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Psychological Mechanisms Predicting Wellbeing in Pet Owners: Rogers' Core Conditions versus Bowlby's Attachment

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Psychological Mechanisms Predicting Wellbeing in Pet Owners: Rogers' Core

Conditions versus Bowlby's Attachment

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Psychological Mechanisms Predicting Wellbeing of Pet Owners: Rogers' Core Conditions versus Bowlby's Attachment

No potential conflict of interest was reported by the authors.

Abstract

While pet ownership may confer physical and psychological health benefits, existing research presents inconsistent findings, and the psychological mechanisms through which health benefits might be conferred are unknown. Exploring human-pet relationships from the perspectives of Bowlby's attachment theory, namely *attachment-related anxiety* and *attachment-related avoidance*, and Rogers' core conditions including *unconditional positive regard* and *empathy* may highlight the psychological mechanisms involved. This study compared quality of life (QOL) and psychopathology in pet owners to those without pets. In the pet owners, we additionally assessed pet attachment, and perceived *empathy*, *unconditionality*, and *congruence* in the human-pet relationships. We then compared the relative value of Bowlby's attachment versus Rogers' core conditions in human-pet relationships as predictors of wellbeing in pet owners. Overall, pet owners and non-pet owners did not significantly differ in terms of QOL or psychopathology. However, in pet owners, secure pet attachments were associated with lower psychological distress and psychopathology and those perceiving higher levels of Roger's core conditions from their pets had higher QOL. Bowlby's *pet attachment insecurity* predicted psychological distress and psychopathology while Rogers' *total core conditions* in pets were significantly predictive of QOL of pet owners. Differences in wellbeing may not be reliably discernable between pet owners and non-pet owners, as wellbeing is related not to pet ownership alone but to qualities of individual human-pet relationships. The results provide new information about psychological mechanisms

through which human-pet interactions are conferred, and support for the applicability of both Bowlby's and Roger's concepts.

Keywords: Human-pet relationships; pet attachment; Rogers' Core Conditions; quality of life; psychopathology

Introduction

Pet ownership is ubiquitous and is widely believed to confer health benefits, provide a source of companionship, and reduce stress in pet owners (Podberscek, Paul, & Serpell, 2000). In view of the rising global trends of mental health conditions and associated healthcare expenditure (Wells, 2009a), it is of interest to better understand human-animal interactions and how companion animals enhance the health of their human owners, with a view towards developing cost-effective and efficacious ways of improving health. While some researchers report physical health benefits associated with pet ownership such as lower blood pressure levels (Arhant-Sudhir, Arhant-Sudhir, & Sudhir, 2011; Mubanga et al., 2017, Somervill, Kruglikova, Robertson, Hanson, & MacLin, 2008), others have found negative associations (Parslow & Jorm, 2003a). It is possible that these inconsistent findings are due to a failure to account for the varying nature and qualities of individual human-pet relationships.

Currently, there is little understanding of the psychological mechanisms through which pet ownership may affect multiple aspects of human health and wellbeing. Attachment theory (Bowlby, 1969) may be relevant, as it provides a framework for explaining how close relationships contribute to an individual's psychological functioning.

Bowlby (1969) claimed that humans possess an innate psychobiological system that motivates them to seek proximity to attachment figures in times of need. Social interactions with attachment figures become internalised into mental representations of self and others, which influence psychological functioning

(Bowlby, 1969). Attachment orientations can be conceptualised and measured in terms of two dimensions namely *attachment-related anxiety* and *attachment-related avoidance* (Brennan, Clark, & Shaver, 1998). People who are low on these dimensions generally have secure attachments, positive internal working models, and employ effective affect-regulation strategies (Mikulincer & Shaver, 2003).

Although attachment originally referred to the relationship between a child and a primary caregiver (Bowlby, 1973), Bowlby (1988) claimed that attachment theory is relevant to other relationships across the life span. Similar to the extension of attachment theory to describe adolescent and adult relationships (Hazan & Shaver, 1987; Hazan & Zeifman, 1994), Bowlby's (1973) attachment theory has been applied to human-animal relationships (Jenkins, Laux, Ritchie, & Tucker-Gail, 2014; Peacock, Chur-Hansen, & Winefield, 2012). Pet attachment has been defined as the perception of a human-animal relationship as emotionally supportive and reciprocal, resulting in an owner's wish to maintain nearness to the pet (Winefield, Black, & Chur-Hansen, 2008). Zilcha-Mano, Mikulincer, and Shaver (2011) defined *pet attachment-related anxiety* as consisting of intense worries of harm occurring to one's pet, a strong need for proximity, and intense frustration when the relationship with the pet is not as close as one would like. Additionally, *pet attachment-related avoidance* reflects feelings of discomfort with physical and emotional closeness to a pet as well as difficulties depending on the pet for comfort in times of distress (Zilcha-Mano et al., 2011).

Previous studies indicate that pets are able to serve as attachment figures (Zilcha-Mano, Mikulincer, & Shaver, 2012), and provide evidence that humans

develop attachment-like relationships with their pets (Julius, Beetz, Kotrschal, Turner, & Uvnäs-Moberg, 2013). These research findings suggest that attachment theory is a valid framework for understanding variability in human-pet relationships and highlight that it may not be the ownership of a pet that is related to psychological wellbeing but the degree of attachment to the animal (Crawford, Worsham, & Swinehart, 2006; Garrity, Stallones, Marx, & Johnson, 1989).

Another way through which pet ownership may confer health benefits is their perceived role as non-judgmental confidantes who display empathy and offer a source of unconditional positive regard. These are similar to the characteristics noted to underlie therapeutic counselling relationships (Rogers, 1957). Rogers' (1951) conceptualised three core conditions of counselling that are necessary to effect personal change. The first condition is *empathy*, which refers to the ability to feel what another is feeling. Secondly, *congruence* refers to sincerity. Lastly, *unconditional positive regard* refers to non-judgmental acceptance and respect.

Studies of animal assisted therapy have found that therapeutic relationships with animals are related to therapy recipients' ascribing Rogerian qualities of *empathy*, *unconditional positive regard*, and *congruence* to the therapy animals (Jenkins et al., 2014; Kruger & Serpell, 2010). Therapy animals, particularly dogs, have been perceived as non-judgmental by therapy recipients (Aydin et al., 2012; Bryan et al., 2014; Chur-Hansen, Stern, & Winefield, 2010). Perception of this non-judgemental quality in the animals, which corresponds to Rogers' concept of

unconditional positive regard, has been linked to reduced stress and health benefits (Farber & Doolin, 2011).

It is important to consider whether humans' perception of Rogerian qualities in animals is due to the possession of these qualities in animals or whether it is influenced by projection or anthropomorphism. There is growing objective evidence that dogs can process emotional states in humans and show signs of empathy towards humans including rapid mimicry, emotional contagion, and responses to emotional and behavioural cues such as pointing (Palagi, Nicotra, & Cordoni, 2015; Romero, Konno, & Hasegawa, 2013; Silva & de Sousa, 2011). Additionally, dogs react to owners' stress with an increase in negative emotional arousal (Jones & Josephs, 2006), and show contagious yawning in response to human yawns (Platek, Critton, Myers, & Gallup, 2003). Researchers suggest that these responses are not a result of mere imitation but rather underscored by affective and social components of the behaviour, further indicating that dogs may possess special propensity for social connections with humans (Romero et al., 2013; Silva, Bessa, & de Sousa, 2012). Additionally, dogs' tendencies to react with unguarded and direct responses to human behaviour have also been interpreted as openness and genuineness, consistent with the Rogerian concept of congruence (Jenkins, 2009; Jenkins et al., 2014; Perry, 2017).

It is possible that human-pet relationships involve projection of human attributes onto pets, or anthropomorphism. However, in context of a human therapist, it is the client's perception of the qualities of the therapist which is important to the therapeutic process, not just the therapist's objective qualities (Rogers, 1957). Thus,

even if projection of human qualities onto pets is involved, Rogers' core conditions may still be a valid mechanism through which health benefits are conferred to pet owners. Nevertheless, it is important to first consider whether humans ascribe Rogerian qualities to their pets, and whether they are associated with wellbeing. There does not appear to be any previous research applying Rogers' core conditions to pet-owner interactions. Previous research has been in the context of trained therapy animals.

Additionally, no previous research has considered which theory, Bowlby's or Rogers', better accounts for the positive associations between pets and human health. Hence, it may be useful for Bowlby's and Rogers' theories to be tested together to identify significant predictors of the positive effects of pets, beyond mere pet ownership.

However, one methodological issue relates to the inconsistent definition of pet attachment (Budge, Spicer, Jones, & St. George, 1998; Keil, 1998). Hence, it is important to choose a measure, such as the Owner-Pet Relationship Questionnaire (OPRQ; Winefield et al., 2008), that assesses pet attachment as defined by Bowlby (1973). Additionally, previous study results may be limited by ceiling effects obtained by tools such as the Pet Attachment Questionnaire (PAQ; Garrity et al., 1989; Lewis, Krageloh, & Shepherd, 2009). As such, a 5-point Likert scale should be used in place of the PAQ to achieve a greater spread in scores and minimise ceiling effects (Kurdek, 2008; Mitchell, 2001). Furthermore, as previous researchers have often examined physical and psychological health outcomes in isolation, there is a need for

research that utilises a more multi-faceted definition of health that includes physical health, mental health and quality of life (QOL; McNicholas et al., 2005).

This study aimed to compare multi-faceted QOL, psychological distress and psychopathology of pet owners and non-pet owners. Additionally, this study investigated whether demographic variables (age, gender, income, and living arrangements) interact with pet ownership to affect wellbeing. Prior studies have revealed that pet owners and non-pet owners differ across socio-demographic variables, such as gender, age, living arrangements, income, and employment status (Downes, Canty, & More, 2009; Saunders, Parast, Babey, & Miles, 2017; Westgarth et al., 2007). As these differences are also associated with human health (Saunders et al., 2017), it is important that such demographic variables are measured and accounted for when studying pet ownership and health-related outcomes. Secondly, associations between aspects of human-pet bonds and wellbeing were examined. Specifically, this study investigated relationships between Bowlby's attachment and Rogers' core conditions and the wellbeing of pet owners. Lastly, this study examined the relative value of Bowlby's attachment versus Rogers' core conditions in pets as predictors of wellbeing in pet owners.

We hypothesised that:

1. Pet owners will report greater wellbeing, as assessed by psychological distress, psychopathology and quality of life measures, than non-pet owners after controlling for demographic variables of age, gender, and income levels.

2. Secure pet attachments and Rogers' core conditions (*empathy, unconditional positive regard and congruence*) endorsed by pet owners in relation to their pets will be positively related to wellbeing in pet owners.
3. Bowlby's and Roger's concepts may differentially predict wellbeing in pet owners. As there are no comparative research studies, we are not able to hypothesise whether Bowlby's or Rogers' concepts will better predict wellbeing in pet owners. Nevertheless, the strength of the concepts of Bowlby's attachment and Rogers' core conditions in pets as predictors of wellbeing in pet owners will be tested in relation to each other.

Method

Participants

The sample comprised of 356 women and 142 men aged from 18 to 72 years of age ($M = 24.19$, $SD = 10.85$). The participants included psychology students ($n = 200$) and members of the public ($n = 298$) who were recruited via advertisements in 2016. The psychology students included undergraduates at University of Wollongong who were recruited online via a psychology research participation scheme and received course credit points. Members of the public were recruited via social media and via the *PetRescue, Australia* website, an Australian, non-profit national animal welfare charity that connects Australia's rescue groups with potential adopters. Adults, with or without pets, who did not have a diagnosed mental illness, were eligible to participate. All participants completed measures of wellbeing. The pet owners completed additional scales related to their relationship with their favourite

pet. The sample consisted of 322 pet owners and 176 non-pet owners. Most pet owners had dogs ($n = 227$; 70.50 %) or cats ($n = 71$; 22.05 %). Participant characteristics such as country of birth, ethnicity, and living arrangements are shown in Table 1. Participants received no monetary rewards.

Table 1

Participant characteristics of pet owners ($n=322$) and non-pet owners ($n=176$)

Demographic variables	Pet owners	Non-pet owners
Country of Birth		
Australia	265	114
Asia	37	46
Europe	12	8
Other	8	8
Living with a partner		
Yes	78	52
No	244	124

Materials

Demographic information was collected, including age, gender, income, country of birth, ethnicity, relationship status and whether living with a partner. All participants then completed the Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983), the Depression, Anxiety, and Stress Scales–21 (DASS–21; Lovibond & Lovibond, 1995), and the WHOQOL – BREF (WHO, 1997). Non-pet owners finished the survey at this point while pet owners continued to complete the OPRQ (Winefield et al., 2008), Pet Attachment Questionnaire (PAQ; Zilcha-Mano et al., 2011), and the Berratt-Lennard Relationship Inventory (BLRI; Barrett-Lennard, 1962).

Measures

The **DASS-21** (Lovibond & Lovibond, 1995) is a 21 item self-report questionnaire which assesses the symptoms of depression, anxiety and stress over the past week. Higher scores indicate high levels of distress. The three subscales of the DASS-21 have demonstrated high internal consistency where Cronbach's alphas were 0.94 for Depression, 0.87 for Anxiety, and 0.91 for Stress (Antony, Bieling, Cox, Enns, & Swinson, 1998). The DASS-21 total score also has excellent internal consistency ($\alpha = .94$) (Gloster et al., 2008).

The **BSI** is a 53-item self-report symptom inventory designed to assess the psychological symptom patterns of psychiatric patients, medical patients and other members of the community (Derogatis & Melisaratos, 1983), with symptom dimensions namely Somatisation, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid ideation and Psychoticism, and three global indices of distress namely Global Severity Index (GSI), Positive Symptom Total, and Positive Symptom Distress Index. Higher scores indicate higher levels of distress. The BSI has good internal consistency with coefficients ranging from 0.78 to 0.83 (Croog et al. 1986) and an excellent stability coefficient of 0.90 (Derogatis 1982).

The **WHOQOL-BREF** measures four domains of QOL, namely Physical health, Psychological health, Social relationships, and Environment (WHO, 1997). Higher scores indicate higher QOL. The internal consistency of each of the four domains was assessed using Cronbach's alpha coefficient and was found to be high,

ranging from 0.66 for the Social relationships domain to 0.84 for the Physical health domain, demonstrating good internal consistency (The WHOQOL Group, 1998).

Pet owners completed the **Owner-Pet Relationship Questionnaire OPRQ** (Winefield et al., 2008) which assesses emotional attachments between humans and their pets. It consists of items reflecting emotional support, proximity-seeking, and reciprocity as well as items from existing scales by Staats, Miller, Carnot, Rada, and Turnes (1996) and Stallones, Marx, Garrity, and Johnson (1990). The items were based on Bowlby's (1969) attachment theory and focused on the owner's wish to maintain nearness to the animal, and perception of the relationship as emotionally supportive and reciprocal. A sample item is "My pet enjoys my company". Responses to this 15-item scale are scored from one to four, except for one item with a "true" (4 points) or "not true" (1 point) response. Total scores range from 15 to 60, with higher scores reflecting greater attachment. Owners with several pets complete the questionnaire based on one specified animal, which they feel closest to. Internal reliability was found to be high ($\alpha = 0.92$) and deletion of any item would have lowered the Cronbach alpha (Winefield et al., 2008). The OPRQ provides information on the level of emotional attachment without differentiating between types of attachment (e.g. secure and insecure). Hence, the PAQ was also used.

Pet owners also completed the **Pet Attachment Questionnaire PAQ** (Zilcha-Mano et al., 2011) which assesses two dimensions of insecure attachment with pets namely *pet attachment related-anxiety* and *pet attachment-related avoidance*. Participants rate the extent to which each item describes their feelings and thoughts about their relationship with their current pet on a seven-point Likert scale ranging

from “not at all” (0 points) to “very much” (7 points). Lower scores on either dimension, or both, reflect secure pet attachments. Zilcha-Mano et al. (2011) conducted five studies using the PAQ and reported that Cronbach’s alphas were high for *pet attachment related-anxiety* items, ranging from 0.86 to 0.91. Cronbach alphas were also high for *pet attachment-related avoidance* items, ranging from 0.87 to 0.92, indicating high internal consistency.

Lastly, pet owners completed the **Barrett-Lennard Relationship Inventory** (BLRI) which was originally created to assess Rogers’ (1957) core conditions within human relationships (Barrett-Lennard, 1962). More recently it has been adapted to assess these constructs in human-animal relationships (Jenkins et al., 2014). The 40-item version (Barrett-Lennard, 2002) of the BLRI was used. Barrett-Lennard (1962) separated the concept of *unconditional positive regard* into two distinct variables namely *level of regard*, and *unconditionality*. Hence, the BLRI has four 10-item subscales, namely *level of regard*, *empathy*, *unconditionality* and *congruence*. Gurman (1977) reported the following mean internal reliability coefficients of the subscales in the BLRI: 0.84 for *empathy*, 0.91 for *level of regard*, 0.74 for *unconditionality* and 0.88 for *congruence*, indicating good internal reliability.

The BLRI is a self-report questionnaire, with a six-point Likert scale ranging from “No, I strongly feel that it is not true” (-3 points) to “Yes, I strongly feel that it is true” (+3 points). Participants responded to each item with a particular pet in mind. Total scores range from -30 to +30. The higher the scale score, the more a pet is judged by the respondent to possess the Rogerian condition.

For this study, three items of the BLRI were slightly modified to be more applicable to animals. The item “_____ keeps quiet about his/her real inner impressions and feelings.”, where the participant mentally inserts the name of a person, was reworded to “_____ does not show me his/her real inner impressions and feelings.”, where the participant mentally inserts the name of his or her pet. Secondly, the item “_____ is willing to say whatever is on his/her mind with me, including feelings about either of us or how we are getting along.” was reworded to “_____ is willing to openly express whatever is on his/her mind with me, including feelings about either of us or how we are getting along.”. Lastly, the item “I believe that _____ has feelings s/he does not tell me about that affect our relationship.” was reworded to “I believe that _____ has feelings s/he does not display to me that affect our relationship.”. The responses on these slightly modified items were scored the same way as the original items.

Procedure

The local Human Research Ethics Committee reviewed and approved this study. Participants accessed the surveys online after giving informed consent.

Statistical Analyses

The Statistical Package for the Social Sciences (SPSS), Version 21, was used to conduct analyses. Analyses of variance (ANOVAs) were used to compare wellbeing, which consisted of scores of psychological distress (measured by DASS-21), psychopathology (measured by BSI) and QOL (measured by WHOQOL-BREF), between non-pet owners, dog owners, and owners of other types of pets. All species other than dogs were combined due to the small number of owners of cats ($n = 71$),

guinea pigs ($n= 2$), hamsters ($n= 1$), rabbits ($n= 4$), horses ($n= 5$), and others ($n= 12$). Further analyses were then conducted on pet owners only. Relationships between level of pet attachment (measured by OPRQ), types of pet attachment (measured by PAQ), owners' ratings of the extent to which they perceived that their pets possessed Rogers' core conditions (measured by BLRI) and wellbeing (measured by DASS-21, BSI, and WHOQOL-BREF) were investigated using Spearman's rho correlations. Lastly, hierarchical multiple regression analyses were conducted to test the relative utility of the concepts of Bowlby's attachment and Rogers' core conditions in pets as predictors of psychological distress, psychopathology, and QOL in pet owners.

Prior to analyses, all variables were tested for violations of assumptions, accuracy of input and missing data. Responses with missing data were excluded from analyses. After removal of missing data, the total sample size was 494. A small number of univariate and multivariate outliers were found. However, as the pattern of results after removal of the outliers was consistent with the results prior to removal, the outliers were retained and analyses with the outliers will be reported. The Cronbach's alpha values and descriptive statistics for all measures used in the study are provided in Table 2.

Table 2

Psychometric Properties of the Major Study Variables by Pet Ownership Groups

Variable	<i>n</i>	<i>M (SD)</i>	No pet <i>M (SD)</i>	Dog <i>M (SD)</i>	Other pet <i>M (SD)</i>	<i>α</i>
BSI						
Global Severity Index	494	0.72 (0.60)	0.66 (0.58)	0.79 (0.62)	0.67 (0.59)	0.97
DASS-21						
Depression	494	7.96 (8.86)	7.05 (8.36)	8.67 (8.87)	7.85 (9.50)	0.91
Anxiety	494	5.74 (6.69)	5.56 (6.12)	6.01 (6.86)	5.37 (7.21)	0.82
Stress	494	9.81 (8.04)	8.78 (7.57)	11.08 (8.29)	8.65 (7.80)	0.86
Overall DASS-21	494	23.51 (20.78)	21.39 (19.43)	25.76 (21.33)	21.87 (21.20)	0.94
WHOQOL-BREF						
Physical Health	494	15.39 (2.40)	15.54 (2.50)	15.24 (2.34)	15.51 (2.35)	0.76
Psychological	494	13.51 (2.92)	13.74 (2.86)	13.42(2.96)	13.32 (2.92)	0.85
Social Relationships	494	14.06 (3.69)	13.95 (3.76)	14.16 (3.74)	14.02 (3.38)	0.75
Environment	494	15.43 (2.43)	15.31 (2.69)	15.49 (2.26)	15.58 (2.38)	0.81
Total	494	58.39 (9.25)	58.54 (9.82)	58.30 (9.04)	58.44 (8.71)	0.92
PAQ						

Anxiety	322	33.93 (13.22)	33.72 (13.47)	34.44 (12.67)	0.86
Avoidance	322	24.52 (11.47)	23.72 (10.86)	26.42 (12.66)	0.91
Pet Attachment Insecurity	322	58.45 (19.93)	57.44 (19.46)	60.86 (20.93)	0.89
OPRQ					
Overall Level of Pet Attachment	322	38.58 (8.44)	39.59 (7.62)	36.17 (9.77)	0.88
BLRI					
Level of Regard	322	14.86 (9.24)	16.19 (8.25)	11.70 (10.64)	0.83
Empathy	322	5.01 (8.82)	6.41 (8.58)	1.66 (8.51)	0.73
Congruence	322	9.72 (8.24)	10.39 (8.19)	8.11 (8.20)	0.68
Unconditionality	322	6.72 (8.02)	6.11 (7.76)	8.18 (8.48)	0.61
Total Core Conditions	322	36.31 (26.19)	39.10 (25.82)	29.64 (26.00)	0.87

Note. BSI = GSI = Brief Symptom Inventory; DASS-21 = Depression, Anxiety, and Stress Scale; WHOQOL-BREF = World Health Organisation Quality of Life; PAQ = Pet Attachment Questionnaire OPRQ = Owner-Pet Relationship Scale; BLRI = Barrett Lennard Relationship Inventory; *n* = number of responses; M = mean; SD = standard deviation

The hypothesised relationships between variables were investigated using Spearman's rho correlations. For this sub-set of the data, the Shapiro-Wilk statistic was significant across all the variables, indicating that the assumption of normality had been violated. Additionally, inspection of scatterplots suggested violations of the assumptions of linearity and homoscedasticity. Therefore, non-parametric correlations were subsequently conducted. Additionally, to reduce the likelihood of Type 1 errors, significance was set at $p < 0.01$ for the correlational analyses (Table 3).

The Cronbach's alpha values for the subscales in the BLRI obtained from this study were lower than those reported in previous studies (Gurman 1977; Eggeman, Moxley, & Schumm, 1985). However, Cronbach's alpha for the total score of Rogers' core conditions was good, ($\alpha = 0.87$), indicating that the total score may be interpreted with more confidence. Thus, the overall total score from Rogers' core conditions was subsequently analysed. The total score of Rogers' core conditions consisting of *empathy, level and unconditionality of regard*, and *congruence* was computed and will be subsequently referred to as *total core conditions*. Additionally, a total score of *pet attachment-related anxiety* and *pet attachment-related avoidance* was obtained to represent levels of insecure pet attachment and will be subsequently referred to as *pet attachment insecurity*.

Results

Between groups Analysis of Variance (ANOVAs)

Three-way ANOVAs were conducted to examine the effects of pet ownership (no pet, dog, other pet), Gender and living arrangements on psychological distress (measured by DASS-21), psychopathology (measured by BSI), and Quality of Life (measured by WHOQOL-BREF). Age and income levels were included as covariates. Inspection of the skewness and kurtosis statistics for the overall sample ($n = 494$) indicated that normality was supported for each of the three dependent variables namely overall DASS-21, total QOL and GSI. Levene's statistics were all non-significant, thus indicating that the assumption of homogeneity of variance was not violated.

There were no significant differences between pet ownership groups (no pet, dog, other pet) in psychological distress, psychopathology or QOL as measured by the overall DASS-21 scores, $F(2, 484) = 0.74, p = 0.48$, the GSI, $F(2, 484) = 0.53, p = 0.59$ and total QOL, $F(2, 484) = 0.21, p = 0.003, \eta^2 < 0.01$.

The effect of income levels on overall-DASS, GSI, and total QOL was not statistically significant, $F(1, 484) = 0.21, p = 0.65, \eta^2 < 0.001$, $F(1, 484) = 1.41, p = 0.24, \eta^2 = 0.003$, and $F(1, 484) = 0.05, p = 0.82, \eta^2 < 0.001$ respectively.

However, the effect of Age on overall DASS-21 and GSI was statistically significant, $F(1, 484) = 10.40, p = 0.001, \eta^2 = 0.02$ and $F(1, 484) = 18.25, p < .001, \eta^2 = 0.04$ respectively, with older participants reporting lower overall DASS-21 and GSI scores. The main effect of Age on total QOL was not statistically significant, F

(1, 484) = 1.83, $p = 0.18$, $\eta^2 = 0.004$. However, the effect of living with a partner on total QOL was statistically significant, $F(1, 484) = 4.10$, $p = 0.04$, $\eta^2 = 0.01$, with participants living with a partner reporting lower overall DASS-21 and GSI scores as compared to participants who do not live with a partner.

Lastly, there were no significant interaction effects between Pet ownership group, Gender and living arrangements on the three dependent variables namely overall DASS-21, $F(2, 484) = 0.79$, $p = 0.50$, $\eta^2 = 0.003$, GSI, $F(2, 484) = 1.42$, $p = .24$, $\eta^2 = 0.01$, and total QOL, $F(2, 484) = 0.19$, $p = 0.83$, $\eta^2 = 0.001$.

Correlational analyses

While differences in wellbeing did not differ across pet ownership groups, it is possible that aspects of the quality of owner-pet relationships rather than pet ownership in general are important to wellbeing. Further analyses were conducted on pet owners only ($n = 322$) to investigate this possibility.

Table 3 shows correlations between variables. Firstly, pet attachment-related anxiety and pet-attachment-related avoidance were negatively related to the BLRI Total Rogers' *core conditions*, $r_s = -0.12$, $p < .01$, and $r_s = -0.52$, $p < .01$, respectively.

Table 3

Spearman's rho Intercorrelations for Study Variables in Pet Owners (n= 322)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. BSI GSI	-														
2. DASS Depression	0.77 **	-													
3. DASS Anxiety	0.73 **	0.62 **	-												
4. DASS Stress	0.79 **	0.67 **	0.66 **	-											
5. Overall DASS-21	0.87 **	0.87 **	0.82 **	0.91 **	-										
6. DOM1	- 0.58 **	- 0.52 **	- 0.46 **	- 0.51 **	- 0.56 **	-									
7. DOM2	- 0.64 **	- 0.67 **	- 0.46 **	- 0.52 **	- 0.62 **	0.63 **	-								
8. DOM3	- 0.32	- 0.40	- 0.25	- 0.25	- 0.34	0.40	0.44	-							

	**	**	**	**	**	**	**								
9. DOM4	-	-	-	-	-										
	0.40	0.37	0.28	0.30	0.36	0.56	0.45	0.43	-						
	**	**	**	**	**	**	**	**							
10. Total QOL	-	-	-	-	-										
	0.60	0.61	0.44	0.49	0.58	0.78	0.80	0.78	0.71	-					
	**	**	**	**	**	**	**	**	**						
11. PAQ Pet attachment-related Anxiety															
	0.24	0.19	0.25	0.19	0.23	-0.13	-0.11	-0.13	0.17	0.16	-				
	**	**	**	**	**				**	**					
12. PAQ Pet attachment-related Avoidance															
	0.07	0.03	0.07	0.00	0.03	-0.09	0.04	-0.13	-0.03	-0.07	0.15	-			
											**				
13. PAQ Pet Attachment Insecurity															
	0.25	0.17	0.24	0.18	0.22	-	-	-	-	-	-	-	-	-	-
	**	**	**	**	**	**	-0.07	0.18	-0.14	0.17	0.81	0.63			
						**		**		**	**	**			
14. OPRQ Overall Level of pet attachment (both secure and insecure)															
	0.08	0.09	0.11	0.06	0.09	-0.11	-0.06	0.00	0.15	-0.09	0.35	0.52	-0.04	-	
									**		**	**			
15. BLRI Total Rogers' Core Conditions															
	-0.06	-0.02	-0.06	0.04	-0.01	0.09	-0.02	0.22	0.19	0.14	0.12	0.52	0.38	0.39	-
								**	**		**	**	**		

Note. BSI GSI = Brief Symptom Inventory Global Severity Index; DASS= Depression, Anxiety, and Stress Scales; DOM1 = Psychological health; DOM2 = Physical health; DOM3 = Social relationships; DOM4 = Environment; QOL = Quality of life; PAQ = Pet Attachment Questionnaire; OPRQ = Owner-Pet Relationship Questionnaire; BLRI = Barrett-Lennard Relationship Inventory

** $p < 0.01$

As hypothesised, pet attachment-related anxiety was positively related to distress $r_s = 0.23, p < 0.01$ and psychopathology, $r_s = 0.24, p < 0.01$, and negatively related to QOL, $r_s = -0.16, p < 0.01$. *Pet attachment insecurity* was also positively related to distress, $r_s = 0.22, p < 0.01$, and psychopathology, $r_s = 0.25, p < 0.01$, and negatively related to QOL, $r_s = -0.17, p < 0.01$.

Furthermore, overall level of pet attachment measured by the OPRQ (including both secure and insecure attachment) showed a negative correlation with Environmental QOL, $r_s = -0.15, p < 0.01$, a negative correlation with PAQ pet attachment related avoidance, $r_s = -0.52, p < 0.01$, and a positive relationship with PAQ pet attachment-related anxiety, $r_s = 0.35, p < 0.01$. The differing directionality of correlations between OPRQ overall level of pet attachment with Environmental QOL, PAQ pet attachment-related anxiety, and PAQ pet-attachment related avoidance shows that measures with separate subscales for types of attachments seem to provide greater information on types of attachment which the OPRQ does not differentiate.

Also, consistent with predictions, Roger's *core conditions* were positively related to Social relationships, $r_s = 0.22, p < 0.01$, and Environmental QOL, $r_s = 0.19, p < 0.01$, indicating links between the quality of pet owners' social relationships and environments and the Rogerian qualities they perceive in their relationship with their pet. Additionally, *pet attachment insecurity* was significantly and negatively related to Psychological QOL, $r_s = -0.18, p < 0.01$ and, Social QOL $r_s = -0.18, p < 0.01$. A negative correlation was also found between *overall level of pet attachment* and

Environmental QOL, $r_s = -0.15$, $p < 0.01$. In other words, secure pet attachments are related to better human wellbeing.

Overall, secure pet attachments were associated with lower levels of psychological distress, psychopathology and better QOL across Psychological health, Social and Environmental domains, while Rogers' core conditions in pets were positively associated with the Social and Environmental domains of QOL.

Hierarchical Multiple Regression Analyses (HMRAs)

To investigate whether pet attachment and Rogers' core conditions accounted for unique variance in psychological distress (measured by DASS-21), psychopathology (measured by BSI) and QOL (measured by WHOQOL-BREF), beyond that explained by demographic variables such as Age and Gender, three hierarchical multiple regression analyses (HMRAs) were performed.

The first HMRA was performed to investigate the relative utility of *pet attachment insecurity*, *overall level of pet attachment*, and *total core conditions* in predicting psychological distress as measured by the DASS-21, beyond that explained by demographic variables (Age and Gender).

At step 1, Age and Gender were entered, explaining 4% of the variance in psychological distress as measured by the DASS-21 Total, $R^2 = 0.04$, $F(2, 319) = 6.35$, $p = 0.002$. At step 2, *pet attachment insecurity*, *overall level of pet attachment*,

and *total core conditions* were added to the regression equation, and accounted for an additional 5% of the variance in psychological distress, $\Delta R^2 = 0.05$, $\Delta F(3, 316) = 5.72$, $p = 0.001$. In combination, the five predictor variables explained 9% of the variance in psychological distress, $R^2 = 0.09$, adjusted $R^2 = 0.07$, $F(5, 316) = 6.09$, $p < 0.001$. The values of unstandardised (B) and standardised (β) regression coefficients, and semi-partial correlations (sr^2) for each predictor in the first regression model are reported in Table 4. At step 2, Age and *pet attachment insecurity* were significant predictors of Overall DASS-21 scores, with *pet attachment insecurity* as the strongest predictor recording the highest beta value, $\beta = 0.20$, $p = 0.001$.

Table 4

Summary of Hierarchical Multiple Regression Analyses Predicting Psychological Distress as measured by the Overall DASS-21 (n=322)

Predictor	B	β	sr^2	p
Step 1				
Age	-0.38	-0.18	0.03	0.002
Gender	-2.76	-0.06	0.00	0.333
Step 2				
Age	-0.33	-0.15	0.02	0.007
Gender	-3.45	-0.07	0.00	0.238
Pet Attachment Insecurity	0.21	0.20	0.03	0.001
Overall Level of Pet Attachment	0.26	0.10	0.01	0.101
Total Core Conditions	0.01	0.02	0.00	0.809

Note. DASS = Depression, Anxiety, and Stress scale

The second HMRA was performed to investigate the relative utility of *pet attachment insecurity*, *overall level of pet attachment*, and *total core conditions* in predicting variance in psychopathology, as measured by the GSI subscale of the BSI,

beyond that explained by demographic variables. At step 1, Age and Gender were entered, explaining 6% of the variance in psychopathology, $R^2 = 0.06$, $F(2, 319) = 10.06$, $p < 0.001$. At step 2, *pet attachment insecurity*, *overall level of pet attachment*, and *total core conditions* were added to the regression equation, and accounted for an additional 6% of the variance in psychopathology, $\Delta R^2 = 0.06$, $\Delta F(3, 316) = 7.46$, $p < 0.001$. In combination, the five predictor variables explained 12% of the variance in psychopathology, $R^2 = 0.12$, adjusted $R^2 = 0.11$, $F(5, 316) = 8.75$, $p < 0.001$ (Table 5). At step 2, Age and *pet attachment insecurity* were significant predictors of psychopathology with *pet attachment insecurity* as the strongest predictor recording the highest beta value, $\beta = 0.21$, $p = 0.001$. However, *total core conditions*, were not significantly predictive of psychopathology, $\beta = -0.06$, $p = 0.361$.

Table 5

Summary of Hierarchical Multiple Regression Analyses Predicting Psychopathology as measured by the GSI subscale of the BSI (n = 322)

Predictor	B	β	sr^2	p
Step 1				
Age	-0.01	-0.22	0.05	< 0.001
Gender	-0.09	-0.06	0.00	0.278
Step 2				
Age	-0.01	-0.19	0.15	0.001
Gender	-0.14	-0.10	0.01	0.092
Pet attachment Insecurity	0.01	0.21	0.03	0.001
Overall Level of Pet Attachment	0.01	0.11	0.01	0.064
Total Core Conditions	0.00	-0.06	0.00	0.361

Note. BSI= Brief Symptom Inventory; GSI = Global Severity Index

The third HMRA was performed to investigate the relative utility of *pet attachment insecurity*, *overall level of pet attachment*, and *total core conditions* in predicting variance in total QOL beyond that explained by demographic variables (Age and Gender). At step 1, Age and Gender were entered, explaining 1% of the variance in total QOL, $R^2 = 0.01$, $F(2, 319) = 1.49$, $p = 0.228$. At step 2, *pet attachment insecurity*, *overall level of pet attachment*, and *total core conditions* were added to the regression equation, and accounted for an additional 5% of the variance in total QOL, $\Delta R^2 = 0.05$, $\Delta F(3, 316) = 5.49$, $p = 0.001$. In combination, the five predictor variables explained 6% of the variance in total QOL, $R^2 = 0.06$, adjusted $R^2 = 0.04$, $F(5, 316) = 3.91$, $p = 0.002$ (Table 6). At step 2, the variables *overall level of pet attachment* and *total core conditions* were significant predictors of total QOL, with *total core conditions* as the strongest predictor recording the highest beta value, $\beta = 0.15$, $p = 0.025$.

Table 6

Summary of Hierarchical Multiple Regression Analyses Predicting Total Quality of Life as measured by WHOQOL-BREF (n = 322)

Predictor	B	β	sr^2	p
Step 1				
Age	0.08	0.09	0.01	0.108
Gender	0.28	0.01	0.00	0.816
Step 2				
Age	0.05	0.06	0.00	0.294
Gender	1.20	0.06	0.00	0.334
Pet Attachment Insecurity	-0.05	-0.12	0.01	0.055
Overall Level of Pet Attachment	-0.14	-0.13	0.01	0.043
Total Core Conditions	0.05	0.15	0.01	0.025

Note. WHOQOL-BREF = World Health Organisation Quality of life-BREF

Discussion

We first compared the physical, psychological, social and environmental aspects of QOL, psychological distress and psychopathology of pet owners and non-pet owners, and assessed whether demographic variables interact with pet ownership to affect wellbeing. We hypothesised that pet owners would have better wellbeing and QOL, than non-pet owners. However, after controlling for demographic variables, pet owners and non-pet owners did not significantly differ in terms of wellbeing.

While the finding that pet owners and non-pet owners did not significantly differ in terms of wellbeing is consistent with some prior research (Wells, 2009b; Parslow & Jorm, 2003b; Rijken & Van Beek, 2011), it is inconsistent with some other studies (Le Roux & Kemp, 2009; Utz, 2014; Parslow & Jorm, 2003a). Discrepancies in previous studies may be due to the varying assessment tools used and differences in the demographic factors of populations studied (Krause-Parello, 2008; Wells, 2009b; Lewis, et al., 2009; Peacock et al., 2012). The current study may provide preliminary indications that mere ownership of pets does not necessarily confer global benefits to the wellbeing in pet owners. Further research is needed to replicate these results more broadly.

Secondly, we investigated whether it may be the quality of human-pet relationships which confers health benefits rather than general pet ownership. We examined relationships between Bowlby's attachment, Rogers' core conditions and the wellbeing of pet owners. With regard to pet attachment, as hypothesised, secure pet attachment was related to lower levels of psychological distress and psychopathology, and better QOL across psychological health and social relationships

domains. These findings are consistent with Bowlby's (1969) attachment theory, studies of human attachment (Peterson & Park, 2007; Sung et al., 2016) and studies of human-animal attachments (Antonacopoulos & Pychyl, 2010; Peacock et al., 2012; Zilcha-Mano et al. 2011) which highlight the importance of establishing secure attachments for positive health outcomes. This finding may be explained by the development of a sense of security, emotion regulation and psychological adjustment in securely attached pet owners (Mikulincer & Shaver, 2012).

With regard to Rogers' core conditions, as hypothesised, pet owners' endorsements of Rogerian qualities in their pets were significantly related to better human QOL in the social and environmental domains. This reveals a link between the quality of pet owners' self-reported social support, living environments and perception of their pets' levels of qualities such as empathy, unconditional regard and genuineness. It is plausible that pets provide social support and companionship for vulnerable individuals who may have restricted human social networks (Castelli, Hart, & Zasloff, 2001; Rew, 2000), provide unconditional affection and non-judgmental acceptance (Arkow, 1987; Hill, Gaines, & Wilson, 2008), and reduce stress. Another explanation may be that pets, especially dogs, act as a primary precipitator of social interactions (Wood et al., 2015), and facilitate social integration (Le Roux & Kemp, 2009; McNicholas & Collis, 2000).

Lastly, we examined the relative value of Bowlby's attachment versus Rogers' core conditions in pets as predictors of wellbeing in pet owners. We found that secure pet attachment was significantly predictive of lower levels of psychological distress and psychopathology while Rogers' core conditions in pets were significant positive

predictors of QOL. These findings indicate that human wellbeing consists of multiple components and highlight a gap in previous studies, which have failed to consider multiple facets of health as defined by the World Health Organisation (2004).

This research contributes to the existing literature on human-animal interactions by investigating the psychological mechanisms that predict wellbeing in pet owners. This study also extends earlier findings that attachment theory is a valid framework for understanding human–pet relationships. While previous studies applied Rogerian concepts to human perceptions of therapy animals, the current study is one of the first to directly measure the concepts of Rogers’ core conditions as perceived by pet owners in relation to their pets. The results do suggest significant relationships between Rogers’ core conditions and wellbeing of pet owners in the hypothesised directions.

Theoretically, these findings imply the extension of Bowlby’s (1969) attachment theory to non-human attachment figures. As such, in the study of human-animal relationships and their impact on wellbeing, it is crucial that researchers assess what the relationship symbolises for an individual rather than simply assessing ownership status. Secondly, while previous studies have examined Rogers’ core conditions in humans as therapists (Arachtingi & Lichtenberg, 1998; Schottelkorb, Swan, Garcia, Gale, & Bradley, 2014), and in therapy animals (Jenkins et al., 2014), the findings of our study provide preliminary evidence that these conditions may also apply to relationships between companion animals and pet owners for positive health outcomes. Thirdly, although this study highlights a tendency for secure pet attachments and conditions such as *empathy*, *unconditional positive regard* and

congruence in pets to be associated with human wellbeing, these findings do not imply that the solution to improve human health lies in simply getting a pet. The costs and risks of owning pets need to be considered. Furthermore, these findings highlight the complexity in the nature of human-animal interactions, and reveal multiple links and psychological mechanisms to multiple different aspects of wellbeing.

The strengths of this study include the recruitment of a relatively large sample, the comprehensive assessment of owner-pet relationships, and statistical control for participant demographics. Furthermore, instead of merely assessing pet ownership status, this study investigated the psychological mechanisms that may underlie wellbeing in pet owners.

Limitations

However, due to the cross-sectional design and correlational nature of this study, conclusions regarding the causality of pet attachment and Rogers' core conditions in pets on human wellbeing cannot be drawn. Individuals who reported secure attachments to their pets may just be more positive in their responses to questionnaire items regarding wellbeing. Additionally, better mental health may lead to healthier relationships with pets and other individuals. These other possible interpretations of the current findings should be noted.

Also, the relationship between owners' perceptions of their pet's qualities and objective measures of constructs such as empathy is not yet known. Hence, the current study is not able to decipher if benefits to human health and wellbeing are due

to anthropomorphism, or due to objective qualities of the pets. Further research in this area would be of interest.

The study may have also failed to capture longer-term differences in wellbeing of pet owners and non-pet owners. Previous longitudinal studies have revealed that pet owners reported fewer visits to the doctor than non-pet owners (Headey, Grabka, Kelley, Reddy, & Tseng, 2002) which highlight the importance of investigating changes in health of pet owners over time as a function of pet ownership. Hence, future researchers should explore the causality and direction of the effects of pet ownership on health outcomes with longitudinal designs.

Another limitation relates to the limited availability of assessment tools to assess human-animal relationships. The BLRI, which was used to measure Rogers' core conditions, was initially developed to assess human relationships. Hence, the results regarding the presence of the Rogers' core conditions in pets perceived by their owners are only valid to the extent that the BLRI can validly measure human-animal relationships (Jenkins et al., 2014). Despite this limitation, this measure was considered psychometrically sound in assessing perceptions of Rogers' core conditions in pets in previous research (Jenkins et al., 2014). Nonetheless, future research may benefit from further evaluation and development of tools to assess such aspects of human-animal relationships.

Moreover, future research may benefit from obtaining more information regarding the age, breed, health status and required activity levels of pets to gain a greater understanding of how pets may or may not encourage their owners to adopt

healthy behaviours. Also, future researchers could obtain information on past pet ownership to better understand the influence of past pet relationships on current human wellbeing. Lastly, this line of research may benefit from a mixed methods approach, as the sole use of quantitative measures is unlikely to capture the complex nature of human-animal relationships (Cohen, 2002).

Conclusion

Overall, the current study indicates that differences in wellbeing may not be consistently discernable between pet owners and non-pet owners because wellbeing is related not to pet ownership alone but to qualities of individual human-pet relationships. These findings contribute to the extension of Bowlby's (1969) attachment theory from human attachment figures to non-human attachment figures and the ways in which the quality of relationships with these figures predict levels of psychological distress and psychopathology. This study also provides preliminary evidence that conditions of *empathy*, *unconditionality of regard*, and *congruence* in pets may influence QOL of pet owners. These findings reflect the complexity in human-animal relationships and indicate that secure pet attachment and Rogers' core conditions in pets are associated with human wellbeing. While the current study does not indicate that the solution to improve human health lies in simply owning a pet, it provides further evidence that animals may serve a valuable and currently underutilised role in promoting wellbeing (Wells, 2009b). The prospect of continued work in this area will advance our understanding of the link between animals and human health, and may facilitate the shaping of future health care and lifestyle practices.

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