The Relationship Between Neuroticism Facets, Conscientiousness, and Human Attachment to Pet Cats

Gretchen M. Reevy[*] and Mikel M. Delgado[†]

[*]Department of Psychology, California State University, East Bay, Hayward, USA
[†]Department of Medicine and Epidemiology, School of Veterinary Medicine, University of California, Davis, USA

Address for correspondence:
M. M. Delgado,
Department of Medicine and Epidemiology,
School of Veterinary Medicine,
One Shields Avenue,
University of California, Davis,
CA 95616, USA.
E-mail:
mmdelgado@ucdavis.edu

ABSTRACT Gaining knowledge about the diverse correlates of human–pet attachment will help us better understand the nature of this bond. Previous research found that the personality dimensions of neuroticism and conscientiousness positively predicted human attachment to multiple types of pets. To address a literature gap, the current study focused on people's attachments to cats. We had two primary goals: first, to replicate earlier findings of associations between neuroticism, conscientiousness, and three attachment variables: attachment anxiety (one's sense of worthiness of love), attachment avoidance (one's sense of trustworthiness of the attachment figure), and general attachment to a pet; and second, we assessed how neuroticism facets (anger, anxiety, depression, immoderation, self-consciousness, vulnerability) are individually related to attachment to cats. Participants ($n = 1,239$) completed an online survey including the Pet Attachment Questionnaire, the Lexington Attachment to Pets Scale, and items from the International Personality Item Pool and the Big Five Inventory. Neuroticism, conscientiousness, and facet level anxiety were negative predictors of attachment avoidance and positive predictors of general attachment. Attachment anxiety toward cats was moderately associated with all neuroticism facets. From these results, incorporating findings from past research on human relationships, we compared associations between neuroticism facets and attachment for three different types of relationships: romantic, friendship, and human–cat. Associations between neuroticism facets and the view of one's worthiness of love (attachment anxiety) were similar across the different relationship types, but the association between neuroticism facets and attachment avoidance depended on the type of relationship (romantic, friendship, or human–cat). Conscientiousness may be a helpful trait in pet owners. Future research could investigate relations between measures of attachment and actual behavior toward pet cats and between neuroticism facets and attachment to other pets, such as dogs.

Keywords: attachment theory, conscientiousness, domestic cats, human–animal interaction, human personality, neuroticism

In recent years research on people's attachments to their pets has proliferated (e.g., Payne, Bennett, & McGreevy, 2015; Reevy & Delgado, 2014) as researchers have recognized the value of the human–animal bond. Compared with human–dog attachment, relatively few researchers have investigated the human–cat bond. Yet, cats are commonly kept pets throughout the world and are frequently well-loved by their human companions. Gaining knowledge about diverse correlates of human–cat attachment will help us understand the nature of this bond. Past research involving multiple types of pets has found that both gender and age are correlated with attachment to a pet (e.g., Kidd & Kidd, 1989; Reevy & Delgado, 2014). Additionally, human personality traits are related to attachment to a pet (Reevy & Delgado, 2014). Studying people's attachments to their cats can also help elucidate the general nature of relationship attachment, for example, by comparing it with other attachments, such as to romantic partners and friends. Studying human–cat attachment is helpful for a thorough understanding of all attachment in humans; cats are significant figures in the lives of many people.

In this study we investigated associations between measures of attachment to cats and two personality traits—conscientiousness (task orientation, reliability) and neuroticism (negative emotion)—which have both correlated with attachment to cats and dogs (Reevy & Delgado, 2014; Zilcha-Mano, Mikulincer, & Shaver, 2011). For the first time, we investigated the relation between cat attachment and facets of neuroticism. We compared the results with previous studies of neuroticism facets and attachment in both human friendships and romantic relationships, in order to determine if the facets of neuroticism affected attachment differently for different attachment figures (cat, romantic partner, friend).

Attachment Theory and Relationships with Pets

John Bowlby described an inborn bonding tendency that humans possess; he called this tendency attachment, and in infancy, it is directed toward a single individual, often the primary caregiver (Bowlby, 1969). Attachment is expressed as a strong desire to remain physically close to the caregiver and can be seen in the distressed behavior that an infant displays when separated from that person. Most infants are easily appeased when reunited with their caregiver, but some respond in an emotionally detached fashion, avoiding reassurance (Ainsworth, Blehar, Walters, & Wall, 1978). Bartholomew and Horowitz (1991) described attachment as having two separate dimensions: avoidance and anxiety (Bartholomew & Shaver, 1998). Avoidance measures how individuals feel about the trustworthiness, reliability, and supportiveness of the attachment figure. Anxiety measures one's feeling of worthiness of love and support and reflects a view of the self. A low score on both dimensions represents trust of others, positive self-worth, and the ability to form secure attachments with others.

Attachment theory can be used to examine adult romantic relationships and friendships (e.g., Fraley & Shaver, 2000; Hazan & Shaver, 1987). Attachment researchers (Hazan & Shaver, 1987; Zeifman & Hazan, 2008) identified that attachment exists among individuals of all ages when individuals 1) seek proximity to an attachment figure, 2) receive emotional support and reassurance from the attachment figure, 3) use the attachment figure as a secure base, and 4) experience distress when separated. Zilcha-Mano, Mikulincer, and Shaver (2012) argue that individuals relate to their pets in ways consistent with all four of these criteria and that pets can

be attachment figures for humans. As in human relationships (Shaver & Brennan, 1992), attachment theory may help us understand how human–pet relationships vary.

Human Personality and Attachment to Cats

Previous studies examined the association between the Big Five personality dimensions (conscientiousness, neuroticism, extraversion, agreeableness, and openness; e.g., Costa & McCrae, 2008; John & Srivastava, 1999) and attachment to pets using the Pet Attachment Questionnaire (PAQ; Zilcha-Mano et al., 2011), a two-scaled measure modelled after the Experiences in Close Relationships Scale (ECR; Brennan, Clark, & Shaver, 1998), which assesses attachment anxiety and avoidance in relationships among humans. In a study of Israeli pet guardians (primarily dog owners; $n = 212$), attachment anxiety in relation to a pet was positively correlated with neuroticism ($r = 0.15$; Zilcha-Mano et al., 2011). A second study also included the Lexington Attachment to Pets Scale (LAPS; Johnson, Garrity, & Stallones, 1992), which is a measure of general attachment to one's pet with three dimensions: general attachment, people substituting, and sentiments about animal welfare (Johnson et al., 1992). Conscientiousness and neuroticism positively predicted LAPS scores, and neuroticism positively predicted PAQ attachment anxiety. Conscientiousness, openness, and extraversion negatively predicted PAQ attachment avoidance (Reevy & Delgado, 2014).

Because conscientiousness and neuroticism were consistently associated with attachment in previous studies, they were selected for the current research. Conscientiousness is frequently associated with positive life outcomes (Bogg & Roberts, 2012). Neuroticism can often be a predictor of negative outcomes (Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007), but in some cases is linked with beneficial or neutral life circumstances. For instance, high levels of both neuroticism and conscientiousness were related to higher levels of personal health, and wives reported better health when their male spouses were high in both neuroticism and conscientiousness (Roberts, Smith, Jackson, & Edmonds, 2009). We attempted to replicate previous findings that conscientiousness is positively correlated with general attachment and negatively correlated with attachment avoidance, and that neuroticism is positively correlated with general attachment and with attachment anxiety (Reevy & Delgado, 2014). In this study we focused on attachment to cats only, thus addressing the gap in the literature regarding attachment to pet cats.

Our study also investigated associations between the facets of neuroticism and attachment to a pet cat, in order to explore which facets may drive the relationships between neuroticism and both general attachment and attachment anxiety. Neuroticism is a general personality domain with six facets: anxiety (tendency to worry), anger (irritability), depression (tendencies toward feeling blue or uncomfortable with oneself), self-consciousness (tendency to be embarrassed or intimidated), immoderation (inability to resist temptation), and vulnerability (inability to remain calm under pressure; Goldberg, 1999). Although most research focuses on the five dimensions of personality, facets may be individually predictive of some behaviors (Paunonen & Ashton, 2001).

We also compared whether the same facets of neuroticism are associated with pet attachment and either friendship or romantic attachment in humans. One previous study by Noftle and Shaver (2006) investigated associations between neuroticism facets and attachment utilizing the Experiences in Close Relationships Scale (ECR; Brennan et al., 1998), a widely used measure of attachment anxiety and avoidance in romantic relationships and the primary measure after which the PAQ was modelled. A study by Marusic, Kamenov, and Jelic

(2011) investigated relations between neuroticism facets and attachment anxiety and avoidance in adult friendships using a questionnaire based on the ECR and adapted to measure attachment in friendships. In both studies all facets of neuroticism were positively correlated with attachment anxiety, regardless of type of attachment figure. Put another way, type of attachment figure (friend or romantic partner) did not differentially affect the association between neuroticism facets and one's general feeling of worthiness of love.

In contrast, neuroticism facets were correlated with attachment avoidance in different ways for friendship and romantic relationships. Depression, self-consciousness, and vulnerability had significant positive relations with attachment avoidance in romantic relationships (Noftle & Shaver, 2006), but only depression had a predictive association for friendships in both women and men (Marusic et al., 2011). Additionally, in friendships, anger correlated positively with attachment avoidance in men and impulsiveness correlated negatively with attachment avoidance in women (Marusic et al., 2011). To compare with the relatively uncomplicated relationship between neuroticism and one's view of lovability of the self, the relationship between neuroticism facets and the view of the other's trustworthiness might be moderated by the type of attachment figure, whether romantic or adult friendship, or possibly, as we investigated in this study, a pet cat.

Because attachment anxiety reflects the view of the self, and all neuroticism facets show a positive correlation with attachment anxiety in both romantic relationships and friendships, we expected a similar finding for pet guardians and their cats. Although our investigation of the association between neuroticism facets and attachment avoidance was largely exploratory, previous studies found a positive association between depression and attachment avoidance in both romantic relationships and friendships. Thus, we predicted similar results in relationships with a pet cat.

Previous research shows that the LAPS and neuroticism are positively correlated (Reevy & Delgado, 2014); thus, we expected at least one facet would be positively correlated with the LAPS in the current study. The same study also found a strong negative correlation between the LAPS and attachment avoidance. Given that depression, self-consciousness, and vulnerability were positively correlated with attachment avoidance in human romantic relationships (Noftle & Shaver, 2006), and anger was positively correlated with attachment avoidance in male friendships (Marusic et al., 2011), we did not predict that any of these four facets would be positively correlated with general attachment (LAPS). The previous study also found a positive correlation between the LAPS and attachment anxiety, so we predicted the LAPS would also have a positive association with trait-level anxiety.

Methods

Data collection was conducted under a protocol approved by the Institutional Review Board of California State University, East Bay (#IRB-2015-213-F). All participants gave informed consent in order to access the survey.

Participants

Two thousand and ninety-two people began the online survey. We removed questionnaires that had no variability in responses, were obvious duplicates based on IP address and demographic information, or had participants who reported they were under the age of 18. We included all surveys with no more than two blank answers. This resulted in 1,239 valid questionnaires that were included in analyses.

Most participants identified as female (87.5%), and the average age of participants was 41 years (*SD* = 13.9, range: 18–85 years). Most participants (86.9%) identified as Caucasian, were from the United States (80%), Canada (6%) or the UK (5%), and had at least a high school level education (98.5%), with the majority (90.5%) reporting some level of college education. More than half of the participants (58.2%) were either married or living with a domestic partner, did not have children at all (54.6%), and did not have children living in the home (65.8%).

Almost all participants currently owned a cat (although in the case of two participants, their cat had recently died), with most participants having one (*n* = 476) or two (*n* = 369) cats (68.2%). Participants had owned their cats for an average of six years (*SD* = 4.7 years). Most cats (75.2%) were indoors only, with only 1% being kept exclusively outdoors. Of the 442 respondents with other pets besides cats, 94% had a dog and 56% reported having another type of pet.

Measures

Participants rated 60 items related to the six facets of neuroticism from the International Personality Item Pool (IPIP; Goldberg, 1999), measuring constructs similar to Costa and McCrae's (1992) NEO-PI-R facets. Cronbach's alphas for each facet, in the current data set, were: anger (0.89), anxiety (0.88), depression (0.92), immoderation (0.80), self-consciousness (0.85), and vulnerability (0.87). Participants were asked to rate how accurately statements such as "I get stressed out easily" described them, using a 5-point Likert scale (ranging from "very inaccurate" to "very accurate").

Participants completed the conscientiousness (9 items) and neuroticism (8 items) scales from the Big Five Inventory (BFI; John & Srivastava, 1999). These items ask participants to assess how well statements such as "I am someone who perseveres until the task is finished" describe them using a 5-point Likert scale (ranging from "strongly agree" to "strongly disagree"). Previous findings had alpha reliabilities between 0.75 and 0.90 (John & Srivistava, 1999). In the current study, both scales had internal consistency reliabilities of $\alpha = 0.88$.

Participants completed the 26-item Pet Attachment Questionnaire (PAQ; Zilcha-Mano et al., 2011), which has two 13-item subscales measuring attachment anxiety and attachment avoidance in relation to one's pet. Items describe feelings about one's pet, such as "I need a lot of reassurance from my pet that it loves me" (Anxiety scale; PAQ-ANX) and "Often my pet is a nuisance to me" (Avoidance scale; PAQ-AV). Items are scored on a 7-point Likert scale stating level of agreement, ranging from "not at all" to "very much." The current study had an internal consistency of $\alpha = 0.80$ for the anxiety scale and $\alpha = 0.87$ for the avoidance scale. Zilcha-Mano et al. (2011) found internal consistency reliabilities for both scales ranging from 0.86 to 0.89 and reported validity evidence for the PAQ.

Participants also completed the Lexington Attachment to Pets Scale (LAPS; Johnson et al., 1992) to measure general attachment to a pet. The LAPS includes 23 items, such as "My pet and I have a very close relationship" and "My pet means more to me than any of my friends." LAPS items are rated on a 4-point Likert scale, with choices ranging from "agree strongly" to "disagree strongly." Johnson et al. (1992) reported an internal consistency of $\alpha = 0.93$, which we also found in the current dataset. They also reported validity evidence for the LAPS, including a strong correlation between LAPS scores and self-reported attachment to the pet.

Procedure

Participants were solicited online via ads on the Craigslist Community-Pets page and a Facebook page for the survey that stated, "Participate in a study about you and your cat!" We collected data from September 2015 through September 2016.

We asked participants to rate all attachment items regarding their cat, or if they had two or more cats, to rate the items regarding the cat whose name began with a letter closest to the letter "A." This would prevent participants from automatically answering questions regarding a favored cat with whom they might have a stronger attachment.

Analyses

All data were analyzed using R 3.2.4 (R Foundation for Statistical Computing, Vienna, Austria). Alpha was set to 0.05 unless otherwise noted. For each participant, we calculated the average response for each scale by summing the responses and dividing by the number of scale items. Prior to analyses, we mean-centered and standardized all variables. We conducted three separate multiple regressions to determine relationships between the six IPIP neuroticism facets and each of the pet attachment scales. To assess the replicability of previous findings (Reevy & Delgado, 2014), we ran three separate regressions examining the effects of the BFI scales (conscientiousness and neuroticism), gender, and age on each pet attachment scale. We included gender and age because these variables impacted attachment relationships in a previous study (Reevy & Delgado, 2014).

Results

Descriptive Statistics

Means and standard deviations for all personality and pet attachment variables and Pearson's correlations between all variables, including gender and age, are presented in Table 1. As predicted, conscientiousness was positively correlated with general attachment (LAPS; $r = 0.13$, $p < 0.001$) and negatively correlated with attachment avoidance ($r = –0.21$, $p < 0.001$). Additionally, as predicted, neuroticism was positively correlated with general attachment (LAPS; $r = 0.14$, $p < 0.001$) and attachment anxiety ($r = 0.39$, $p < 0.001$).

As predicted, all neuroticism facets correlated positively with attachment anxiety, with correlations ranging from 0.28 for immoderation and anger to 0.43 for depression (all $p < 0.001$). Our hypothesis that facet-level anxiety would positively correlate with general attachment (LAPS) was supported ($r = 0.14$, $p < 0.001$). Additionally, three other neuroticism facets correlated positively with the LAPS: anger ($r = 0.09$, $p < 0.01$), depression ($r = 0.12$, $p < 0.001$), and vulnerability ($r = 0.12$, $p < 0.001$). Contrary to our prediction, attachment avoidance did not correlate with depression ($r = 0.06$). In fact, none of the neuroticism facets correlated significantly with attachment avoidance.

Multiple Regressions

For regression models with neuroticism facets, we tested for multicollinearity between the facets. All variables had VIF (Variance Inflation Factor) values below 3.78, well below the suggested cutoff of 10 (Robinson & Schumacker, 2009).

General Attachment (LAPS)

The LAPS score was positively related to the facet anxiety ($F_{(6, 1232)} = 5.19$, $p < 0.001$, Adj. $R^2 = 0.02$). Both conscientiousness and neuroticism positively predicted LAPS scores in the regression that controlled for gender and age. Additionally, being female and younger were

Table 1. Attachment and personality variables (LAPS, PAQ, BFI, IPIP) with gender and age: Correlations and descriptive statistics.

	LAPS	PAQ ANX	PAQ AV	BFI-N	BFI-C	IPIP-AN	IPIP-AX	IPIP-DE	IPIP-SC	IPIP-IM	IPIP-V	Gender	Age
LAPS	1.00												
PAQ ANX	0.29**	1.00											
PAQ AV	−0.55**	0.05	1.00										
BFI-N	0.14**	0.39**	0.01	1.00									
BFI-C	0.13**	−0.25**	−0.21**	−0.39**	1.00								
IPIP-AN	0.09*	0.28**	0.08	0.67**	−0.30**	1.00							
IPIP-AX	0.14**	0.39**	0.01	0.86**	−0.35**	0.65**	1.00						
IPIP-DE	0.12**	0.43**	0.06	0.75**	−0.60**	0.57**	0.74**	1.00					
IPIP-SC	0.07	0.34**	0.07	0.62**	−0.38**	0.41**	0.67**	0.61**	1.00				
IPIP-IM	0.08	0.28**	0.03	0.39**	−0.45**	0.36**	0.39**	0.45**	0.32**	1.00			
IPIP-V	0.12**	0.39**	0.06	0.80**	−0.50**	0.60**	0.80**	0.74**	0.69**	0.43**	1.00		
Gender	−0.16**	−0.01	0.22**	−0.07	−0.07	−0.01	−0.11**	−0.01	−0.06	0.02	−0.09*	1.00	
Age	−0.11**	−0.30**	−0.05	−0.31**	0.18**	−0.24**	−0.30**	−0.26**	−0.26**	−0.16**	−0.26**	0.06	1.00
M	3.22	2.46	1.49	2.90	3.76	2.62	2.80	2.41	2.72	2.88	2.37	—	41.44
SD	0.45	0.99	0.53	0.81	0.62	0.76	0.80	0.88	0.77	0.68	0.73	—	13.88

Note: LAPS = Lexington Attachment to Pets Scale, PAQ = Pet Attachment Questionnaire (AV = attachment avoidance, ANX = attachment anxiety), BFI = Big Five Inventory (N=Neuroticism, C = Conscientiousness), IPIP = International Personality Item Pool (AN = Anger, AX = Anxiety, DE = Depression, SC = Self-Consciousness, IM = Immoderation, V = Vulnerability).

Female gender was coded as "0" and male gender as "1."

**Statistical correlation with p-values < 0.001 after Holm correction for multiple comparison.

*Statistical correlation with p-value < 0.01 after Holm correction for multiple comparisons.

Table 2. Beta coefficients for all regressions predicting LAPS, PAQ-ANX, and PAQ-AV scores from Big Five Inventory Trait scores, demographic variables, and neuroticism facets.

Variable	LAPS β	LAPS 95%CI	LAPS p	PAQ-ANX β	PAQ-ANX 95%CI	PAQ-ANX p	PAQ-AV β	PAQ-AV 95%CI	PAQ-AV p
Neuroticism	0.18	[0.12, 0.24]	< 0.001	0.29	[0.23, 0.35]	< 0.001	−0.08	[−0.14, −0.01]	0.02
Conscientiousness	0.20	[0.14, 0.26]	< 0.001	−0.09	[−0.15, −0.04]	< 0.001	−0.22	[−0.28, −0.16]	< 0.001
Gender: Male	−0.44	[−0.62, −0.26]	< 0.001	0.03	[−0.14, 0.20]	0.70	0.69	[0.51, 0.87]	< 0.001
Age	−0.08	[−0.14, −0.03]	< 0.005	−0.19	[−0.24, −0.13]	< 0.001	−0.05	[−0.11, 0.01]	0.08

Variable	LAPS β	LAPS 95%CI	LAPS p	PAQ-ANX β	PAQ-ANX 95%CI	PAQ-ANX p	PAQ-AV β	PAQ-AV 95%CI	PAQ-AV p
Anger	−0.03	[−0.10, 0.05]	0.47	−0.02	[−0.08, 0.05]	0.64	0.11	[0.03, 0.19]	0.004
Anxiety	0.16	[0.05, 0.26]	0.004	0.09	[0, 0.19]	0.06	−0.20	[−0.30, −0.09]	< 0.001
Depression	0.02	[−0.07, 0.11]	0.64	0.25	[0.17, 0.33]	< 0.001	0.04	[−0.05, 0.13]	0.41
Self-Consciousness	−0.08	[−0.16, 0]	0.05	0.06	[−0.02, 0.13]	0.12	0.09	[0.01 0.17]	0.03
Immoderation	0.02	[−0.04, 0.09]	0.45	0.09	[0.03, 0.14]	0.002	0.00	[−0.07, 0.06]	0.90
Vulnerability	0.04	[−0.06, 0.15]	0.42	0.06	[−0.03, 0.16]	0.18	0.06	[−0.05, 0.17]	0.26

Note: LAPS = Lexington Attachment to Pets Scale, PAQ = Pet Attachment Questionnaire (ANX = attachment anxiety, AV = attachment avoidance), BFI = Big Five Inventory (N=Neuroticism, C = Conscientiousness).

Table 3. Results of regression analyses testing the model predicting PAQ-AV for suppression effects.

Variables Predicting PAQ-AV	β for Anxiety	Other β	Model F	p
Anxiety	0.01	—	0.17	0.676
with anger	–0.07	0.12*	10.22	0.001
with depression	–0.06	0.10*	5.68	0.017
with self-consciousness	–0.06	0.11*	8.27	0.004
with immoderation	0.00	0.03	1.09	0.296
with vulnerability	–0.10*	0.13*	8.38	0.004

Note: PAQ-AV = Pet Attachment Questionnaire Attachment Avoidance.

*Statistical correlation with *p*-value < 0.05.

associated with higher LAPS scores ($F_{(4,1195)} = 26.2$, $p < 0.001$, Adj. $R^2 = 0.08$). See Table 2 for beta values, confidence intervals, and p-values.

Attachment Anxiety (PAQ-ANX)

The PAQ-ANX score was positively related to the neuroticism facets depression and immoderation ($F_{(6,1232)} = 54.45$, $p < 0.001$, Adj. $R^2 = 0.21$). In the regression that included neuroticism, conscientiousness, gender, and age, neuroticism positively predicted the PAQ-ANX score, while conscientiousness negatively predicted it. Younger people had higher scores on PAQ-ANX ($F_{(4,1195)} = 68.44$, $p < 0.001$, Adj. $R^2 = 0.18$; Table 2).

Attachment Avoidance (PAQ-AV)

Higher scores on facet-level anger and self-consciousness were associated with higher PAQ-AV scores, and higher scores on facet-level anxiety were related to lower PAQ-AV scores ($F_{(6,1232)} = 3.73$, $p = 0.001$, Adj. $R^2 = 0.01$). In the regression that controlled for gender and age, higher scores on both conscientiousness and neuroticism were associated with lower PAQ-AV scores. Being male was associated with higher PAQ-AV scores ($F_{(4,1195)} = 30.43$, $p < 0.001$, Adj. $R^2 = 0.09$; Table 2).

Because both the sign and the size of the effect of facet-level anxiety on PAQ-AV changed between the Pearson's correlation and the regression model results, we tested the model for suppression effects. We first ran a regression model predicting attachment avoidance from just the facet anxiety. Then we ran separate models that predicted the PAQ-AV from anxiety with each other neuroticism facet individually to assess their impact on the anxiety beta estimate (MacKinnon, Krull, & Lockwood, 2000). Each facet except immoderation influenced the beta estimate for anxiety. See Table 3 for the results of the suppression evaluation.

Discussion

The current study replicated Reevy and Delgado's (2014) findings that conscientiousness is positively correlated with general attachment and negatively correlated with attachment avoidance. Given that the earlier study involved multiple pets and did not separate the results by different pet type, and the current study involved cats only, our results show that these findings indeed apply to relationships with pet cats. In our study, conscientiousness was again associated with outcomes that are likely positive (high general attachment and low attachment avoidance), as has been demonstrated in several studies (Bogg & Roberts, 2012). We

Table 4. Pearson's correlations between and regression coefficients of measures of attachment and neuroticism facets in three types of relationships: romantic, adult friendship, and human–cat.

Type of Relationship and Attachment Style	ANX	ANG	DEP	SC	IMM	VUL
Zero-order Correlations:						
Romantic – Anxiety[a]	0.39*	0.31*	0.49*	0.37*	0.24*	0.39*
Friendship – Anxiety Females[b]	0.39*	0.31*	0.42*	0.48*	0.33*	0.41*
Friendship – Anxiety Males[b]	0.44*	0.47*	0.31*	0.52*	0.11	0.23*
Human–Cat – Anxiety[c]	0.39*	0.28*	0.43*	0.34*	0.28*	0.39*
Romantic – Avoidance[a]	0.01	0.09	0.26*	0.17*	–0.03	0.17*
Friendship – Avoidance Females[b]	0.06	0.05	0.21*	0.01	–0.21*	0.05
Friendship – Avoidance Males[b]	0.15	0.21*	0.21*	0.13	–0.11	0.14
Human–Cat – Avoidance[c]	0.01	0.08	0.06	0.07	0.03	0.06
Human–Cat – General Attachment (LAPS)[c]	0.14*	0.09*	0.12*	0.07	0.08	0.12*
Regression Coefficients:						
Romantic – Anxiety[a]	0.11	0.13	0.29*	0.05	0.01	0.04
Human–Cat – Anxiety[c]	0.09	–0.02	0.25*	0.06	0.09*	0.06
Romantic – Avoidance[a]	–0.10	–0.07	0.13	–0.06	–0.09	0.11
Human–Cat – Avoidance[c]	–0.20*	0.11*	–0.04	0.09*	0.00	0.06
Human–Cat – General Attachment (LAPS)[c]	0.16*	–0.03	0.02	–0.08	0.02	0.04

Note: ANX = Anxiety, ANG = Anger, DEP = Depression, SC = Self-Consciousness, IMM = Immoderation, VUL – Vulnerability, LAPS = Lexington Attachment to Pets Scale.

[a]Noftle & Shaver, 2006. [b]Marusic & Kamarov, 2010. [c]Current results. *$p < 0.05$.

also replicated the findings that neuroticism is positively correlated with both general attachment and attachment anxiety and that being female is associated with higher general attachment and lower attachment avoidance. In both the current and previous studies, age was negatively associated with attachment anxiety.

This study, to our knowledge, was the first to determine that specific facets of neuroticism are drivers of the established association between neuroticism and different types of attachment to pets (Reevy & Delgado, 2014). Also, some associations between neuroticism facets and attachment to cats were like those found in attachment relationships among humans. Equally noteworthy, some of the effects of neuroticism facets on relationships with pet cats were dissimilar to relationships between adult humans. Table 4 provides correlation coefficients and beta estimates (where available) relating neuroticism facets with attachment measures, comparing studies of adult friendships, adult romantic relationships, and human–cat relationships. This comparison should be interpreted with caution, since these are different studies of different samples, using different measures of attachment avoidance and anxiety, although the PAQ is based on the ECR (Zilcha-Mano et al., 2011). However, the comparison allows for hypothesis generation and for the observation of some general tendencies among different relationship types.

The relationship between one's neuroticism and the feeling of one's worthiness of love (attachment anxiety) did not differ by type of attachment figure. All facets of neuroticism had robust zero-order correlations with attachment anxiety toward cats, consistent with both romantic relationships and adult friendships (Marusic et al., 2011; Noftle & Shaver, 2006). In

the regression model the neuroticism facet, depression, was a positive predictor of attachment anxiety, similar to a previous study of romantic relationships (Noftle & Shaver, 2006). Thus, the studies on the different types of relationships are convergent: the diverse aspects of neuroticism are associated with attachment anxiety regardless of the type of relationship (romantic, friendship, or cat–human), and with whom (human or cat), suggesting that neuroticism may directly affect one's general feeling of worthiness of love.

In our regression model including neuroticism facets as predictors, anxiety was a negative predictor of attachment avoidance, despite no significant zero-order correlations between attachment avoidance and any of the neuroticism facets. Four of the facets (depression, self-consciousness, anger, and vulnerability) may have had a "suppression effect" (where these four facets would be called "suppressors") on the facet anxiety. Specific variables in a regression model can increase the predictive validity of other variables in a model by partialling out shared variance (in this case, between anxiety and each of the respective other facets; MacKinnon et al., 2000). Thus, for example, anxiety without anger better predicted attachment avoidance than did anxiety which included anger. In our results, a relatively "pure" form of anxiety, without four other negative emotions (anger, depression, self-consciousness, and vulnerability), negatively predicted attachment avoidance.

As in romantic relationships (Noftle & Shaver, 2006), self-consciousness positively predicted attachment avoidance. Anger positively predicted attachment avoidance, similar to Marusic at al.'s (2011) finding about adult male friendships. Contrary to previous studies, we did not find relationships between either vulnerability, immoderation, or depression and attachment avoidance. The relationship between neuroticism facets and the view of the other's trustworthiness appears to be moderated by the type of attachment figure, whether romantic, adult friendship, or pet cat. For instance, depression affects the view of the other with a human (a friend or romantic partner) and anxiety affects the view of the other with a cat.

As predicted, facet-level anxiety was related to general attachment (LAPS) in both the Pearson's correlations and in the regression model. We had hypothesized that facets that are positively associated with attachment avoidance in the human literature (anger, vulnerability, depression, and self-consciousness) would not correlate positively with the LAPS. However, all four facets showed positive Pearson's correlations with the LAPS. Given that neuroticism facets were generally not positively associated with attachment avoidance in the current study, and that the LAPS and attachment avoidance had a strong inverse correlation, these correlations are less surprising especially because previous research also found that the personality dimension neuroticism is a significant predictor of the LAPS (Reevy & Delgado, 2014).

The finding that anger was positively correlated with the LAPS was surprising; the correlation was relatively small ($r = 0.09$) but statistically significant. Items in the IPIP that measure anger, such as "I get angry easily" and "I am often in a bad mood" may reflect human relationships more than those with companion animals. The effects of anger did not hold in the regression model, indicating the relatively greater influence of other neuroticism facets such as anxiety. Because no measure similar to the LAPS exists for human relationships, we do not fully understand how anger might be related to general attachment in adult romantic relationships or friendships. One study found that relationship commitment was affected only by the neuroticism facet depression, which was a negative predictor (Kurdek, 1997). In another study, anger toward a partner was negatively correlated with scores on the Rubin Love Scale (Ellis & Malamuth, 2000). Thus, further exploration of the potential relationship between anger and general attachment to a pet is warranted.

The associations we found between five neuroticism facets and general attachment to one's pet cat suggests that possessing these aspects of neuroticism may be beneficial in the human–cat relationship, with the caveat that we suspect that anger is likely not beneficial. Additionally, anxiety emerged as a potentially beneficial neuroticism facet in regard to attachment to pet cats because it is positively associated with the LAPS and negatively associated with attachment avoidance.

Our findings are potentially limited by a few issues. Despite the large sample size, internet surveys are often prone to some bias (Schonlau, Van Soest, Kapteyn, & Couper, 2009); our sample was comprised largely of female, Caucasian pet guardians, who may not be representative of all pet guardians. Surveys are often subject to socially desirable responding even when the survey is anonymous (e.g., Van de Mortel, 2008). The adjusted R^2 values of our models ranged in size and suggest that other factors besides the ones we included in this study are important to the human–cat relationship. Additionally, attachment avoidance had a lower mean and variability compared with other variables which may have impacted our ability to discriminate between different levels of attachment avoidance. Finally, although the LAPS is perhaps the most commonly used measure of human–pet relationships, it does not operationalize attachment based on well-established human attachment theory; for that purpose, the Pet Attachment Questionnaire is appropriate (Zilcha Mano et al., 2011). Also, there are some outstanding questions about the LAPS's conceptualization of pet attachment (Zaparanick, 2008).

Implications and Further Research

Associations between neuroticism and attachment anxiety appear to be quite similar regardless of attachment figure, and the neuroticism facet, depression, is prominent in the relationship with attachment anxiety. Reevy and Delgado (2014) proposed that attachment anxiety may be a beneficial trait in pet guardians despite being generally considered detrimental to human parent–child relationships, because parents who are anxiously attached may stifle their children's independence (Selcuk et al., 2010). However, pets do not need to become independent in the same way that children do, so anxious attachment to pets may be associated with more vigilant, or careful, caretaking of pets (Reevy & Delgado, 2014). However, further research is needed to establish whether there is a connection between an owner's attachment to their pet cat and positive outcomes for the welfare of the cat. Including physiological or behavioral measures of stress in cats and measures of cat owner practices (e.g., Delgado & Reevy, 2018; Titeux, Gilbert, Briand, & Faivre, 2018) would help link pet guardian personality and behavior to outcomes for cats.

The pattern of associations between neuroticism facets and attachment avoidance when the attachment figure is a cat was different from these same associations with a romantic figure or a friend. Additionally, attachment avoidance, the view of the other, may be moderated by other personality traits in addition to neuroticism. Because this relationship may not be consistent across all types of companion animals, future research could also explore these relationships with other pets, such as dogs.

Conscientiousness appears to be an important trait for human–cat relationships, consistent with past research, given its positive associations with general attachment and negative associations with attachment avoidance. Neuroticism also may be an important trait, given its associations with general attachment and that the facet anxiety is negatively associated with attachment avoidance.

Acknowledgements

Conflicts of Interest

The authors declare no conflict of interest.

References

Ainsworth, M. D. S., Blehar, M. C., Walters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation.* Hillsdale, NJ: Lawrence Erlbaum.

Bartholomew, K., & Horowitz, L. M. (1991). Attachment styles among young adults: A test of a four-category model. *Journal of Personality and Social Psychology, 61*, 226–244.

Bartholomew, K., & Shaver, P. R. (1998). Methods of assessing adult attachment. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 22–45). New York, NY: Guilford.

Bogg, T., & Roberts, B. W. (2012). The case for conscientiousness: Evidence and implications for a personality trait marker of health and longevity. *Annals of Behavioral Medicine, 45*, 278–288.

Bowlby, J. (1969). *Attachment and loss*. New York, NY: Basic Books.

Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998). Self-report measurement of adult attachment: An integrative overview. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 46–76). New York, NY: Guilford.

Costa, P. T., & McCrae, R. R. (1992). Normal personality assessment in clinical practice: The NEO Personality Inventory. *Psychological Assessment, 4*, 5–13.

Costa, P. T., & McCrae, R. R. (2008). The Revised NEO Personality Inventory (NEO-PI-R). *The SAGE handbook of personality theory and assessment, 2*, 179–198.

Delgado, M. M., & Reevy, G. M. (2018). Development and psychometric evaluation of the Cat Care and Needs Scale (CCANS). *Anthrozoös, 31*, 89–100. doi:10.1080/08927936.2018.1406203

Ellis, B. J., & Malamuth, N. M. (2000). Love and anger in romantic relationships: A discrete systems model. *Journal of Personality, 68*, 525–556.

Fraley, R. C., & Shaver, P. R. (2000). Adult romantic attachment: Theoretical developments, emerging controversies, and unanswered questions. *Review of General Psychology, 4*, 132–154. doi:10.1037/1089-2680.4.2.132

Goldberg, L. R. (1999). A broad-bandwidth, public domain, personality inventory measuring the lower-level facets of several five-factor models. *Personality Psychology in Europe, 7*, 7–28.

Hazan, C., & Shaver, P. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology, 52*, 511–524. http://dx.doi.org/10.1037/0022-3514.52.3.511

John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. *Handbook of Personality: Theory and Research, 2*, 102–138.

Johnson, T. P., Garrity, T. F., & Stallones, L. (1992). Psychometric evaluation of the Lexington Attachment to Pets Scale (LAPS). *Anthrozoös, 5*, 160–175.

Kidd, A. H., & Kidd, R. M. (1989). Factors in adults' attitudes toward pets. *Psychological Reports, 65*, 903–910. doi:10.2466/pr0.1989.65.3.903

Kurdek, L. A. (1997). The link between facets of neuroticism and dimensions of relationship commitment: Evidence from gay, lesbian, and heterosexual couples. *Journal of Family Psychology, 11*, 109–124.

MacKinnon, D. P., Krull, J. L., & Lockwood, C. M. (2000). Equivalence of the mediation, confounding and suppression effect. *Prevention Science, 1*, 173–181.

Marusic, I., Kamenov, Ž., & Jelic, M. (2011). Personality and attachment to friends. *Drustvena Istrazivanja, 20*, 1119–1137. doi:10.5559/di.20.4.10

Noftle, E. E., & Shaver, P. R. (2006). Attachment dimensions and the Big Five personality traits: Associations and comparative ability to predict relationship quality. *Journal of Research in Personality, 40*, 179–208. doi:10.1016/j.jrp.2004.11.003

Paunonen, S. V., & Ashton, M. C. (2001). Big Five factors and facets and the prediction of behavior. *Journal of Personality and Social Psychology, 81*, 524–539.

Payne, E., Bennett, P. C., & McGreevy, P. D. (2015). Current perspectives on attachment and bonding in the dog–human dyad. *Psychology Research and Behavior Management, 8*, 71–79.

Reevy, G. M., & Delgado, M. M. (2014). Are emotionally attached companion animal caregivers conscientious and neurotic? Factors that affect the human–companion animal relationship. *Journal of Applied Animal Welfare Science, 18*, 239–258. doi:10.1080/10888705.2014.988333

Roberts, B. W., Kuncel, N. R., Shiner, R., Caspi, A., & Goldberg, L. R. (2007). The power of personality: The comparative validity of personality traits, socioeconomic status, and cognitive ability for predicting important life outcomes. *Perspectives on Psychological Science, 2*, 313–345.

Roberts, B. W., Smith, J., Jackson, J. J., & Edmonds, G. (2009). Compensatory conscientiousness and healh in older couples. *Psychological Science, 20,* 553–559. doi:10.1111/j.1467-9280.2009.02339.x. Compensatory

Robinson, C., & Schumacker, R. E. (2009). Interaction effects: Centering, variance inflation factor, and interpretation issues. *Multiple Linear Regression Viewpoints, 35*, 6–11.

Schonlau, M., Van Soest, A., Kapteyn, A., & Couper, M. (2009). Selection bias in web surveys and the use of propensity scores. *Sociological Methods & Research, 37*, 291–318.

Selcuk, E., Günaydin, G., Sumer, N., Harma, M., Salman, S., Hazan, C., … Ozturk, A. (2010). Self-reported romantic attachment style predicts everyday maternal caregiving behavior at home. *Journal of Research in Personality, 44*, 544–549.

Shaver, P. R., & Brennan, K. A. (1992). Attachment styles and the Big Five personality traits: Their connections with each other and with romantic relationship outcomes. *Personality and Social Psychology Bulletin, 18*, 536–545. doi:10.1177/0146167292185003

Titeux, E., Gilbert, C., Briand, A., & Faivre, N. C. (2018). From feline idiopathic ulcerative dermatitis to feline behavioural ulcerative dermatitis: Grooming repetitive behaviours indicators of poor welfare in cats. *Frontiers in Veterinary Science, 5*, 81. doi:10.3389/fvets.2018.00081

Van de Mortel, T. F. (2008). Faking it: Social desirability response bias in self-report research. *The Australian Journal of Advanced Nursing, 25*, 40–48.

Zaparanick, T. L. (2008). *A confirmatory factor analysis of the Lexington Attachment to Pets Scale* (Unpublished doctoral dissertation). University of Tennessee, Knoxville, Tennessee, USA.

Zeifman, D., & Hazan, C. (2008). Pair bonds as attachments: Reevaluating the evidence. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 436–455). New York, NY: The Guilford Press.

Zilcha-Mano, S., Mikulincer, M., & Shaver, P. R. (2011). An attachment perspective on human–pet relationships: Conceptualization and assessment of pet attachment orientations. *Journal of Research in Personality, 45*, 345–357. doi:10.1016/j.jrp.2011.04.001

Zilcha-Mano, S., Mikulincer, M., & Shaver, P. R. (2012). Pets as safe havens and secure bases: The moderating role of pet attachment orientations. *Journal of Research in Personality, 46*, 571–580. doi:10.1016/J.JRP.2012.06.005