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Development of the Pet Owner Connectedness Scale (POCS)

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Abstract

Studies which have reported on the loneliness protective effect of pet ownership have recently been called into question due to methodological drawbacks, including the frequent use of an inappropriate scale of measurement for loneliness in pet owner samples. It has also been recently demonstrated that pet interactions may only influence positive, not negative human affect. In light of these recent advances, the current study aimed to create a new scale focussing on the inverse experience of loneliness: connectedness. An initial 24 item scale was developed using qualitative raw data collected from our previous study investigating the impact of pet ownership for Australians living alone during a government enforced "lockdown" in response to COVID-19. Study 1 included 934 dog and cat owners who self-selected into the online study. Factor analyses revealed two distinct factors and only items that loaded uniquely on one factor were retained. Study 2 included 526 dog and cat owners who self-selected into the online study, which confirmed the two factor structure and established validity and reliability of the scale. The result was a 14 item Pet Owner Connectedness Scale (POCS) with two subscales: i) owner-pet connection, and ii) connectedness through pet. Hence, we present evidence for a new scale that can be used to measure the positive social states of connectedness that owners may gain from their pets. This may provide a good alternative to more traditional methods such as measuring the buffering effect pets have on negative social states such as loneliness. It may also offer a more robust method to measure the impact of pet interactions on their owners.

Keywords: Cat; connection; dog; human-animal interaction; loneliness; questionnaire

The positive impact of companion animals on human health has come to be known as the "pet effect" (Allen, 2003). One of these effects is their presumed ability to buffer loneliness. However, the literature supporting this is mixed and most empirical studies have design flaws, including, small sample sizes, lack of control groups, and lack of novelty control, rendering their findings uninterpretable (Herzog, 2011). Gilbey and Tani's (2015) systematic review concluded that there was not yet any convincing evidence for such a "pet-effect" on loneliness. Due to numerous methodological limitations identified in their review, they recommended that more studies be conducted under conditions whereby time spent interacting with the pet were accounted for, and time spent on non-pet interactions were controlled for. However, these are difficult parameters to impose in a real-world scenario and it is not ethical to impose extended periods of social isolation on humans simply for research purposes. However, in 2020, in response to the COVID-19 pandemic, government enforced lock-downs were imposed around the globe on the basis of human health and physical safety from the virus. This created the perfect real-world scenario in which to directly test the loneliness buffering effect of pets, as all other activities where one may gain some sort of social benefit were prevented or heavily restricted.

Findings from our sample of Australian's living alone revealed that dog ownership was a significant negative predictor of loneliness, as measured by both the short version of the popular measure of loneliness, the University of California, Los Angeles Loneliness Scale (UCLA-LS) (Hughes et al., 2004), as well as a 1-item "direct" measure of loneliness (Oliva & Johnston, 2021). However, we were not able to demonstrate a direct relationship between more frequent dog interactions and reduced levels of loneliness. We were also not able to demonstrate any loneliness buffering effects of cat ownership, nor frequency of cat interactions. Hence, despite

demonstrating a loneliness protective factor of simply being a dog owner, we could provide no quantitative evidence that pet interactions were influencing the loneliness levels in their owners.

Through our analysis of qualitative data we deduced that the loneliness buffering effect in dog owners may be due to the fact that owning a dog encourages exercise and is an excuse to leave the house during lockdown (as was permitted in the lock-down in Australia), and this in itself offered an opportunity to socialise with other people. However, only 21% of dog owners endorsed the idea that owning a dog was an excuse to leave the house and only 6% endorsed the idea that dog ownership afforded them increased opportunities to socialise with other people. This in contrast to 67% of dog owners who endorsed the idea that owning a dog during the lockdown made isolation easier, reduced loneliness, or provided companionship. This was the single most commonly endorsed theme that came out of the qualitative data, and a theme which was also endorsed by 72% of cat owners. Additionally, approximately a quarter of both dog and cat owners also endorsed the idea that their pet improved their mental state or wellbeing (Oliva & Johnston, 2021).

The prevailing loneliness buffering effect of dog ownership, in spite of the null effect of dog interactions on loneliness levels, begged the question of whether simply having a dog in the house was enough to elicit this effect. Certainly there was some support for this idea in the qualitative data, with responses such as "*just the company around the house makes a big difference*" and "*At least there is someone to talk to and see during the days/nights, although they don't answer, it is a distraction from the nothingness*". Janssens et al. (2020) empirically tested this idea using a continuous sampling method whereby dog and cat owners rated their levels of positive and negative affect at 10 random time-points during the day for five consecutive days, as

well as whether their pet was present, and the extent of their interactions with it.

Results revealed that the mere presence of an animal in the room can indeed buffer

negative affect, in line with qualitative reports from Oliva and Johnston (2021), but

does not bolster positive affect. In contrast, positive affect (but not negative affect)

was positively associated with degree of pet interactions. Hence, this study shows

support for investigating the pet effect not only in terms of buffering negative social

states such as loneliness, but in terms of bolstering positive social states such as

connectedness. This may also explain why frequency of pet interactions were not

associated with loneliness levels in Oliva and Johnston (2021).

In the case of cat ownership, we were not able to demonstrate any link to loneliness

quantitatively. However, we cannot deny the qualitative data supporting this link

anecdotally for 72% of the sample. Absence of evidence does not mean evidence of

absence, and this calls for us to also consider the specificity of our measures of

loneliness in more detail. Indeed, the commonly used UCLA-LS was not originally

created to measure perceptions of loneliness in relation to human-pet relationships

(see Russell et al., 1982 for their conceptualisation of the construct as it relates to their

measure). To evaluate its appropriateness for use in a pet owner sample, Gilbey and

Tani (2020) used a mixed methods approach to determine which items of the 20-item

UCLA-LS "imply or state that the source of variance in loneliness was only due to

humans, and, in so doing, logically preclude the item tapping direct effects on

loneliness due to pet ownership" (p. 533). Their findings revealed that only a minority

of items on the UCLA-LS may tap into loneliness levels due to pet ownership, and

suggest that due to the vast majority of inappropriate items, earlier studies that have

demonstrated non-significant buffering effects of loneliness from pets using these

items are likely to reflect type II error, rather than a true null finding.

Gilbey and Tani (2020) suggest that more appropriate ways to measure the construct of loneliness as it relates to owner-pet relationships are to include the use of a short-form version of the UCLA-LS, containing items that might be relevant for this context, such as the 3-item version by Hughes et al. (2004) used in Oliva and Johnston (2021). Alternatively, using a direct, one-item measure of loneliness, which, unlike the UCLA-LS, has been successfully used to demonstrate a decrease in loneliness after acquiring a dog (Antonacopoulos, 2017). However, direct measures also have their own drawbacks. For example, because they explicitly use the word "lonely" (e.g., how often have you felt lonely?) they are subject to more socially desirable responding, or "faking good", which Russell (1982) proposed might be due to negative stigma associated with loneliness. However, in light of public negative pushback in relation to the COVID-19 lockdowns (Carothers, 2020), people may also be inclined to "fake bad" on research questionnaires regarding loneliness that aim to evaluate the lockdowns' impact. Furthermore, as demonstrated by Janssens et al. (2020) measures of loneliness, be they direct or indirect, may not be able to capture the positive outcomes of pet interactions. The final solution proposed by Gilbey and Tani (2020) is to utilize a mixed-methods approach to develop a new scale. This is what we set out to do in the current study, utilising rich qualitative data from data collected in 2020 for our study investigating loneliness in Australian pet owners living alone during the COVID-19 lockdown. We decide to focus on the inverse construct of loneliness, which we deemed to be connectedness, in support of previous findings supporting a negative correlation between the two constructs (Satici et al., 2016). Hence the goals were twofold: in study 1 we set out to establish the factor structure of the scale using principal axis factoring with promax rotation. In study 2 we tested its factor structure in a second sample, as well as its internal consistency, convergent

validity with other measures of similar constructs, such as the Love, Regulation, and Personal Growth subscales of the Pet Attachment and Life Impact Scale (PALS; Cromer & Barlow, 2013) and the Freibug Mindfulness Inventory (FMI; Walach et al., 2006), and divergent validity with measures of different constructs, such as the UCLA-LS v3 (Russell, 1996) and the Negative Impact subscale of the PALS. In line with recommendations by Cromer and Barlow, the sample was split by gender, as well as pet type ownership, to explore whether individual differences in scores could be explained by either of these two factors.

Methods

Scale Development

The original study used for the development of the scale was completed by 384 participants (54 men, 328 women, 1 non-binary gender, 1 unspecified), Mage = 50.9 years, SDage = 15.1 years, age range 23 to 89 years) (Oliva & Johnston, 2021). Participants were asked to describe how being a pet owner affected their experience of the COVID-19 lockdown, with responses informing the development of the current measure. Questions included in the 20-item UCLA-LS (Russell, 1980) were also reviewed to identify whether any of the ideas identified in the qualitative data could be translated into similarly constructed questions (e.g., UCLA-LS question: "I feel in tune with people around me" was used as a template for our question: "I feel 'in tune' with my pet"). Through this process we derived a total of 24 preliminary statements with strong face validity for the construct of connectedness which was defined as being explicitly aware of ones' environment and ones' shared place within it. Connection was also conceptualised as an acceptance of what is, both negative and positive, and an ability to change ones' relationship/mindset towards those things, as

opposed to distracting oneself from them. Statements that were not relevant to the ideas of connectedness were not included. Hence, despite several participants commenting in Oliva and Johnston (2021) that their pet offered a welcome "distraction" during the lockdown, statements relating to the pet acting as a 'distractor' were not deemed appropriate for this scale.

All statements were positively worded as evidence suggests reverse-worded items do not necessarily prevent response bias and may lead to respondent inattention and confusion (see for example van Sonderen et al., 2013). A 7-point Likert scale from 'Strongly Disagree' to 'Strongly Agree' was adopted as Krosnick and Presser (2010) have suggested this is the optimum number of scale points for findings reliable differences between samples. Also in line with Krosnick and Presser (2010), the ordering of the questions was such that statements with similar underlying ideas were clustered together, starting with simple, easy to answer questions at the beginning of the scale and moving towards more broad or abstract ideas relating to connectedness at the end of the scale. Following the creation of the preliminary 24 items, these were reviewed by a psychology academic experienced in scale creation, and not involved in the current project, for verification and readability before final approval for inclusion in the survey.

Participants

Study 1

The scale was initially completed by 934 participants who were recruited using social media snowballing and personal contacts between July and October 2020. Participants self-selected into the study if they identified as the owner of a pet dog or cat and had

sufficient English literacy to complete the measures. No incentive or payment for participation was offered.

Of the 934 participants, 538 identified as dog owners (58%) and 607 identified as cat owners (65%). For the purpose of completing the pet items, participants were required to consider the pet they were closest to or spent the most time with, which 49% indicated to be their dog ($n = 461$) and 51% indicated to be their cat ($n = 473$). Participants reported that they had, on average, owned their pet for 5.9 years (time owned dog $M = 5.9$ years $SD = 4.0$; time owned cat $M = 5.9$ years $SD = 5.1$). The age of participants ranged from 18 – 84 ($M = 45.0$; $SD = 13.4$) with most participants identifying as a woman ($n = 856$; 91.6%), 71 as a man, 6 as non-binary / gender diverse and 1 participant who did not specify their gender. The sample was predominantly university educated, with 64% of participants having an undergraduate or postgraduate qualification. A quarter of the sample lived alone ($n = 239$; 25.6%) with the remainder living with a partner ($n = 376$; 40.3%), with family ($n = 247$; 26.4%), or in other arrangements (e.g., with children or housemates). The vast majority (94.6%) of participants resided in Australia ($n = 42$ reported living outside Australia). There were no observable differences between the demographic make-up of cat owners comparative to dog owners.

Study 2

To further test the scale a follow-up study was completed by 526 pet owners who voluntarily self-selected into the study via social media recruitment between July and October 2021. The sample was generally consistent with study 1. Participants were aged 19 – 82 years ($M = 44.1$, $SD = 12.6$). Almost all participants were from Australia ($n = 471$; 89.5%) with most participants living with a partner ($n = 224$;

42.6%), or with family (*n* = 134; 25.5%). Almost a quarter of the sample reported

living alone (*n* = 116; 22.1%). The gender balance was less skewed than study 1, with

68.1% women (*n* = 358), 30.6% men (*n* = 161), and the remaining 7 participants

identifying as gender diverse. The sample was predominantly university educated (*n* =

206; 39.2% postgraduate degree and *n* = 153; 29.1% undergraduate degree). Of the

526 participants, 285 identified as being closest to their pet dog and 241 identified as

being closest to their pet cat.

Measures

The surveys were administered in the form of online questionnaires hosted through

Qualtrics.

In both studies the survey began with demographic questions (e.g., gender, education)

followed by the 24 item scale (Study 1) or the revised 18 item scale (Study 2).

In study 2, the following additional inventories were also included:

Pet Attachment and Life-Impact Scale (PALS; Cromer & Barlow, 2013)

The PALS is a psychometrically sound measure of pet attachment. It consists of 35

questions which measures 4 separate constructs: i) love, ii) regulation, iii) personal

growth, and iv) negative impact. This makes it a very good scale for testing the

convergent and discriminant validity of our own measure. Items are scored on a 5

point Likert scale; not at all, somewhat, moderately, quite a bit, very much. Example

items include: "My pet is part of the family" and "my pet is a financial hardship". It

has a demonstrated 4 factor structure and strong convergent and criterion validity

(Cromer & Barlow, 2013). Cronbach alpha values obtained for each scale in the

current study 2 were α = .91 for Love, α = .90 for Regulation, α = .83 for Personal

Growth, and α = .60 for Negative Impact.

The University of California, Los Angeles, Loneliness Scale (version 3); (UCLA Loneliness Scale v3; Russell, 1996)

The UCLA-LS and its various versions/forms is the most commonly used scale that has been used to measure the "pet effect" on human loneliness (Gilbey & Tani, 2015). This revised version by the original author has demonstrated high reliability with internal consistency alpha coefficients between .89 — .94, and test-re-test reliability of $r = .73$ (Russell, 1996). It has also demonstrated convergent validity with other measures of loneliness and construct validity with measures of health and wellbeing (Russell, 1996). It is made up of 20 questions, 9 of which are reverse scored. An example item is: "How often do you feel alone?" Statements are scored on a 4 point Likert scale; never, rarely, sometimes, often. Cronbach alpha obtained in the current study 2 was $\alpha = .95$.

Freiburg Mindfulness Inventory (FMI; Walach et al., 2006)

The FMI is a useful, valid and reliable questionnaire for measuring mindfulness. It is most suitable in generalized contexts, where knowledge of the Buddhist background of mindfulness cannot be expected. The 14 items cover all aspects of mindfulness and items are rated on a 4 point Likert scale; rarely, occasionally, fairly often, almost always. An example item is: "I am friendly to myself when things go wrong". This scale was demonstrated to have excellent internal consistency ($\alpha = .86$). Cronbach alpha obtained in the current study 2 was $\alpha = .89$.

Procedure

The studies utilised a cross-sectional non-experimental survey design and were completed online by clicking on a secure link to a Qualtrics platform hosting the questionnaires. Ethical clearance was approved by the Monash University Human

Ethics Committee. In both studies, participants were presented with an explanatory statement outlining the study and then following provision of consent completed demographic questions. They were subsequently invited to consider which pet they are closest to and/or spend the most time with (dog or cat) and then complete our survey items in relation to this pet. In study 2, participants were invited to complete additional measures in order to establish the convergent and divergent validity of our scale. These included, in order, the PALS, the UCLA-LS v3, and the FMI.

Results

Study 1

To investigate the underlying factor structure of the questionnaire, data were subjected to principal axis factoring with promax rotation due to inter-item correlations. This was conducted for the total sample, dog subsample, and cat subsample. Prior to running the principal axis factoring, examination of the data indicated that not every item was normally distributed, however given the robust nature of factor analysis these deviations were not considered problematic. Further, the relationships between pairs of items were generally linear. High squared multiple correlations were evident between some items however follow-up examination of these using regression modelling indicated multicollinearity was not a substantial concern.

An *a priori* decision was made to initially retain only items with unique loading at or above .5 on a factor. Two factors were initially identified for both dog owners and cat owners, with 14 items uniquely loading above .5 on the first factor, four items uniquely loading above .5 on the second factor, and six items that did not load at or above .5 on either factor in a consist way across cat owners, dog owners, and cat and

dog owners combined (refer to Table 1). Therefore, another principal axis factor analysis using promax rotation was conducted, eliminating these items. The six items deleted were: "My pet provides me with a sense of purpose", "My pet makes me feel grounded", "I feel a sense of belonging as a pet owner", "My pet provides me with perspective in life", "Having a pet in the house gives me a reason to talk out loud" and "I feel connected in the moment in the company of my pet". A second factor analysis was conducted with these items deleted and similarly identified two factors for the dog subsample, the cat subsample, and the total combined sample.

Two factors were retained in the final solution for both the dog owner and cat owner subsamples. All 18 items loaded on the same factors as the previous analysis, indicating consistency of extraction. Although there was some minor variation in the strength of correlations between the dog owner and the cat owner subsamples, items loaded on the same factors for dog owners and cat owners demonstrating the appropriateness of the scale for both populations of pet owners. The final factor structure was then confirmed using the total sample combined. In total, 63.57% of the variance in the questionnaire data could be explained by these two factors.

Study 2

A second independent dataset was used to corroborate the factor structure, validity and reliability of the scale, as well as explore whether any individual differences in mean scores are related to gender or pet ownership type.

Factor Structure

A principal axis factoring with promax rotation was conducted using the 18 items determined as the final structure in study one. As per study 1, the factor analysis was conducted for cat owners and dog owners separately, and then confirmed using the

total sample. The factor analysis indicated that four of the items needed to be considered for removal from the scale. Item 12 "I feel in tune with my pet" did not load at or above .5 for both samples and Item 11 "I feel alone in the company of my pet" did not load at or above .5 for the dog subsample, which was an *a priori* requirement for inclusion. Item 13 "Even when I am not physically with my pet I still feel connected to them" and item 14 "I can turn to my pet in times of need" changed from loading on factor 1 to loading on factor 2. To explore the impact of removing these items, a principal axis factor analysis was conducted on the first data set with the four items deleted. The 14 remaining items loaded consistently at or above .5 on two factors in both the study one and study two data sets, therefore a decision was made to remove the four items from the scale, reducing the total questions to 14 items.

The two factors (14 items) accounted for 67.96% cumulative variance in the dog subsample (factor 1 = 56.16%; factor 2 = 11.80%), 73.09% cumulative variance in the cat subsample (factor 1 = 60.53%; factor 2 = 12.56%), and 70.43% cumulative variance in the total sample combined (factor 1 = 58.50%; factor 2 = 11.93%), representing an additional 6.86% as compared to the 18 item version established in study 1. The final factor structure is presented in Table 2. Consistent with the data set from study one, two factors were identified and the factor loading was the same for the cat owner subsample and dog owner subsample. This pattern was confirmed by then conducting the factor analysis for the total sample and for the total sample split by gender (men and women). A final factor analysis was then conducted using the 14-item scale by conducting the factor analysis using the original data set from study one. This confirmed the same pattern loading.

Validity

Convergent validity was established through correlational analysis. Both factors correlated with other measures of similar constructs such as the PALS (Factor 1: Love *r(513)* = .59, *p* < .001; Regulation *r(512)* = .45, *p* < .001; Personal Growth *r(515)* = .36, *p* < .001; Factor 2: Love *r(513)* = .59, *p* < .001; Regulation *r(512)* = .68, *p* < .001; Personal Growth *r(515)* = .61, *p* < .001). The PALS Negative impact scale was not used due to this subscale not reaching sufficient internal consistency in our sample to be useful. There was no significant correlation between either of the two factors and mindfulness (as measured by the FMI), suggesting divergent validity (Factor 1: *r(477)* = -.002, *p* = .96; Factor 2: *r(477)* = .03, *p* = .47). There was also no significant correlation between the first factor and the UCLA-LS (*r*(489) = .04, *p* = .41). There was a significant positive but extremely weak correlation between the second factor and the UCLA-LS (*r*(489) = .11, *p* = .015). This also suggests divergent validity with the UCLA-LS.

A statistically significant, moderate positive correlation was also found between the two factors, *r* = .58, *p* <.001. This indicates that the two factors are related but not strongly enough to indicate redundancy, suggesting that the constructs underlying the two factors, though related in some way, are distinct.

Reliability

Cronbach alpha values indicate strong reliability for each factor (α = .95 factor 1 and α = .86 factor 2).

Mean scores and Individual Differences

Descriptive analysis for the final scale is presented in Table 3. As can be seen from the table, means scores indicate skew towards higher connectedness across both samples of pet owners. This was particularly evident in factor 1, with high kurtosis

scores reflecting that more scores were obtained in the tails of the distribution than around the mean. Despite this violation of normality, there was still sufficient spread of scores (ranging between 1-7) and due to the robustness of *t*-test in large samples, the decision was made to proceed with this test. Hence, an independent samples *t*-test was conducted to ascertain if there were any differences between dog owners and cat owners. There was homogeneity of variances, as assessed by Levene's test for equity of variances ($p > .05$), and dog owners scored significantly higher than cat owners on both factors (Factor 1: $t(524) = 2.97$, $p = .003$, $d = .26$; Factor 2: $t(524) = 7.32$, $p <.001$, $d = .64$).

In line with recommendations by Cromer and Barlow (2013) the file was then split by gender (male versus female – with non-binary genders excluded) and an independent samples t-test was then run comparing mean scores. Skew and kurtosis were high in both males (skew (SE) = -2.70 (0.19), kurtosis (SE) = 10.79(0.38)) and females (skew (SE) = -4.14(0.13), kurtosis (SE) = 24.81(0.26)) for factor one, but we proceeded with the t-test as per above. Again, homogeneity of variances was established by Levene's test for equity of variances ($p > .05$). The t-test revealed an almost significant difference between males ($M = 6.35$, $SD = 0.85$) and females ($M = 6.50$, $SD = 0.79$) for factor 1, $t(517) = 1.97$, $p = .05$, $d = .19$. For factor 2, females ($M = 5.62$, $SD = 1.21$) scored significantly higher than males ($M = 5.20$, $SD = 1.23$), $t(517) = 3.58$, $p < .001$, $d = .34$).

Discussion

The aim of the current study was to create a new scale using positive worded statements to evaluate how companion animals might bolster positive social states (in this case, connectedness), as an alternative to evaluating their impact by measuring

loneliness. We started with a preliminary 24 items with high face validity for our conceptualisation of this construct, derived from qualitative data from Oliva and Johnston (2021). Using two separate samples of dog and cat owners, we were able to successfully identify the presence of two related but distinct underlying factors in our scale, one on which 10 items uniquely loaded, and the other on which four items uniquely loaded. Both factors demonstrated convergent validity with the Love, Regulation, and Personal Growth subscales of the PALS, however, not strongly enough to suggest redundancy. This indicates that there is some overlap between these similar constructs but that connectedness is a distinct construct worthy of its own measure. More importantly still, we demonstrated divergent validity with the UCLA-LS. This indicates that the ability of pets to bolster positive states such as connectedness is not simply the inverse of identifying a negative association with loneliness, providing further support against the use of the UCLA-LS for measuring such a pet effect in protecting owners from loneliness. Interestingly, we also demonstrated divergent validity with the FMI. This was unexpected as mindfulness facilitates our awareness of our connectedness to other living things (Nhat Hanh, 2001) and has been associated with connectedness to nature (Schutte & Malouff, 2018). However, similar to emerging findings relating to the UCLA-LS, connectedness specific to pets may differ to connectedness obtained through other means and therefore provides further support for a pet-specific connectedness measure. Comparisons of means between dog owners and cat owners, and between males and females revealed significant differences similar to those that have been found previously (Cromer & Barlow, 2013; Herzog, 2007), with dog owners scoring higher than cat owners and females scoring higher than males.

As the first factor contains items that relate to direct connective gains from the pet itself, we define this as the 'owner-pet connection' factor. As the second factor contains items that relate to indirect connective gains gained *through* the pet relationship, we define this as the 'connectedness through pet' factor. Hence, we were able to successfully devise a reliable scale containing sub-scales measuring distinct concepts relating to a companion animals' influence on the human experience of connection: The Pet Owner Connectedness Scale (POCS). We hope that this scale will be used to advance the study of the pet effect, which remains an elusive concept due to methodological limitations of studies to date (Herzog, 2011), including the inappropriate use of current self-report measures (Gilbey & Tani, 2020). We would encourage academics particularly interested in the loneliness buffering effect of pets to consider the inverse experience (i.e. connectedness), particularly when accounting for pet interactions, which, as demonstrated by Janssens et al., (2020), may only impact positive, and not negative human affect.

While we were able to demonstrate the psychometric properties of our scale in a sample of cat and dog owners, its ongoing use in research will help to further establish these in other samples and in relation to other pet animals. The high level of connectedness in our samples (refer to Table 3) might be explained by the fact participants self-selected into the study because they love their pets and already get a lot out of their relationship with them. It would be interesting to see how pet owner connectedness changes over time, for example, after the acquisition of a new pet. For the convenience of those who wish to use our scale in their research we provide it, along with scoring instructions, in the appendix below.

Conflict of interest: The authors declare no conflict of interest

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Table 1

Initial Factor Structure (Study 1)

	Total		Dog owner		Cat owner	
	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2
My pet provides me with companionship	**0.97**	-0.19	**0.96**	-0.18	**0.96**	-0.17
My pet provides comfort and reassurance	**0.89**	-0.04	**0.86**	-0.01	**0.88**	-0.03
My pet improves my mental state	**0.88**	-0.07	**0.88**	-0.06	**0.87**	-0.08
My pet influences my mood in a positive way	**0.86**	-0.08	**0.81**	0.01	**0.85**	-0.08
It is important for me to be able to touch and feel my pet	**0.82**	-0.12	**0.78**	-0.04	**0.83**	-0.13
My pet is a constant in my life	**0.77**	0.03	**0.61**	0.17	**0.86**	-0.04
I feel a sense of belonging with my pet	**0.75**	0.14	**0.62**	0.27	**0.80**	0.10
My pet is reliably there for me	**0.72**	0.09	**0.73**	0.06	**0.76**	0.04
My pet is good company	**0.70**	-0.15	**0.77**	-0.23	**0.70**	-0.13
My pet provides me with a sense of connection	**0.69**	0.12	**0.67**	0.15	**0.66**	0.14
I can turn to my pet in times of need	**0.67**	0.12	**0.59**	0.20	**0.69**	0.11
I do not feel I am alone in the company of my pet	**0.65**	0.02	**0.59**	0.02	**0.67**	0.06
Even when I am not physically with my pet I still feel connected to them	**0.62**	0.12	**0.54**	0.17	**0.65**	0.12
I feel 'in tune' with my pet	**0.61**	0.24	**0.58**	0.26	**0.60**	0.25
My pet provides me with a sense of purpose	0.48	0.28	0.42	0.26	**0.50**	0.30
My pet makes me feel grounded	0.42	0.45	0.21	**0.65**	0.47	0.40
I feel a sense of belonging as a pet owner	0.41	0.38	0.32	0.42	0.43	0.39
My pet provides me with perspective in life	0.37	0.49	0.26	**0.59**	0.35	**0.53**
Having a pet in the house gives me a reason to talk out loud	0.36	0.25	0.25	0.36	0.33	0.30

I feel connected to the moment in the company of my pet	0.34	0.46	0.23	**0.57**	0.36	0.43
Having a pet to look after helps get me out of my own head	0.16	**0.63**	0.07	**0.67**	0.20	**0.61**
My pet helps me connect with reality	-0.15	**0.91**	-0.24	**0.94**	-0.18	**0.96**
My pet helps me connect with nature	-0.16	**0.81**	-0.09	**0.71**	-0.16	**0.83**
My pet helps me connect with other people	-0.18	**0.79**	-0.15	**0.73**	-0.16	**0.75**

Note. Factor loadings ≥0.5 have been bolded.

Table 2

Final Factor Structure (Study 2)

	Total		Dog owner		Cat owner	
	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2
My pet is good company	**0.93**	-0.12	**0.92**	-0.15	**0.94**	-0.08
My pet improves my mental state	**0.90**	-0.10	**0.87**	-0.11	**0.92**	-0.06
My pet influences my mood in a positive way	**0.85**	-0.01	**0.90**	-0.06	**0.80**	0.04
It is important for me to be able to touch and feel my pet	**0.82**	-0.05	**0.73**	0.07	**0.86**	-0.11
My pet provides me with companionship	**0.80**	-0.09	**0.77**	-0.11	**0.85**	-0.05
My pet provides comfort and reassurance	**0.79**	0.05	**0.81**	0.01	**0.75**	0.10
My pet is a constant in my life	**0.79**	0.05	**0.61**	0.24	**0.87**	-0.06
My pet provides me with a sense of connection	**0.74**	0.17	**0.58**	0.35	**0.83**	0.07
I feel a sense of belonging with my pet	**0.70**	0.21	**0.50**	0.38	**0.80**	0.12
My pet is reliably there for me	**0.64**	0.19	**0.62**	0.14	**0.69**	0.17
My pet helps me connect with other people	-0.09	**0.85**	-0.15	**0.87**	-0.03	**0.76**
My pet helps me connect with nature	-0.13	**0.85**	-0.08	**0.89**	-0.19	**0.89**
My pet helps me connect with reality	0.09	**0.75**	-0.05	**0.88**	0.16	**0.72**
Having a pet to look after helps get me out of my own head	0.17	**0.63**	0.16	**0.70**	0.17	**0.63**

Note. Factor loadings ≥0.5 have been bolded.

Table 3

Means, Standard Deviations and Reliability Statistics for the Factors of the Final 14-item Scale

	Dog Owner (*n* = 285)		Cat Owner (*n* = 241)		Total Sample (*N* = 526)	
	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2
Range	1-7	1-7	1-7	1-7	1-7	1-7
M	6.54	5.84	6.33	5.09	6.41	5.50
SD	0.75	1.14	0.89	1.21	0.82	1.23
Skew	-3.99	-1.36	-3.26	-0.61	-3.57	-0.90
(*SE*)	(0.14)	(0.14)	(0.16)	(0.16)	(0.11)	(0.11)
Kurtosis	23.55	2.70	15.04	0.50	18.33	0.96
(*SE*)	(0.28)	(0.28)	(0.31)	(0.31)	(0.21)	(0.21)

Appendix

Pet Owner Connectedness Scale (POCS)

The following questions relate to ownership of the pet you are closest to or spend the most time with. Please select only one pet to base your answers on and indicate below which species they belong to and how long you have owned them in the space below.

DOG _____

CAT _____

OTHER _____

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neutral (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
1. My pet is good company							
2. My pet improves my mental state							
3. My pet influences my mood in a positive way							
4. It is important for me to be able to touch and feel my pet							
5. My pet provides me with companionship							
6. My pet provides me with comfort and reassurance							
7. My pet is a constant in my life							
8. My pet provides me with a sense of connection							
9. I feel a sense of belonging with my pet							
10. My pet is reliably there for me							
11. My pet helps me connect with other people							
12. My pet helps me connect with nature							
13. My pet helps me connect with reality							
14. Having a pet to look after helps get me out of my own head							

Note: Items 1 to 10 load onto Factor 1 (Owner-Pet Connection) and items 11 to 14 load onto Factor 2 (Connectedness through pet)

Scoring

To score the 'owner-pet connection' subscale simply sum together the responses to items 1-10 and divide this total by 10.

To score the 'connectedness through pet' subscale simply sum together the responses to items 11-14 and divide this total by 4.