



## Birds of a feather flock together? Perceived personality matching in owner–dog dyads

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### ABSTRACT

Partner choice is strongly affected by similarity in physical and psychological characteristics. Although there is a popular belief that dogs share similar personality characteristics with their owners, no studies have yet addressed the topic. Here, we tested for associations between the dog and owner personality in two countries (Austria and Hungary) and found significant positive correlations between owners and their dogs in all the five investigated personality dimensions (neuroticism, extraversion, conscientiousness, agreeableness, and openness). This similarity could not be attributed solely to the owners' self-projection, since the similarity in the first four dimensions was also significant when an independent peer person assessed the dog instead of the owner. The similarity was not affected by the length of ownership, however, we found cultural differences in the correlation pattern; more and stronger correlations were found in the Hungarian sample. Moreover, in multi-dog households the dogs' similarity patterns complement each other, suggesting possible differences in the dogs' role. Our results provide the first evidence that dogs do resemble their owners suggesting potential applied utility as well as indicating that dog–owner relationship could be a useful model of human social relationships.

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### 1. Introduction

Personality similarity and assortative mating have received wide interest in psychological studies. There is consistent evidence for the so called 'similarity-attraction hypothesis' suggesting that the more similar two individuals are, the higher the attraction between them (Byrne, 1971; Byrne et al., 1967). Evidence for the similarity-attraction hypothesis has been found in many human domains, for example personality traits (e.g. Luo and Klohnen, 2005), physical attractiveness (Feingold, 1988),

attitudes (Buunk and Bosman, 1986) or "communication traits" (Martin and Anderson, 1995). It is assumed that having a similar partner helps to maintain the relationship by reducing the risk of conflicts and disagreements and validates our beliefs about the world and ourselves (Barelds and Barelds-Dijkstra, 2007; Byrne, 1971; Morry, 2005).

Similarity can be assessed either by measuring the actual similarity (comparing the self-reports of the partners) or by measuring the perceived or assumed similarity (comparing one's self-report and the report that (s)he provides about the partner). The degree of personality similarity varies among studies and characteristics, the degree of actual similarity most often is below 0.20 (e.g. Barelds, 2005; Kurtz and Sherker, 2003; Watson et al., 2004). The degree of perceived (or assumed) similarity is usually higher, but it rarely exceeds 0.30 (e.g. Lee et al., 2009; Watson et al., 2000). In summary, similarity (either

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actual or perceived), has positive effects on relationship functioning and is one of the most important interpersonal variables in social psychology.

People establish social relationships with a range of other species as well. Dogs have lived with humans for over thousands of years and have become an integral part of human society. Owners in western countries consider their dogs usually as social partners (family member, friend or companion, Kubinyi et al., 2009; Serpell, 2003), and put serious efforts into selecting the “right dog” to become such a partner. As “man’s best friend”, dogs can provide social support and pet ownership has many other positive psychological and physical benefits for the owners (McConnell et al., 2011). If the similarity-attraction principle affects human social preferences in general, this could also manifest in people’s pet choice. They may choose a breed (or breeding line within a breed) which is genetically predisposed to show certain behavioral traits they find attractive, or they may find the behavior of an individual puppy or adult dog more acceptable or attractive. Therefore one could expect a correspondence also between owners’ and dogs’ personality traits.

Only a few attempts have been made to investigate the relationships between dogs’ and owners’ personalities. For instance, O’Farrell (1995) found a positive correlation between owners’ anxiety and dogs’ displacement activity. Podberscek and Serpell (1997) showed that owners of highly aggressive English Cocker Spaniels were emotionally less stable, shy, undisciplined and more likely to be tense than owners of less aggressive spaniels. Zeigler-Hill and Highfill (2010) showed that owners were more satisfied with their pet if its perceived level of warmth (an interpersonal dimension that relates to extraversion and agreeableness; McCrae and Costa, 1989) was similar to their own. Accordingly, these studies suggest a link between dogs’ and owners’ personality profiles. However, it is still an open question whether dogs actually do resemble their owners in a full personality profile.

Studying owners and dogs together requires a cross-species approach and similar means for assessing the two parties. Human personality research has established the Five Factor Model (FFM) for assessing broad personality dimensions of humans. On the contrary, dog personality research has not established yet a widely accepted personality model, not even standardized definitions and methods measuring it. However, Gosling and John (1999) suggested that the human FFM could provide a common tool for cross-species personality comparisons since these dimensions showed considerable generality across species.

In this study, we tested for an association between the owners’ and their dogs’ perceived personality using FFM framework. Based on the results of human studies on assortative mating, we expected that owners would perceive their dogs as being similar to themselves in all the five dimensions. In particular, we expected that dogs would be rated to be more similar to their owner than to another randomly chosen dog owner (Hypothesis 1).

Personality similarity may originate from several sources. Owners may simply attribute similar personality traits to their animal companions, irrespective of their dogs’ real personality. Kwan et al. (2008) showed that people’s

projection of their self-views onto dogs is similar to their projections onto other humans. To investigate whether owners simply rate their dog’s personality similarly to their own, we analyzed whether peer persons rate the owner and dog similar to each other, and also compared the owners’ scores about themselves to the dogs’ scores assessed by a family member. On the basis of the studies mentioned earlier, we predicted weaker but significant associations between these two scores (Hypothesis 2).

Time spent together could affect the perceived similarity between owners and dogs. Studies on married couples and roommates found some emotional convergence over time (Anderson et al., 2003), thus the same might be expected between owners and dogs. However, dogs age much faster than their owners therefore the nature of the human–dog relationship could change markedly over a dog’s life course. For example, in older age, the decreasing physical capabilities may prevent dogs from participating in shared activities with the owners, such as going hiking or attending dog sports. Dogs’ personality change due to aging may also affect the owner–dog personality association. In light of these arguments, we made no specific predictions regarding the effects of length of ownership on similarity.

We also considered how multiple owner–dog relationships influence personality matching. Owners may share all personality traits with all of their dogs but there are also reasons to expect differences. In case of the second or third dog, owners may choose a dog more consciously drawing on their increased experience. Dogs may have different social roles in the family, and the emerging intra-specific relationship between dogs could also influence their behavioral traits. Therefore we expected differences between the perceived similarities of dogs living in the same household. In particular, we hypothesized that secondly acquired dogs would be perceived as more similar to the owner than the firstly acquired dogs because of owners optimizing their choice after gaining experience with their first dog (Hypothesis 3).

Another unique aspect of this study is repeating the same observation in two neighboring countries (Austria and Hungary). Owners from different cultures may prefer different traits, paralleling the effect of culture on human relationships as was shown in the case of married couples (McCrae et al., 2008). We hypothesized that ‘cultural’ effects would influence perceived personality matching between owners and their dogs, resulting in different similarity patterns in the two countries (Hypothesis 4).

## 2. Material and methods

### 2.1. Subjects

A sample of 389 owners (88% women, mean age 35 years) was recruited from volunteers of the Clever Dog Lab database in Vienna, Austria ( $N=178$ ) and from the Family Dog Project database in Budapest, Hungary ( $N=211$ ). Our subjects were adult owners (>18 years) with adult dogs (>1 year). Owners and dogs had lived together for at least 10 months. The sample consisted of 237 dogs from Austria (mean age:  $5.75 \pm 3.2$  years, 47.3% males) and 281 dogs from Hungary (mean age:  $4.82 \pm 3.36$  years, 47.6% males).

**Table 1**  
Characteristics of the participants and the studied dog populations in Austria and Hungary.

Owners	Austria			Hungary		
	Total N	Women (%)	Mean age (SD)	Total N	Women (%)	Mean age (SD)
Owners with one dog	119	87.4	39.6 (12.8)	141	83.7	33.2 (10.1)
Owners with more dogs	59	89.8	40.0 (12.9)	70	88.6	34.2 (11.2)
Dogs	Austria			Hungary		
	Total N	Female (%)	Mean length of ownership (SD)	Total N	Female (%)	Mean length of ownership (SD)
Single dogs	119	52.9	4.1 (2.2)	141	49.6	3.4 (2.2)
First dogs	59	54.2	7.5 (3.1)	70	52.9	7.2 (4.2)
Second dogs	59	57.6	5.2 (2.9)	70	52.9	3.2 (2.1)

The descriptives of the samples in the two countries are presented in Table 1. To investigate the owners' perception bias we provided peer ratings of the dog's personality for 61 owner–dog pairs from the Hungarian sample.

## 2.2. Questionnaires

The human personality was measured by either the German or Hungarian version of the 44-item Big Five Inventory (BFI, John et al., 1991; John and Srivastava, 1999). The measure includes 8 questions for neuroticism (e.g. "Is emotionally stable, not easily upset"); 8 questions for extraversion (e.g. Is full of energy); 9 questions for conscientiousness (e.g. "Tends to be lazy"); 9 questions for agreeableness (e.g. "Can be cold and aloof"); and 10 questions for openness (e.g. "Is curious about many different things"). All personality factors contained reverse scored items. The personality of the dog was measured by the BFI adapted for dogs (Canine BFI) (for the adaptation procedure, see Gosling et al., 2003). For each item, the owners scored themselves and their dogs using a 5-point scale (from disagree strongly to agree strongly). The personality dimension scores of the owners and dogs were calculated by averaging the scores of the variables representing each dimension (Gosling et al., 2003; John and Srivastava, 1999).

## 2.3. Procedure

Each owner provided demographic information about him/herself and filled out a questionnaire about his/her dog followed by a self-report personality questionnaire. The participants completed the questionnaires either on the Internet or during a visit at one of the laboratories. The owners were told that the purpose of the study is to analyze the dog–owner relationship.

## 2.4. Statistical analyses

Our first two hypotheses were tested using Pearson correlations. For these analyses, only one randomly chosen dog was included for each owner (the first in the alphabetical order). To test our first hypothesis (owners perceive their dogs similar to themselves), we computed the correlations between the owner-reported personality dimensions.

To test whether the similarity was due to the owners' perception only (Hypothesis 2), we computed correlations

between the peer-assessed dog personality dimensions and both the self-assessed owner dimensions and the peer-assessed owner dimensions.

For subsequent analyses, we included two dogs for each multiple dog owner, however, this might bias our results by violating the independence of the data points. We assigned the dogs to three groups, based on the number of dogs in the household and the length of ownership. These groups ("dog groups") were: (i) only one dog lives in the household (single dogs); (ii) in multi-dog households the dog with the longest relationship with the owner (first dogs); (iii) in multi-dog households the dog with the second longest relationship with the owner (second dogs). The length of ownership was computed from the dogs' age at acquisition and the age at participation. The length of ownership correlated strongly with the dog age (Pearson  $r=0.938$ ,  $P<0.001$ ).

To test whether the length of ownership, dog group and the country of residence affect owners' perception of similarity (Hypotheses 3 and 4), we used general linear models (GLMs) with the owner-assessed dog dimension as dependent variable, the owner personality dimension and the length of ownership as covariates and dog group (single, first, and second dogs) and country of residence (Austria and Hungary) as fixed factors. Interactions between the owner dimension and length of ownership, owner dimension and the country, and owner dimension and dog group were added to the model. Significant interaction would mean that the given factor has a significant effect on the owners' perceived similarity on that dimension. According to the backward elimination procedure, variables were removed from the model in the order of their decreasing significance, starting with the interactions until only

**Table 2**  
Pearson correlations of the Big Five dimensions between real owner–dog pairs and between randomly assigned owner–dog pairs.

Personality dimension	Real owner–dog pairs (N = 389)	Random owner–dog pairs (N = 389)
Neuroticism	0.458***	0.019
Extraversion	0.312***	−0.014
Conscientiousness	0.282***	−0.051
Agreeableness	0.252***	0.041
Openness	0.288***	0.023
Average	0.318	0.004

\*\*\*  $P<0.001$ .

**Table 3**

Pearson correlations of the Big Five dimensions between peer-assessed dog personality and self-assessed owner/peer-assessed owner personality.

Personality dimension	Owner judgment of self, peer judgment of dog ( $N=61$ )	Peer judgment of owner and dog ( $N=43$ )
Neuroticism	0.330**	0.335*
Extraversion	0.263*	0.318*
Conscientiousness	0.348**	0.632**
Agreeableness	0.263*	0.417**
Openness	-0.134	0.175
Average	0.214	0.375

\*  $P < 0.05$ .

\*\*  $P < 0.01$ .

\*\*\*  $P < 0.001$ .

significant variables were present in the model (minimal adequate model). The argument in favor of the GLM method is that it tests the three hypotheses at once hereby reducing the Type I error. However, we also provided the more traditional zero-order (Pearson) correlations separately in the dog groups in each country, with Bonferroni correction to account for multiple comparisons. Statistical analysis was conducted with SPSS version 17.0.

### 3. Results

#### 3.1. Perceived similarity between owners and dogs

Our first hypothesis suggested that owners would perceive their dogs as similar to themselves in all the five dimensions. We first tested similarity on the entire sample using Pearson correlation and found significant positive relationships between owners and dogs in all five dimensions, ranging from  $r=0.252$  (agreeableness) to  $r=0.458$  (neuroticism) (Table 2). However, this could be because any given dogs' personality is similar to any given owners' personality. To test this, we computed correlations between randomly assigned dog-owner pairs (similar to the human 'pseudo-couple analysis' Kenny et al., 2006). The correlations between the random pairs were negligible, (ranging from  $r=-0.051$  (conscientiousness) to  $r=0.041$  (agreeableness), Table 2), thus the correlations between real dog-owner pairs are clearly significant and higher than those between randomly created dog-owner pairs.

#### 3.2. Personality similarity due to self-projection

We tested whether owners simply project their own characteristics on their dogs by comparing the owners' scores about themselves to the dogs' scores assessed by a family member. We also analyzed whether peer persons rate the dog and owner similar to each other. In both analyses, the correlations between the dog and owner personality were significant in all but the openness dimension (Table 3). This suggests that the association found between the owners' self and dog assessments in openness seems to be only a perception. However, the similarity in the remaining four dimensions may have objective cause.

#### 3.3. Factors affecting the owners' perception of similarity

In order to investigate the effect of the length of ownership, the number of dogs in the household and the country of residence on the owners' perception of similarity, we used the owner-assessed dog dimension as dependent variable in the general linear models. The personality of the owners had a significant (positive) main effect in every GLMs.

No significant interaction was detected between the length of ownership and owner personality, thus, the length of ownership did not affect (either positively or negatively) the owners' perceived similarity to their dogs. However, the GLM analyses revealed that the length of ownership had a negative main effect on the extraversion, agreeableness, and openness dimensions (extraversion  $F_{1,511}=20.24$ , agreeableness  $F_{1,515}=11.17$ ; openness  $F_{1,515}=20.70$ ,  $P < 0.001$  for all); the longer the relationship with the dog, the less extraverted, agreeable, and open the dog is, according to the owner.

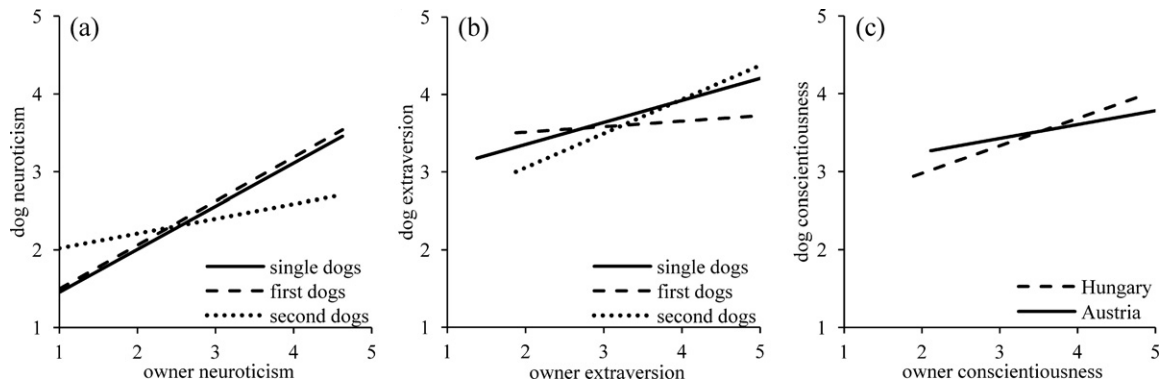
We found significant interactions between the owner personality and dog group in neuroticism and extraversion dimensions. There is a positive association between the dogs and owners neuroticism in single and first dogs, but this association was missing in the second dogs (owner neuroticism  $\times$  dog group  $F_{2,512}=5.64$ ,  $P=0.004$ , Fig. 1A). In extraversion, the positive association between the dogs and owners characteristics was restricted to the single and second dogs and was absent in the first dogs group (owner extraversion  $\times$  dog group  $F_{2,511}=6.95$ ,  $P=0.001$ , Fig. 1B). Thus, as expected, the dog group (representing number of the dogs in the household and the dogs' acquisition order) affected the owners' perception of similarity.

Only one significant interaction was found between the owner personality and the country of residence. Conscientiousness of dogs and owners were associated in case of the Hungarian sample only (owner conscientiousness  $\times$  country  $F_{1,514}=4.36$ ,  $P=0.037$ , Fig. 1C).

Traditional zero-order (Pearson) correlations were computed for testing the strength of the correlations. Since both the country and dog groups had modifying effects on some of the associations, the correlations were computed separately in the dog groups in each country (Table 4). We found the highest mean correlation in case of single dogs in both countries. In Hungary, second dogs were more similar to the owners than the first dogs, confirming our Hypothesis 3. The results of this correlation analysis revealed further interesting patterns. In the Hungarian sample the first and second dogs' similarity patterns complement each other and form the same similarity pattern as that of single dogs. This phenomenon is also present in the Austrian sample (except the correlation in agreeableness in the first dogs). In general, we found more and higher correlations between the owners and dogs in the Hungarian sample; particularly, no significant correlations were found in conscientiousness and openness dimensions in the Austrian sample.

### 4. Discussion

The present study examined whether dog owners perceive their dogs as being similar to themselves, mirroring



**Fig. 1.** The number of the dogs in the household and the country of residence modify the owner–dog personality associations. (a) In neuroticism, the associations are positive in single and first dogs and absent in second dogs; (b) in extraversion, the associations are positive in single and second dogs and absent in first dogs; and (c) in conscientiousness, the association is positive in Hungary and absent in Austria. For illustrative reasons, only the trend lines are presented, the lines were drawn on the basis of 518 data points.

the personality similarity found in various human–human social relationships (reviewed in Montoya et al., 2008; Watson et al., 2004). Consistent with our expectations, we have found significant positive associations between owners' and dogs' personality dimensions. To our knowledge, our study provides the first evidence for personality similarity in owner–dog pairs, confirming that owner–dog partnerships share characteristics with human–human partnerships.

On average, our findings are in harmony with human studies, with the exception that the highest correlation between owners and dogs was in neuroticism, while human studies suggest positive assortment effects mainly in openness (e.g. Lee et al., 2009). Anxious, neurotic owners may make their dog more nervous, e.g. by behaving more inconsistently them (O'Farrell, 1995) or by being overprotective and thereby failing to socialize them adequately (Podberscek and Serpell, 1997). Correlations between owners' and dogs' personality could also imply a reverse causal relationship; for example O'Farrell (1997) found that owner anxiety is not associated with a higher incidence of phobias in the dog; a dog's phobia, however, tends to cause greater distress to a more anxious owner.

We also investigated several sources of the (perceived) similarity. In the case of human social relationships, there are three, not mutually exclusive hypotheses about the origin of the similarity. First, the relationship and

attraction may lead to perceptions of higher similarity (attraction-similarity hypothesis, e.g. Morry, 2005). Accordingly, owners may simply attribute similar personality traits to their animal companions. This hypothesis cannot be ruled out completely, however, we also found positive associations between peer and self ratings, and owners and dogs are assessed to be similar also by independent peer raters (in harmony with the results of Kwan et al., 2008) in four of the five dimensions. The similarity found in the openness dimension, however, seems to reflect mostly the owners' projection of this characteristic onto their dog. Human studies also suggest a positive perception-bias in openness (e.g. Lee et al., 2009; Watson et al., 2000), our findings may be analogs to it.

Second, in a reverse causal situation, people may actively seek similar others as social partners (similarity-attraction hypothesis, e.g. Byrne, 1971). Owners may have a tendency to select dogs that are similar to themselves, either at the individual or at the breed level. Although we lack information about why/how owners choose a particular dog or select a breed, this hypothesis is the most plausible explanation for our results and some studies seems to confirm it. For example, Ragatz et al. (2009) found that the owners of "vicious breeds" scored themselves higher in sensation seeking and primary psychopathy. Egan and MacKenzie (2012) reported that persons with low agreeableness, high neuroticism and high

**Table 4**  
Bonferroni corrected Pearson correlations between owners and dogs in the Big Five personality dimensions.

Personality dimension	Austria			Hungary		
	Single dogs N = 119	First dogs N = 59	Second dogs N = 59	Single dogs N = 141	First dogs N = 70	Second dogs N = 70
Neuroticism	0.532***	0.587***	−0.072	0.544***	0.294	0.323**
Extraversion	0.427***	0.070	0.400**	0.238**	0.040	0.497***
Conscientiousness	0.166	0.124	0.200	0.485***	0.267	0.393***
Agreeableness	−0.014	0.324†	0.186	0.415***	0.210	0.293*
Openness	0.180	0.091	0.291	0.421***	0.224	0.418***
Average	0.258	0.239	0.201	0.421	0.207	0.385

†  $P < 0.05$ .

\*\*  $P < 0.01$ .

\*\*\*  $P < 0.001$ .

conscientiousness preferred a dog breeds which they perceived as more aggressive. These studies suggest that the breed choice of the owners may depend on the prospective owners' psychiatric characteristics, at least to some degree. However, this hypothesis needs further investigation.

Third, the characteristics of people sharing a relationship may become (more) similar over time due to convergent processes (e.g. Acitelli et al., 2001; Anderson et al., 2003). In a similar vein, dogs with a longer relationship with their owners should be more similar to their owner than dogs with a shorter relationship, which was not supported by our results. No interaction between the owner personality and the length of ownership proved to be significant, the association between the owner and dog personality did not change with longer relationships. This is in accordance with the results of Caspi et al. (1992), who did not find support for increased resemblance with time in married couples. However, the length of ownership had a negative main effect on the dog extraversion, agreeableness, and openness dimensions. These associations could be explained by the strong correlation between the length of ownership and the dogs' age and are in harmony with the results of previous studies. Older dogs (usually having a longer relationship with their owner) are less active and extraverted, less sociable with others, and less trainable (e.g. Bennett and Rohlf, 2007; Kubinyi et al., 2009; Siwak et al., 2002).

Having a second dog in the household affects the similarity pattern between the owner and dog in neuroticism and extraversion. The positive association between owners and dogs was found only in the case of single and first dogs in neuroticism, while only in the case of single and second dogs in extraversion. The results of the correlation analysis revealed an interesting pattern: in multi-dog households, the two dogs' similarity patterns complement each other and form the same similarity pattern as that of single dogs (Table 4). While Austrian single dogs were assessed similarly to their owners in neuroticism and extraversion, first dogs resembled only in neuroticism, and second dogs only in extraversion. In Hungary, single and second dogs were assessed as similar to their owner in each dimension, while first dogs did not resemble at all. As far as we know, this is the first study reporting personality differences between dogs housed together. A possible explanation for the results is that single dogs fulfill all the needs and expectations of the owner from being a companion to more practical functions (e.g. attending to different dog sports). In multi-dog households these functions may be divided between the dogs as was shown in children (Sulloway, 1996), leading to differences in their respective relationship with the owner. Owners may also need to experience some degree of similarity with the dog and if they are not satisfied with the relationship, they acquire a second dog. Owners may think over their need and choose their second dog more carefully than their first one, leading to differences in the first and second dogs' similarity pattern to the owner. This explanation was confirmed partially by our results because we found the highest mean correlation in the case of single dogs in both countries, and also found that the second dogs were more similar to the owners than the first dogs, however, only in the Hungarian sample.

We also revealed cultural differences in the personality matching between owners and dogs. According to the GLMs, the interaction between the owner personality and country was significant only in conscientiousness, however, the correlation pattern also showed differences in openness (see Table 4). It seems that different characteristics are relevant to the dog–owner similarity in the two countries, which is consistent with cultural differences found in human studies about marital compatibility (McCrae et al., 2008). Possible cultural differences in factors like dog keeping practices, dogs' general role, shared activities, or factors affecting the dog choice may explain the differences in the similarity pattern to the owner.

Note that in case of owner–dog relationship evolutionary causes explaining people's preference for similarity as being the outcome of sexual imprinting or an urge for genetic similarity (choosing friends or mates similar in heritable characteristics ensure that one's own segment of the gene pool will be safely maintained and transmitted to future generations, Rushton and Bons, 2005) plays little role. Therefore it is likely, that the choice of the animal partner is affected mainly by cognitive, psychological, and cultural factors. This offers exciting possibility to use the dog–human relationship for modeling the development and maintenance of social relationships among humans. However, we acknowledge that our subjects voluntarily participated in the study, and may be more interested in their dogs' behavior than general dog owners are, therefore some caution might be needed when interpreting these results.

## 5. Conclusion

In conclusion, we found considerable analogies between human–human and human–dog social relationships and pointed out a possibility why people consider keeping multiple dogs. Although our study has its own limitations, the results of this study may have important implications not only just for the human–dog relationship but also for humans in general. As Gosling (2001) argues and our study confirms, studying animal–human relationships may lead to additional insights about humans.

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