrew, & Wright, 2011; Turner, Hewstone, Voci, Paolini, & Christ, 2007). This beneficial effect of cross-group friendship is said to occur because friendship provides the opportunity to empathize with and take the perspective of an outgroup member (Pettigrew & Tropp, 2008; Swart, Turner, Hewstone, & Voci, 2011). The positive

attitudes developed through friendship with a particular outgroup member can then generalize to other outgroup members such that attitudes toward the entire outgroup are improved. The cross-group friendship literature is also highly relevant to the pets as ambassadors hypothesis. Indeed, the close relationships most people have with their pets can be viewed as a form of friendship (Peretti, 1990; Townley, 2010). A recent survey revealed that 95% of American pet owners consider their pets as their friends (American Pet Products Manufacturers Association, 2008). Pets provide social support in a manner that is comparable to the support provided by a friend (McConnell, Brown, Shoda, Stayton, & Martin, 2011; Zilcha-Mano, Mikulincer, & Shaver, 2012). In this way, contact with pets can be considered a form of cross-group friendship that may then fuel positive attitudes toward animals more broadly.

The Common Ingroup Identity Model and Inclusion of the Other in the Self

To further account for the cognitive mechanisms that underpin the pets as ambassadors effect – through which our contact with pets as a specific subgroup of animal generalize to produce more concerns and positive attitudes toward animals in general – we turn to the common ingroup identity model (CIIM; Gaertner, Mann, Dovidio, Murrell, & Pomare, 1990; Gaertner et al., 1993). Based on the CIIM, the association between contact with pets and positive attitudes toward animals more broadly could be explained through mental recategorization into a larger social group (Gaertner et al., 1990, 1993; Gaertner & Dovidio, 2000).

Specifically, *recategorization* occurs following cooperative contact between individuals of different groups. This contact leads group members to change their

cognitive representation of different social groups (e.g., Blacks and Whites in the United States) such that they become subsumed within the same superordinate group – i.e., a group that is large and inclusive of smaller subgroup identities (e.g., all Americans, including Blacks and Whites; Gaertner, Rust, Dovidio, Bachman, & Anastasio, 1994). In this case, the original mental representations of *us vs them* combine into a more inclusive *we* (Gaertner et al., 1993). The perception of a superordinate group (i.e., *we*) leads to an extension of the ingroup to include former outgroup members, who are henceforth considered fellow ingroup members within the superordinate category. Empirical evidence confirms that when different groups think of themselves as belonging to the same superordinate group, more positive thoughts and attitudes follow (Gaertner et al., 1994, 1999). In contrast, perceiving the ingroup as restrictive results in intergroup discrimination and prejudice. When applying these ideas to the pets as ambassadors effect, we suggest that contact with pets could improve our attitudes toward all animals by fostering the perception of a superordinate group of *animals*, which encompasses two particular subgroups: humans and nonhuman animals.

Recategorization into a common superordinate group should also affect how we cognitively represent the self and others, how people feel connected to fellow ingroup members, and how much they feel these others are included in their own sense of self (Dovidio et al., 1997). Indeed, the inclusion of the other in the self (IOS) is a relevant notion to capture this feeling of connection and the cognitive expansion and overlap between the self and another person or group (Aron, Aron, Tudor, & Nelson, 1991; Aron et al., 2004). IOS also plays a role in intergroup relations as it has been found to mediate the positive effects of extended contact on intergroup attitudes (Turner, Hewstone,

Voci, & Vonofakou, 2008). IOS has been applied to various types of relationships, including intimate relations (Aron et al., 1991), friendships (Davies et al., 2011; Page-Gould, Mendoza-Denton, Alegre, & Siy, 2010), feelings of connection with social groups (Smith & Henry, 1996; Tropp & Wright, 2001), and even to human-animal relations per se (McConnell et al., 2011; Thibault, Bourgeois, & Hess, 2006). In the context of our relationships with pets, inclusion of a pet in the self captures both the intimate nature of this relationship and how important the relationship is to own our identity. Based on the theoretical and empirical literature on IOS, we should expect friendly contact with a pet to predict more inclusion of this pet in the self. Then, as pets are hypothesized to act as ambassadors for other animals (Serpell & Paul, 1994), a higher inclusion of a pet in the self should lead to a higher inclusion of animals in the self more generally, which in turn should predict more positive attitudes toward animals in general.

Extending the Pets as Ambassadors Effect to Nature

Beyond our feelings of connection with animals in general, an even broader superordinate group exists, namely, nature. In fact, apart from belonging to the superordinate *animal* group, humans and nonhuman animals are also part of nature (Ponting, 1991). The notion of identification with nature – which can be operationalized as one’s feeling of relatedness with nature, and inclusion of nature in the self (Clayton, 2003; Nisbet, Zelenski, & Murphy, 2007; Schultz, 2002) – is a relatively new concept that is receiving increased empirical attention. It refers to the belief that nature is an important part of the self (Nisbet, Zelenski, & Murphy, 2009; Stets & Biga, 2003). Identifying with nature also implies that we perceive

similarities between the self and nature, and feel a sense of connection or emotional attachment with nature (Clayton & Myers 2009; Schultz, 2001). Identification with nature is relevant to the pets as ambassadors hypothesis because, concretely, our connection with nature is in part built on our interactions with animals and the natural world (Clayton, 2003). Myers and Saunders (2002) have proposed that animals can provide a bridge to caring about the natural world. Concretely, contact with pets and non-pet animals can promote contact with nature through everyday activities, for example through walking one's dog or through observing wild animals outside (Melson & Melson, 2009; Podberscek, Paul, & Serpell, 2000; Serpell, 2000).

The association between our relation with animals and our relation with nature has been supported empirically. Nisbet, Zelenski and Murphy (2009) reported that feeling of closeness with nature is associated with greater love of animals. Gosling and Williams (2010) also observed that assigning greater value to non-human animals is associated with feelings of an emotional connection with nature. These results are also coherent with conceptualizations that animals are an inherent part of nature (Clayton, 2003; Kellert, 1993; Shultz, 2000).

Returning to the pets as ambassadors hypothesis, we expect that the same mechanisms through which pets act as ambassadors for animals should also apply between animals and nature. If animals are an important part of nature, they should act as ambassadors for nature in the same way that pets act as ambassadors for their main group, animals. Nature is also the next logical superordinate group to which we belong after animals in general; investigating identification with nature in relation to our relations with animals therefore represents a relevant extension of the pets as ambassadors hypothesis. Following this logical sequence

and based on aforementioned empirical evidence, we suggest that positive relations with pets should predict positive relations with animals, which in turn should predict positive relations with nature. Therefore, following and extending the pets as ambassadors hypothesis, we propose that inclusion of a pet in the self will predict identification with nature through inclusion of animals in general in the self.

The Present Research

The first objective of the present research is to test if contact with pets is associated with more positive attitudes toward animals, in line with Serpell and Paul's (1994) pets as ambassadors hypothesis. As a second objective, and building on theories of intergroup relations, we aim to investigate the relational and cognitive mechanisms (i.e., recategorization into a superordinate group; inclusion of animals in the self) through which contact with pets flows on to predict more positive attitudes toward animals more broadly. For the third objective, we seek to extend the pets as ambassadors hypothesis by investigating if including a favorite pet in the self can flow on to predict higher identification with nature as well.

Study 1

Study 1 tests the correlational association between contact with pets and positive attitudes toward animals, and whether this association is mediated by the underlying process of inclusion of animals in the self. The theoretical arguments presented in previous sections guided us in proposing the sequential ordering of variables in our mediation hypotheses. In line with the pets as ambassadors hypothesis, we first hypothesize that contact with pets will be associated with more positive attitudes toward animals

(i.e., greater moral concern for animals and less speciesism; Hypothesis 1 [H1]). Second, we propose that contact with pets will be associated with greater inclusion of animals in the self (Hypothesis 2 [H2]). Third, we hypothesize that the association between contact with pets and positive attitudes toward animals will be mediated by inclusion of animals in the self (Hypothesis 3 [H3]). Finally, we propose that contact with pets will be positively associated with inclusion of animals in the self through inclusion of a favorite pet in the self (Hypothesis 4 [H4]).

Method

Participants and design

We recruited a convenience sample of undergraduate university students. Students attending the University of Quebec in Montreal (UQAM; $N=148$, 109 women, 39 men; mean age of 24.96 years old) were recruited in 19 different undergraduate classes with permission from class instructors. About 70% of the students approached to take part in the study participated in it. Out of our 148 participants, 103 were pet owners.

Procedure

The objectives of the research were briefly presented to students during class time. Students were asked to provide their

email address on a list if they were interested to take part in the study¹. Afterwards, these students were sent an email containing a link directing them to the 30-minute online study. Students had to complete a consent form before taking part in the study. This study was approved by UQAM institutional research ethics board. Data analyses were conducted using IBM SPSS Statistics software (SPSS).

Measures

Contact with pets. To assess contact with pets, one question first asked participants if they were currently living with a pet (yes/no). Then we used a continuous 4-item measure which we developed for the purpose of this study. We developed this scale based on the intergroup contact and cross-group friendships literatures (Davies et al., 2011; Pettigrew & Tropp, 2006; 2008). These literatures highlight both the qualitative and quantitative aspects of contact as pertinent factors for the prediction of intergroup attitudes (e.g., Brown, Vivian, & Hewstone, 1999; Harwood, Hewstone, Paolini, & Voci, 2005; Pettigrew & Tropp, 2006). According to the cross-group friendship literature, the frequency of contact, the reciprocity felt, and the positive emotions felt during contact are important components of intergroup contact (Davies et al., 2011). Each of these components was hence covered in the items assessing contact with pets. This measure asked participants

¹Study 1 also included an experimental manipulation of human-animal cooperation vs competition (Sherif & Sherif, 1956; Gaertner et al. 1990; Gaertner & Dovidio, 2000). Participants were randomly assigned to one of two conditions (competition or cooperation) and were each presented pictures of 3 different human-animal interactions. In the competition condition ($n=78$), participants were presented pictures depicting conflicts between animals and humans. In the cooperation condition ($n=70$), participants were presented pictures depicting cooperative interactions. ANOVAs revealed that participants in the cooperation condition ($M=5.27$, $SD=1.18$) perceived significantly more cooperation

than participants in the competition condition ($M=2.48$, $SD=1.24$) $F(148,1)=195.43$, $p<.001$) and participants in the competition condition ($M=5.65$, $SD=1.33$) perceived significantly more competition than did participants in the cooperation condition ($M=1.78$, $SD=0.98$) $F(148,1)=398.90$, $p<.001$). However, ANOVAs conducted on the main variables revealed no significant effect of the condition on speciesism ($F(148,1)=0.01$, $p=.922$), moral concern for animals ($F(148,1)=0.00$, $p=.982$), perception of similarity ($F(148,1)=0.12$, $p=.735$), perception of superordinate identification ($F(148,1)=0.01$, $p=.915$), or identification with animals ($F(148,1)=0.59$, $p=.445$). Given these lack of significant effects, we therefore focus herein on the correlational data.

about the main aspects of their contact with pets, qualitative and quantitative aspects, through a focus on four specific points: frequency, reciprocity, affective valence of contact, and global lifetime contact (1= *never*, 6=*always*). The 4 items were: “At what frequency do you have contacts with pets?;” “Do you have reciprocal interactions with pets (e.g. play with them, pet them, etc.);” “Do you feel positive emotions when you are in contact with pets (e.g., enthusiasm, feeling of belongingness)?;” and “At what frequency, throughout your life, have you had contact with pets?” A mean scale score was computed with higher scores indicating more contact with pets. The scale's Cronbach's alpha was adequate ($\alpha = .89$).

Inclusion of a favorite pet in the self.

This measure is an adaptation of the Inclusion of the Other in the Self Scale (IOS scale; Aron et al., 1991). The IOS scale is a 1-item pictorial scale that has been shown to be subjectively perceived as measuring the feeling of closeness with others. The IOS scale has been applied to assess closeness in a variety of relations (i.e., relation with a

significant other, a friend, family, a pet; Aron, Aron, & Smollan, 1992; McConnell et al., 2011). For the purpose of this research, it was adapted to assess the extent to which participants felt close to their favorite pet (i.e., inclusion of a favorite pet in the self). Participants had to choose the figure, out of seven choices presenting circles that overlapped to different degrees, that best corresponds to their relationship with this pet (see Figure 1). Each figure was attributed a number from 1 (least overlapping) to 7 (most overlapping). A higher score indicated a stronger inclusion of the pet in the self. Given that this pet was one that participants had to currently have, only pet owners completed this measure (n=103).

Inclusion of animals in the self.

This measure is also an adaptation of the Inclusion of the Other in the Self Scale (IOS scale; Aron et al., 1991). Based on Tropp and Wright (2001) who adapted the IOS scale in order to capture the feeling of closeness toward one's ingroup, we adapted the IOS scale to assess the feeling of closeness toward animals in general (i.e., inclusion of animals

Figure 1: Inclusion of a favorite pet in the self.

Please circle the illustration which best corresponds to the relation between you and your favorite pet:

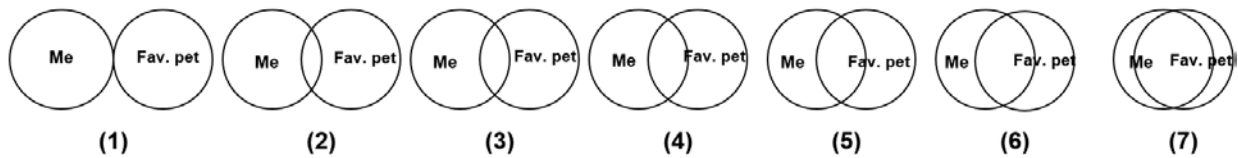
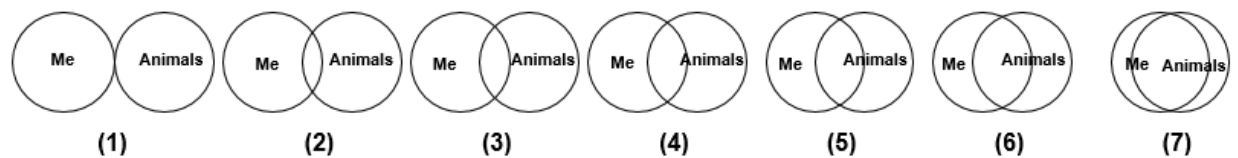


Figure 2: Inclusion of animals in general in the self.

Please circle the illustration which best corresponds to the relation between you and animals in general:



in the self). Again, for this 1-item measure, participants had to choose the figure (out of seven choices) that best corresponds to their relationship with animals (see Figure 2, previous page). Each figure was attributed a number from 1 (least overlapping) to 7 (most overlapping). A higher score indicated a stronger inclusion of animals in the self.

Moral concern toward animals. This scale measures how much moral concern participants have for a variety of animals. The original scale was from Laham (2009), but we chose to use the modified version from Bastian and colleagues (2012) as it contained a greater variety of animals. Participants were asked to circle the animal species for which they felt moral concern out of a list of 25 animals (chimps; gorillas; pigs; baboons; monkeys; bats; rats; elephants; kangaroos; birds; snakes; sheep; sharks; frogs; chickens; fish; starfish; snails; alligators; lions; cows; orangutans; dogs; dolphins; ducks). The total number of animal species circled provided the participants' score. A higher score was interpreted as greater moral concern toward animals.

Animals Attitude Scale (AAS; Herzog, Grayson & McCord, 2015). This 10-item measure assesses speciesism (i.e., discriminatory attitudes toward animals) using a 1 (Don't agree at all) to 7 (Really strongly agree) scale. The 10 items were: "It is morally wrong to hunt wild animals just for sport;" "I do not think there is anything wrong with using animals in medical research;" "I think it is perfectly acceptable for cattle and hogs to be raised for human consumption;" "Basically, humans have the right to use animals as we see fit;" "The slaughter of whales and dolphins should be immediately stopped even if it means some people will be put out of work;" "I sometimes get upset when I see wild animals in cages at zoos;" "Breeding animals for their skins is a legitimate use of animals;" "Some aspects of biology can only be learned through

dissecting preserved animals such as cats;" "It is unethical to breed purebred dogs for pets when millions of dogs are killed in animal shelters each year;" and "The use of animals such as rabbits for testing the safety of cosmetics and household products is unnecessary and should be stopped." Items 1, 5, 6, 9, and 10 were reversed to reflect negative attitudes toward animals. A mean scale score was computed with higher scores indicating more negative attitudes toward animals. The scale's Cronbach's alpha was adequate ($\alpha = .77$).

Results

Correlations. To verify the links between the continuous measure of contact with pets, inclusion of animals in the self, and attitudes toward animals in general, correlations were first examined (see Table 1). Among the whole sample (including both pet owners and non pet owners, $N=148$), contact with pets was negatively associated with speciesism ($r = -.33$, $p < .001$), and positively associated with moral concerns for animals ($r = .27$, $p < .01$). These results support H1. Contact with pets was also significantly correlated with inclusion of animals in the self ($r = .61$, $p < .001$). This result supports H2.

Pet ownership, attitudes toward animals, and identification with animals. A one-way ANOVA was first conducted to compare pet owners vs non pet owners on their degree of inclusion of animals in the self. Results revealed a significant difference between pet and non pet owners in terms of their degree of inclusion of animals in the self ($F(146,1)=12.25$, $p < .01$, $\eta^2 = .08$), with pet owners reporting greater inclusion of animals in the self ($n=102$, $M=4.59$, $SD=1.54$) than non pet owners ($n=44$, $M=3.59$, $SD=1.68$). These results provide support for H2 with pet ownership as a proxy for contact with pets.

Mediation analyses. To assess whether contact with pets was linked to more positive

Table 1.

Complete Correlations for Study 1.

	<i>M</i>	<i>SD</i>	1. Contact with pets	2. Inclusion of a favorite pet in the self (pet owners only)	3. Inclusion of animals in the self	4. Moral concern for animals	5. Speciesism
1. Contact with pets	4.74	1.15	1	.61***	.61***	.27**	-.33***
2. Inclusion of a favorite pet in the self (pet owners only)	5.01	1.58		1	.71**	.33**	-.44**
3. Inclusion of animals in the self	4.29	1.63			1	.46***	-.37***
4. Moral concern for animals	16.49	7.86				1	-.28**
5. Speciesism	2.69	.91					1

Note. ** $p < .01$, *** $p < .001$

attitudes toward animals in general through inclusion of animals in the self, mediation analyses with bootstrapping (5000 samples) were conducted (Hayes, 2012, 2013) among the whole sample (including pet owners and non pet owners, $N=147$). For this mediation analysis and the following ones, we used the variables' standardized scores (Z scores) to obtain the standardized beta coefficients of regressions and computed the analyses using

the *PROCESS* tool in the *SPSS* software. First, a mediation analysis using moral concern for animals as the dependent variable was conducted. Results (see Table 2 for a summary of total and direct effects of the mediation analyses conducted for Studies 1 and 2) confirmed that contact with pets positively predicted inclusion of animals in the self ($\beta=.58$, $p < .001$). Inclusion of animals in the self in turn predicted positively

Table 2.
Standardized Total and Direct Effects of Mediation Analyses (Studies 1 & 2)

Parameters estimates	Total effect			Direct effect		
Contact with pets → Inclusion of animals in the self → Moral concern for animals (Study 1)						
	β	SE	t	β	SE	t
	.27	.08	3.34**	-.02	.09	-.22
Contact with pets → Inclusion of animals in the self → Speciesism (Study 1)						
	β	SE	t	β	SE	t
	-.33	.08	-4.14***	-.16	.10	-1.65
Contact with pets → Inclusion of a favorite pet in the self → Inclusion of animals in the self (Study 1)						
	β	SE	t	β	SE	t
	.65	.12	5.62***	.13	.12	1.05
Inclusion of a favorite pet in the self → Inclusion of animals in the self → Id. with nature (Study 2)						
	β	SE	t	β	SE	t
	.40	.09	4.32***	.14	.10	1.44
Inclusion of a favorite pet in the self → Perception of the superordinate animal group → Inclusion of animals in the self (Study 2)						
	β	SE	t	β	SE	t
	.53	.09	5.9***	.40	.08	4.73***
Inclusion of a favorite pet in the self → Perception of the superordinate animal group → Id. with nature (Study 2)						
	β	SE	t	β	SE	t
	.40	.09	4.27***	.25	.09	2.84**

Note. ** $p < .01$; *** $p < .001$; id.= identification

moral concern for animals ($\beta=.49, p<.001$).

The overall model consisting of contact with pets and inclusion of animals in the self significantly predicted moral concern for animals ($F=19.70, p<.001, R^2=.22$). In terms of mediation, the positive association between contact with pets and moral concern for animals dropped from $\beta=.27, p<.01$ to $\beta=-.02, p=.825$, after including inclusion of animals in the self in the model. Bootstrapped estimates of the mediation effect confirmed that inclusion of animals in the self was a significant mediator of the relation between contact with pets and moral concern for animals (indirect effect: $\beta=.29, 95\%$ BCa CI [.1603, .424]). These findings support H3.

A second mediation analysis with bootstrapping (5000 samples) was conducted using speciesism as the dependent variable, contact with pets as independent variable, and inclusion of animals in the self as the mediator. The analysis revealed that inclusion of animals in the self negatively predicted speciesism ($\beta=-.29, p<.01$). The overall model consisting of contact with pets and inclusion of animals in the self significantly predicted speciesism, ($F=13.01, p<.001, R^2=.15$). In terms of mediation, the negative association between contact with pets and speciesism dropped from $\beta=-.33, p<.001$ to $\beta=-.16, p=.101$ after including inclusion of animals in the self in the model. Bootstrapped estimates of the mediation effect confirmed that inclusion of animals in the self was a significant mediator of the relation between contact with pets and speciesism (indirect effect: $\beta=-.17, 95\%$ BCa CI [-.2999, -.0550]). These findings support H3.

To test H4 and assess whether contact with pets is linked to inclusion of animals in the self through inclusion of a favorite pet in the self, a mediation analysis with bootstrapping (5000 samples) was conducted among pet owners as only they could respond to the inclusion of a favorite pet in the self

measure ($n=102$). The results showed that contact with pets positively predicted inclusion of a favorite pet in the self ($\beta=.79, p<.001$) and inclusion of a favorite pet in the self in turn positively predicted inclusion of animals in the self ($\beta=.67, p<.001$). The overall model consisting of contact with pets and inclusion of a favorite pet in the self significantly predicted inclusion of animals in the self ($F=50.29, p<.001, R^2=.50$). In terms of mediation, the positive association between contact with pets and inclusion of animals in the self dropped from $\beta=.65, p<.001$, to $\beta=.13, p=.296$ after including inclusion of a favorite pet in the self in the model. Bootstrapped estimates of the mediation effect confirmed that inclusion of a favorite pet in the self was a significant mediator of the relation between contact with pets and inclusion of animals in the self (indirect effect: $\beta=.53, 95\%$ BCa CI [.3377, .7443]). This result supports H4.

Summary

Study 1 provided support for hypotheses 1 through 4. First, correlations showed that greater contact with pets was associated with more positive attitudes toward animals (i.e., lower speciesism and greater moral concerns for animals) (H1) and with more inclusion of animals in the self (H2). Then, ANOVA results revealed that pet owners were significantly higher in terms of their levels of inclusion of animals in the self compared to non pet owners (H2). Mediation analyses confirmed the indirect effect of contact with pets on moral concern (positively) and speciesism (negatively) through inclusion of animals in the self (H3). A last mediation analysis revealed that contact with pets was associated with inclusion of animals in the self through greater inclusion of a favorite pet in the self(H4). These findings provide support for

the pets as ambassadors effect and the mediating role of inclusion of animals in the self in driving this effect.

Study 2

To further test and extend the pets as ambassadors effect, Study 2 included two additional measures, namely identification with nature and perception of the superordinate animal group. In this study, as well, the sequential ordering of variables proposed in our mediation hypotheses was guided by the theoretical arguments presented in the introduction. We hypothesize that inclusion of a favorite pet in the self will be associated with inclusion of animals (more generally) in the self, and that this sense of identification will in turn be associated with identification with nature (Hypothesis 5, [H5]). Study 2 also aims to capture a cognitive mechanism involved in the pets as ambassador effect and in our feelings of connection with pets and with animals more generally. To this aim, we test whether people's perception of the superordinate animal group is a mechanism through which inclusion of a favorite pet in the self will be associated with higher inclusion of animals in general and higher identification with nature (Hypothesis 6, [H6]).

Method

Participants and procedure

We recruited a convenience sample of undergraduate university students. Approximately 50% of the students approached to take part in the study participated in it. Participants were 159 students recruited at the University of Quebec in Montreal (UQAM) in two undergraduate classes (biology and psychology) or at the university's library. Participants completed a consent form before completing the 40-minute paper questionnaire. Two

participants were excluded from the analyses for having more than 25% of their answers missing, and nine other participants were excluded for having been identified as multivariate outliers. The final sample was consisting of 148 students (108 women, 40 men; mean age of 23.26 years old). Ninety-five participants were pet owners and reported that their favorite pet was a dog (n=32), a cat (n=27), a hamster (n=1), and a snail (n=1), while 34 pet owners did not specify the species of their favorite pet. This study was approved by UQAM institutional research ethics board. All data analyses were conducted using SPSS software.

Measures

The same measures of pet ownership, inclusion of a favorite pet in the self, and inclusion of animals in the self that were used in Study 1 were also used in Study 2. We added a measure of identification with nature and a measure of perception of the superordinate animal group.

Identification with nature (Clayton, 2003). We used Clayton's (2003) adaptation of the Collective Identification Scale (Luhtanen & Crocker, 1992) to measure identification with nature. This 4-item scale assessed the extent to which participants feel that nature is an important part of themselves using a 7-point Likert scale ranging from 1 (doesn't correspond at all) to 7 (correspond exactly). The 4 items were: "I consider myself as being a part of nature, not as being separated from nature;" "I feel I have a lot in common with other species;" "Being part of the ecosystem is an important part of who I am;" and "Generally, being a piece of the natural world is an important part of how I see myself." A mean scale score was computed with higher scores indicating stronger identification with nature. This scale's Cronbach's alpha was adequate ($\alpha = .86$).

Perception of the superordinate animal group. This 5-item scale is an adaptation of a recategorization scale from Esses, Hodson, and Dovidio (2003; see also Costello & Hodson, 2010). It measured the degree to which participants view humans and animals as members of a common superordinate group. The 5 items were: “The distinction between humans and animals is artificial, we are all part of the same group;” “Humans and animals belong to different groups;” “Humans are so different from other life forms that it is a mistake to categorize them as animals;” “Humans evolved from animals, in that way animals are structurally and mentally similar to humans;” and “Humans too are animals” (1=Don't agree at all, 7=Really strongly agree). A mean scale score was computed (items 2 and 3 were reversed) with higher scores indicating a stronger view of humans and animals as members of common superordinate group. This scale's Cronbach's alpha was adequate ($\alpha = .82$).

Results

Pet ownership, attitudes toward animals, and inclusion of animals in the self. We first sought to replicate the association between pet ownership and inclusion of animals in the self in the current sample. A one-way ANOVA compared pet owners vs non pet owners in terms of their degree of inclusion of animals in the self. The results pertaining to H2 revealed a non-significant association between pet ownership and inclusion of animals in the self ($F(136,1)=3.40, p=.07, \eta^2=.03$). Pet owners ($n=89, M=4.27, SD=1.59$) were not statistically different from non pet owners ($n=47, M=3.75, SD=1.57$). This particular finding and the fact that it does not replicate the results from Study 1 will be discussed in the summary for Study 2.

Mediation analyses. Correlations for Study 2 are reported on Table 3. To verify if

pets can also act as ambassadors of nature, we tested whether inclusion of a favorite pet in the self predicts identification with nature and whether this association is mediated by inclusion of animals in the self. We conducted a mediation analysis with bootstrapping (5000 samples). Again, only pet owners were included in the analysis given that the inclusion of a favorite pet in the self measure pertained to a current pet ($n=86$). Results showed that inclusion of a favorite pet in the self positively predicted inclusion of animals in the self ($\beta=.53, p<.001$), and that inclusion of animals in the self in turn positively predicted identification with nature ($\beta =.49, p<.001$). The overall model consisting of inclusion of a favorite pet in the self and inclusion of animals in the self significantly predicted identification with nature ($F=23.91, p<.001, R^2=.37$). In terms of mediation, the positive association between inclusion of a favorite pet in the self and identification with nature dropped from $\beta=.40, p<.001$ to $\beta=.14, p=.15$, after including inclusion of animals in the self in the model. Bootstrapped estimates of the mediation effect confirmed that inclusion of animals in the self was a significant mediator of the relation between inclusion of a favorite pet in the self and identification with nature (indirect effect: $\beta=.26, 95\% \text{ BCa CI } [.1482, .4228]$). These results support H5.

To test the role of perception of the superordinate animal group as an underlying mechanism involved in the pets as ambassadors effect, we conducted two mediation analyses with bootstrapping (5000 samples; with pet owners only, $n=86$). The first mediation analysis tested if the association between inclusion of a favorite pet in the self and inclusion of animals in the self was mediated by perception of the superordinate animal group. Results showed that inclusion of a favorite pet in the self positively predicted perception of the superordinate animal group ($\beta=.32, p<.01$),

Table 3: Complete Correlations for Study 2.

	<i>M</i>	<i>SD</i>	1. Inclusion of a favorite pet in the self (pet owners only)	2. Inclusion of animals in the self	3. Identification with nature	4. Perception of the superordinate animal group
1. Inclusion of a favorite pet in the self (pet owners only)	5.16	1.51	1	.54***	.41***	.34***
2. Inclusion of animals in the self	4.10	1.60		1	.57***	.59***
3. Identification with nature	4.72	1.40			1	.57***
4. Perception of the superordinate animal group	4.60	1.27				1

Note. *** $p < .001$

and perception of the superordinate animal group in turn positively predicted inclusion of animals in the self ($\beta = .42, p < .001$). The overall model consisting of inclusion of a favorite pet in the self and perception of the superordinate animal group significantly predicted inclusion of animals in the self, ($F = 35.09, p < .001, R^2 = .46$). In terms of mediation, the positive association between inclusion of a favorite pet in the self and inclusion of animals in the self dropped from $\beta = .53, p < .001$ to $\beta = .40, p < .001$ after including perception of the superordinate animal group in the model. Bootstrapped estimates of the mediation effect revealed that perception of the superordinate animal group was a significant mediator of the relation between inclusion of a favorite pet in the self and inclusion of animals in the self (indirect effect: $\beta = .14, 95\% \text{BCa CI } [.0508, .2530]$). These findings provide support for H6.

A second mediation analysis with pet owners tested if the association between inclusion of a favorite pet in the self and identification with nature is mediated by perception of the superordinate animal group. Results revealed that inclusion of a favorite

pet in the self positively predicted perception of the superordinate animal group ($\beta = .33, p < .01$), and perception of the superordinate animal group in turn positively predicted identification with nature ($\beta = .45, p < .001$). The overall model consisting of inclusion of a favorite pet in the self and perception of the superordinate animal significantly predicted identification with nature ($F = 24.84, p < .001, R^2 = .37$). In terms of mediation, the positive association between inclusion of a favorite pet in the self and identification with nature dropped from $\beta = .40, p < .001$ to $\beta = .25, p < .01$ after including perception of the superordinate animal group in the model. Bootstrapped estimates of the mediation effect revealed that perception of the superordinate animal group was a significant mediator of the relation between inclusion of a favorite pet in the self and identification with nature (indirect effect: $\beta = .15, 95\% \text{BCa CI } [.0572, .2847]$). These results also support H6.

Summary

Study 2 provided support for hypotheses 5 and 6, but not for hypothesis 2. Mediation

analyses confirmed that inclusion of a favorite pet in the self predicted identification with nature through inclusion of animals in the self (H5). This finding provides support for the contention that pets can act as ambassadors for both animals more generally and even for nature. Inclusion of a favorite pet in the self was also associated both with inclusion of animals in the self and with identification with nature through perception of the superordinate animal group (H6). This finding suggests that perceiving animals as a large and inclusive superordinate group represents a cognitive mechanism whereby inclusion of a favorite pet in the self predicts higher feelings of connection with animals and with nature.

This discrepancy in results pertaining to H2 between Study 1 and Study 2 might be due to characteristics of the sample. Specifically, 31% of Study 2 sample was composed of biology students vs. 11.6 % in Study 1. Being in this specific program of study could play a role in explaining the findings uncovered. Indeed, Broida, Tingley, Kimball, and Miele (1993) reported that students exposed to animal research, including Biology students, tended to be more opposed to experimentation on animals. Similarly, Caro, Pelkey, and Grigione's (1994) longitudinal results revealed that taking a conservation biology course improved students' attitudes toward animals. In this way, it is possible that biology students in our sample reported high inclusion of animals in the self regardless of whether they had pets or not. Pet ownership might be less determining for this subsample in improving their attitudes toward animals in general as their program of study already brings them into greater contact with animals and leads them to learn more about nonhuman animals.

Supporting this explanation, we conducted supplementary analyses and compared pet owners ($n=26$, $M=5.04$,

$SD=1.64$) and non pet owners ($n=17$, $M=4.41$, $SD=1.54$) among the subsample of biology students ($N=45$). There was no statistical difference in this subsample on the extent to pet and non pet owners included animals in the self ($F(43, 1)=1.56$, $p=.217$, $\eta^2=.04$). Furthermore, in the entire sample, biology students generally reported greater inclusion of animals in the self ($n=43$, $M=4.79$, $SD=1.61$) than did students in other programs of study ($n=91$, $M=3.80$, $SD=1.51$, $F(134, 1)=12.01$, $p<.001$, $\eta^2=.08$). This pattern of findings could explain the discrepancy in results observed across studies. We conclude that the greater proportion of biology students in Study 2 vs Study 1 provides an explanation for this discrepancy: Because they are presumably more exposed to animals, biology students might feel closer to animals in general, notwithstanding their contact with pets.

General Discussion

Two studies aimed to test the pets as ambassadors hypothesis and deepen our understanding of the mechanisms involved in this phenomenon. Specifically, we first aimed to test if contact with pets (both in terms of pet ownership and in terms of feelings of connection with them) could predict more positive attitudes toward animals more generally. Second, we investigated if relational and cognitive mechanisms (i.e., inclusion of animals in the self and perception of the superordinate animal group) could account for the association between contact with pets and positive attitudes toward animals in general. Third, we aimed to extend the pets as ambassadors hypothesis and test if inclusion of a favorite pet in the self could also predict identification with nature.

Altogether, our results supported and extended the pets as ambassadors hypothesis. We found that contact with pets predicted

more positive attitudes toward animals and that this association was mediated by enhanced inclusion of animals in the self. Contact with pets also predicted inclusion of a favorite pet in the self (Study 1). Moreover, Study 2 revealed that inclusion of a favorite pet in the self predicted identification with nature through inclusion of animals in the self. Finally, we found that perception of the superordinate animal group accounted for the pets as ambassadors effect.

From a theoretical perspective, our findings confirm the applicability of the intergroup contact literature to the realm of human-animal relations as one specific type of intergroup encounter (Plous, 2003). Although no causal conclusions can be deduced from our study design, our correlational findings align with prior experimental work conducted in the intergroup contact tradition among groups of humans, which show that intergroup contact generally results in improved attitudes (Pettigrew & Tropp, 2006). Whereas the current research does not allow us to rule out this alternative direction of causality, in the realm of human-pet interactions, it is possible to expect both contact to affect attitudes toward animals and attitudes to affect quality or quantity of contact with pets (Hemsworth, 2003; Randler, Hummel, & Prokop, 2012).

In the last years, the contact literature has turned to investigate what parameters of contact are important to effectively improve intergroup attitudes (Pettigrew, Tropp, Wagner, & Christ, 2011). In line with these different parameters, and going beyond the pets as ambassadors hypothesis – which typically refers to contact with pets in terms of pet keeping (i.e., being a pet owner or not; Paul & Serpell, 1993) – the present research extended this conceptualization to also evaluate contact with pets more broadly, namely, in terms of its frequency/length, perceived reciprocity, and valence of interaction (Davies et al., 2011). In Study 1,

we found that contact with pets in the entire sample (including both pet owners and non pet owners) predicted more positive attitudes toward animals, and that this association was mediated by a higher sense of including animals in the self.

Our results also build a bridge between different theories of intergroup relations (i.e., intergroup contact theory and the CIIM) and the human-animal relations literature. Our findings highlight the role of inclusion of the other in the self as an important underlying psychological process through which contact with pets can predict improved attitudes toward animals in general. These results confirm the importance of contact with pets for people's feelings of connection with animals more broadly. Indeed, it seems that contact with pets could have lasting effects for people by affecting their mental representations of the groups they belong to. This view is consistent with the cross-group friendship literature which suggests that intimate intergroup contact affects both our feeling of connectedness with others and how we categorize them cognitively (i.e., IOS; Davies et al., 2011). In this way, it seems that including animals in the self could represent an important pathway through which close contact with pets can yield more positive attitudes toward animals more broadly.

Our results pertaining to the mediating role of superordinate identity perception also supports this view. Indeed, in line with the CIIM, the perception that humans and animals are members of the same superordinate group was found to mediate the associations between a specific relationship (i.e., inclusion of a pet in the self) and feelings of being connected to large and inclusive social groups (i.e., inclusion of animals in the self and identification with nature). Whereas the CIIM recognizes recategorization as a crucial process to foster positive attitudes toward outgroup members, our findings on the perception of the

superordinate animal group inform us on the very nature of the cognitive processes that occur in the pets as ambassadors phenomenon. Our results stress the importance of perceiving humans and animals as members of the same superordinate group in order for specific positive attitudes toward pets to generalize to positive attitudes toward animals and nature.

Finally, our results suggest that the pets as ambassador effect is not limited to the representation of other animals, but rather that pets can also promote our links to nature more broadly. Indeed, we found that contact with pets predicts identification with nature through inclusion of animals in the self. Identifying with nature has important societal implications: Empirically, this notion is associated with more pro-environmental behaviors and concerns and with greater intentions to preserve the environment (Gosling & Williams, 2010; Hinds & Sparks, 2008; Kiesling & Manning, 2010; Mayer & Frantz, 2004; Nisbet, Zelenski, & Murphy, 2009; Schultz, 2000, 2001).

Limitations and Future Research Directions

Overall, our hypotheses were confirmed and our results yielded moderate to strong effect sizes (ranging from $R^2=.12$ to $R^2=.50$; Cohen, 1992). This observation is coherent with what has generally been observed in research on contact theory (Davies et al., 2011; Pettigrew & Tropp, 2006; Wright et al., 1997). To further investigate the applicability of intergroup theories to the pets as ambassadors hypothesis, a next important step would be to explore potential enhancers or attenuators (i.e., moderators) that play a role in the pets as ambassadors phenomenon, and whether some individual characteristics (e.g., attachment style to animals) facilitate or perhaps undermine the pets as ambassadors effect.

An important limitation of our studies is that the correlational study designs employed do not allow for causal inference (Iacobucci, 2008). Only an experimental design could provide causal evidence for the links between contact with pets and attitudes toward animals in general, as well as the causal role of inclusion of the other in the self and perception of a superordinate animal group (Holland, 1986; James & Brett, 1984). Future work should hence test the links investigated herein using experimental designs in order to allow for causal inferences. As well, conducting mediation analyses with cross-sectional data has recently been discussed as not ideal (Maxwell & Cole, 2007). Particularly, it seems that tests of longitudinal mediation – in which all variables in the mediation model are expected to change over time – may render biased results when conducted with cross-sectional data (Maxwell & Cole, 2007). Future research on the pets as ambassadors hypothesis would benefit from using longitudinal designs in order to address these methodological issues and test these mediating processes temporally. Finally, regarding the generalizability of our findings, it is important to note that our samples were relatively small, comprised only of Canadian university students, and that they were female-biased ($N1=148$, 73.7% women; $N2=148$, 73% women), all of which constrain generalization of our findings (Calder, Phillips, & Tybout, 1982; Highhouse & Gillespie, 2009).

Based on our current results, which extended the pets as ambassadors hypothesis to uncover the mechanisms that underlie this effect and to an even broader identity (i.e., identification with nature), future research could directly test the potentially beneficial role of pets in promoting pro-environmental behaviors. These studies could add to the growing body of studies uncovering in which contexts animals have beneficial effects on

human well-being (Amiot & Bastian, 2015), and in fostering positive interpersonal relations among humans and among humans and animals (Gibbons, Cunningham, Paiz, Poelker, & Cardenas, 2015; Schneider et al., 2014). Such future studies are important as they could guide the development of innovative interventions that would promote healthy relationships among humans, their pets, and animals more broadly.

The pets as ambassadors hypothesis represents a useful framework to deepen our understanding of the complex ways in which we relate to animals. Herein, we have aimed to provide emerging empirical evidence in support of this hypothesis, as well as uncover potential underlying mechanisms. We have tested the applicability of the contact literature, and particularly the cross-group friendship literature, to the pets as ambassadors effect and to the realm of human-animal relations more broadly. The current findings confirm that our contacts with pets are important in shaping both who we are and how we relate to our environment more broadly (i.e., animals and nature).

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