

Exploring the contribution of animal companionship to human wellbeing: A three-country study

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Abstract: While it is often assumed that animal companions unilaterally contribute to the wellbeing of their human companions, research has to date been equivocal. At best it appears to be that animal companionship may add an extra dimension to human lives, and thus human wellbeing. In this paper we report on a quantitative study conducted in 2021 that surveyed 2090 people with animal companions living in Australia, the United Kingdom, and the United States. Participants responded to measures asking about their wellbeing and psychological distress, their connectedness to other humans, and their interactions with and attachment to animals. Regression analysis found that relationships with humans was associated with reduced psychological distress ($\beta = -.594$, $p = .001$), while relationships with animals ($\beta = .205$, $p = .001$), particularly cats ($\beta = .077$, $p = .001$), was associated with increased psychological distress. Regression analysis also found that relationships with other humans ($\beta = .522$, $p = .001$), interactions with animals ($\beta = .142$, $p = .001$), and bonds with animal companions ($\beta = .128$, $p = .001$) were associated with increased wellbeing. We conclude by considering the groups for whom relationships with animals are most likely to offer unique benefits, and suggest the importance of continuing to examine why it is that relationships with animals are both intertwined with, yet distinct from, human-human relationships.

Keywords: animal companionship; attachment; human wellbeing; psychological distress; wellbeing

1. Introduction

It is a common trope in public discourse to suggest that humans who love their animal companions¹ do so due to a deficit in human-human relationships. Think of the trope of the ‘crazy cat lady’, alone but for her troupe of cats (Probyn-Rapsey, 2018). Yet in the field of human-animal studies, researchers have long critiqued this idea of human-animal relationships being indicative of a deficit. Serpell, for example, noted in 1996 that “pets do not substitute for human relationships. They complement and augment them” (p. 143). More recently, Cudworth (2011) has argued that “the bonds between humans and their animal companions are best conceived in terms of attempts to negotiate difference across species rather than any form of ‘surrogacy’ where companion animals stand in as human substitutes” (p. 141). In this paper we explore the relationship between human-animal interactions and attachment and human wellbeing and psychological distress in a three-country sample, examining specifically if interactions and bonds with animals contribute something to human wellbeing over and above that provided by bonds

¹ While we use the terms ‘humans’ and ‘animals’ throughout, we do so for brevity, noting that humans are also animals.

with other humans. Below we summarize research on the impact of animal attachment on human wellbeing, the impact of human-animal interactions on human wellbeing, and individual differences in terms of the impact of animal companionship on human wellbeing, noting the often equivocal nature of the literature.

1.1 Animal companionship and human wellbeing

Research on the impact of the bond with, attachment to, or love for animals on human health and psychological wellbeing has, to date, produced mixed findings. For example, in a study of 128 people living with HIV in Australia, Hutton (2014) found that participants with fewer human social supports reported greater attachment to animals, and poorer emotional wellbeing. Also focused on people living with HIV, Siegel and colleagues (1999) found that of their 1872 participants living in the United States, animal companions moderated the association between living with HIV and depression, and this was especially true for those who had fewer human social supports and who were more strongly attached to their animal companions. Studies in the United Kingdom undertaken during COVID-19 lockdowns, such as Ratschen et al.'s (2020) study of 5926 people, have found that participants who reported higher levels of comfort derived from animal companions reported more positive mental health. Finally, Bennetts et al. (2022), in their Australian study of 2022 people, found that feeling close to animals was associated with significant greater psychological distress.

It has been repeatedly noted that the literature on the impact of animal companionship on human wellbeing is flawed by being cross-sectional and thus unable to speak to causality (Herzog, 2011). Humans who already experience psychological distress may seek to live with animals for comfort, though of course animals cannot be expected to entirely mitigate distress. It may also be possible that living with an animal companion serves as a reminder for some humans that their relationships with other humans are lacking.

1.2 Human-animal interactions and human wellbeing

Previous research has also examined, beyond bonds with, attachment to, or love for animals, the role that human interactions with animals may play in human wellbeing. For example, Robino et al. (2021) assessed outcomes from an animal-assisted intervention for college students living in the United States and found that, while interactions instigated on the part of animals did not predict positive human affect, human-instigated interactions with animals did predict a reduction in negative human affect. Examining interactions with animals among 136 gender and sexuality diverse young people, McDonald et al. (2022) found that interactions with animals did not mediate the effects of experiences of microaggressions on psychological distress.

Again, then, research in this area is equivocal. Certainly, it may be the case that interacting with animals helps humans to feel better, but it appears unlikely that interactions with animals can entirely mitigate human suffering and marginalization. Nonetheless, what appears to be the case is that it is not simply the fact of interactions occurring that may impact human wellbeing. Rather, it is the quality of the interactions, and if they bring meaning to human lives (Hosey & Melfi, 2014).

1.3 Individual differences and the benefits of animal companionship

Research on the benefits of animal companionship to human wellbeing has often focused on specific human and animal individual differences that may shape the nature of the animal-human relationship. For example, Parslow and colleagues (2005), in their study of 2551 people

aged 60-64 living in Australia, found that men who were in relationships with other humans and who lived with dogs reported poorer mental health than did participants who lived with other humans but who did not live with animals. Conversely, Bennett et al. (2015), in their study of 68 people aged 65 years and older living in Australia, found that while depression scores were higher among those who lived with animals compared with those who did not (and especially those who lived with dogs), overall wellbeing was higher among those who lived with an animal. In their study of 1267 people living in the United States, Mueller et al. (2021) found that living with animals was associated with anxiety disorders particularly for women and people living with a cognitive disability, though they did not find species differences, nor that education level or employment status was predictive of wellbeing. Conversely, Zasloff (1996) in a study of 177 people in the United States found that participants who lived with dogs reported greater comfort from animal companionship than did those who lived with cats. Tower and Nokota (2006), in their study of 2291 people living in the United States found that men who lived alone with animals were more depressed than women who lived alone with animals. Finally, Antonacopoulos and Pychyl, in their Canadian study of 132 people, found that participants who lived only with animals and who had few human social supports and who were highly attached to their animal companions were more depressed than those who had greater human social supports.

Again, here, we see inconsistency. Some of this inconsistency may be accounted for by the differing locales in which the research is conducted. While we may presume that, both being westernized countries, findings from Australia and the United States should be similar, differences between the countries in terms of politics, legislation, and support for human-animal relationships may impact findings. So too likely to impact research findings are the differing measures used, with some using measures of general wellbeing, and others using more specific measures of psychological distress. Further, some studies have used measures of human-animal attachment, while others have simply focused on living with animals.

1.4 Addressing gaps in the literature

Given the equivocal nature of the literature outlined above, it is important to consider why it might be that relationships with animal companions appear to in some way be related to human wellbeing. Important insights are provided by the work of Diaz Videla (2020), who in their study of 425 people living in Buenos Aires found that animals play a unique role in human lives, rather than a supplementary or compensatory role. Meehan and colleagues (2017) too found in their study of 1161 college students in the United States, that animals were considered by their participants to be part of a circle of attachment figures that in combination created positive outcomes, rather than animals being stand-alone figures of support absent human relationships. Nonetheless, they did find that the support provided by animals was uniquely differentiated from support provided by other humans. McConnell and colleagues (2011), in three studies conducted in the United States, found that connections with animals did not come at the expense of, or as compensation for, human relationships. Rather, that closeness to both other humans *and* to animals mirrored and amplified one another.

Further, while some of the research summarized above has compared humans who live with animal companions with those who do not, researchers such as Herzog (2011), have suggested that such comparisons may lead researchers to fall foul of the assumption that correlation equals causation. As Mueller and colleagues (2018) have suggested, even when it comes to correlations, when it comes to any differences between those without and those with animal companions, it cannot be said with certainty what direction the correlation runs (i.e., if those without animals report lower levels of psychological distress, is that because they don't live with animals, or do

they choose not to live with animals because of psychological distress).

1.5 Research Questions

Given the literature summarised, we sought to explore relationships between humans and animals as they potentially impact human wellbeing and psychological distress across a convenience sample collected from three countries. Specifically, we sought to answer the following research questions:

- 1) What are the relationships between key independent variables (human-animal interactions and attachment, and species of animal) and dependent variables (psychological distress and wellbeing) across the three countries? Given the differing findings and measures used in previous research, it is important to establish a comparative baseline for these variables.
- 2) Does human-animal interactions and attachment explain unique variance in terms of human wellbeing and psychological distress, over and above that explained by social connectedness with other humans?
- 3) If bonds and interactions with animals make a unique contribution to explaining human wellbeing and psychological distress, for which groups of people is this most true?

2. Method

2.1 Sample

Ethics approval was granted by the Flinders University Social and Behavioural Research Ethics Committee. Participants were recruited as members of a Qualtrics audience panel. Qualtrics offers a paid service that provides researchers with representative samples of a chosen population (in this case, participants from Australia, the United Kingdom, and the United States. These three countries were chosen given the predominance of research from these countries, and the ready access to participants from these countries via Qualtrics audience panels). Audience panel members are individuals who consent to being contacted by Qualtrics for inclusion in particular studies relevant to their experiences, interests, and demographics. Once invited to join a particular study people can decline to participate with no penalty. Inclusion criteria were living in either Australia, the United States or the United Kingdom, living with at least one animal, and being aged 18 years or older. Potential participants who did not confirm that they met these inclusion criteria were excluded from participation. Recruitment occurred over two weeks in March 2021, and closed once the minimum sample sizes were exceeded (based on the population sizes of each of the three countries and a 95% confidence level, and a 4% margin of error. The sample sizes were much larger than required based on a power analysis. An a priori analysis was conducted using G*Power, indicating that the required sample to achieve 95% power for detecting a medium effect at $p = .05$ was 178 per country). Participants were asked to give consent to participation, and were advised that they could withdraw at any time prior to submitting their completed responses. Participants were paid a small honorarium for their time as members of a Qualtrics audience panel, at a rate determined by Qualtrics as part of the overall fee paid by the authors to Qualtrics for recruitment.

2.2 Materials

Participants completed a survey designed by the authors, hosted on Qualtrics. The survey opened with an information screen, detailing the purpose of the study, outlining inclusion criteria, and then asked participants to consent to participation. Given there were no obvious

stereotype threats likely to arise from asking demographic questions first, participants were first presented with a series of demographic questions: gender; whether they were trans; whether they were born with an intersex variation; sexuality; age, whether or not they were in an intimate relationship; their current employment status; whether they were living with a disability; human and animal cohabitants; whether any animal cohabitants had a chronic illness; dietary preference for vegetarianism or veganism; and their degree of religiosity: 1 = not at all, 2 = somewhat, 3 = quite a bit, 4 = a lot. Participants were also asked questions specific to their country of residence. In all three countries participants were asked to report their combined household annual income (using standardised income brackets for each country); their state/territory (for Australia) or region (for the United States or United Kingdom) of residence, and to report whether or not they were First Nations (for Australia), their cultural identity (United States) or ethnic identity (United Kingdom). Having provided these demographic details, participants then completed six measures.

2.2.1 *The Human-Animal Interaction Scale*

The Human-Animal Interaction Scale (HAIS, Fournier & Letson, 2016) includes two components: human interactions with animals, and animal interactions with humans. These are asked using two matrices: 'how much do you [the participant] interact with the animal' and 'how much does the animal interact with you'. Examples of the former include 'spend time with', 'hug', 'pet', and 'play with'. Examples of the latter include 'make friendly sounds', 'lick you', and 'initiate friendly interaction'. For the present study, only human interactions with animals was included, given that in the study by Robino et al (2021) only the human interactions measure was statistically significantly related to human wellbeing. Participants were asked to rate the degree to which they engage in a range of interactions with animals living in their house, using the following 5-point scale: 1 = Never, 2 = Sometimes, 3 = A moderate amount, 4 = Quite often, and 5 = Much of the time. Participants could also indicate if a form of interaction was not applicable. Examples of the 14 interactions included in the HAIS for human interactions with animals are watching, petting, talking to, hugging, playing with, and kissing animals. Participants who lived with more than one animal were asked to focus on one animal in responding to the HAIS, with all nominating either a dog or a cat. The creators of the HAIS report alpha levels between 0.72 and 0.89, depending on the sample population and animal of focus. For the present study the alpha level was 0.88. Higher scores indicate greater levels of positive interactions with animals, with the possible range being -8 to 48. Fournier and Letson report an average score of 23.82 in their sample. See Table 2 for means for the present study.

2.2.2 *Pet Attachment and Life-Impact Scale*

The Pet Attachment and Life-Impact Scale (PALS, Cromer & Barlow, 2013) is a 39-item measure that encompasses four factors: love for and by animals, emotional regulation provided by bonds with animals, personal growth derived from attachment to an animal, and negative impacts of living with animals. This scale was used in the present study following its use by McDonald et al (2022) and its demonstrated applicability to a diversity of populations. For the present study, only the first factor was included, representing 17 of the items. This was done given the overall length of the survey (and limitations on survey length imposed by Qualtrics), and concerns in the literature about the importability of human notions of 'attachment' into research on human-animal relationships (e.g., Crawford et al., 2006). Example items include 'I love my animal(s)', 'My animal gives me unconditional love', and 'My animal and I have a special relationship'. Participants are asked to respond to each of the items using a 5-point scale where 1 = Strongly

disagree, 2 = Somewhat disagree, 3 = Neither agree nor disagree, 4 = Somewhat agree, and 5 = Strongly agree. Participants could also choose 'not applicable' for any of the items. Participants who lived with more than one animal were asked to focus on one animal in responding to the PALS, with all nominating either a dog or a cat. The authors of the PALS do not report alpha levels, however for the present study the alpha level for the love factor was .90. Higher scores indicate a greater sense of love for animals, with the range being 1-5. Cromer and Barlow report a mean of 3.48 for the love for and by animals factor. See Table 2 for means for the present study.

2.2.3 Social Connectedness Scale Revised

The Social Connectedness Scale Revised (SCS-R, Lee et al., 2001) measures the degree to which humans feel connected with other humans. While the Multidimensional Perceived Social Support Scale (Kazarian & McCabe, 1991) is more commonly used in human-animal studies research, it focuses solely on human-human relationships with loved ones. The present study was more broadly interested in human-human relationships as a generalised concept. The 20-item SCS-R scale includes items such as 'I feel understood by the people I know', 'I feel close to people', and 'I find myself actively involved in people's lives'. Participants rate their responses to items using a 5-point scale where 1 = Strongly disagree, 2 = Somewhat disagree, 3 = Neither agree nor disagree, 4 = Somewhat agree, and 5 = Strongly agree. The authors of the SCS-R report an alpha level of 0.94. For the present study the alpha level was 0.91. Higher scores indicate greater sense of connectedness to other humans, with the range being 1-5. Lee et al report a mean of 3.40. See Table 2 for means for the present study.

2.2.4 Personal Wellbeing Index – Adult

The Personal Wellbeing Index – Adult (PWI-A, International Wellbeing Group, 2013) assesses satisfaction with life as a whole. This measure has been previously used by Bennet et al (2015) in their study of human-animal relationships. The 7-item measure asks participants to rate their satisfaction with their standard of living, their health, their achievements, their relationships, their safety, their sense of community, and their future security. Participants are asked to rate their satisfaction for each of these items using a 10-item scale from 1 = No satisfaction at all to 10 = Completely satisfied. The authors of the PWI-A report alpha levels between .70 and .85. For the present study the alpha level was .91. Higher scores indicate greater satisfaction with life. The PWI-A has a normalised range of 50-10. The International Wellbeing Group report a mean of 75.2. See Table 2 for means for the present study.

2.2.5 Kessler Psychological Distress Scale

The Kessler Psychological Distress Scale (K10; Kessler et al., 2002) measures psychological distress, asking participants to indicate the frequency at which they experienced emotional states such as 'How often did you feel tired out for no good reason', 'How often did you feel nervous' and 'How often did you feel hopeless' over the past four weeks. The K10 has been used in previous studies of human-animal relationships, such as Powell et al (2019). The ten items on the scale are scored on a 5-point Likert-type scale, where 1 = None of the time, 2 = A little of the time, 3 = Some of the time, 4 = Most of the time and 5 = All of the time. Higher scores indicate higher levels of psychological distress. Normative data from the K10 suggest that 88% of people are likely to score below 20, and that of those who score 25 or above, 66% are likely to meet the criteria for a diagnosis of clinical depression or anxiety (Andrews & Slade, 2001). Andrews and Slade assessed the reliability of the K10 through comparing scores on the K10 with the probability of meeting a psychiatric diagnosis for psychological distress, reporting an alpha level of 0.93. For

the present study the alpha level was 0.86. The K10 has a range of 10-50, and Kessler et al report a mean of 14.2. See Table 2 for means for the present study.

2.3 Analytic approach

Data were exported from Qualtrics into SPSS 28.0. Given the use of a Qualtrics Audience Panel, all of the participants included in the final sample of 2090 (Australia = 639, United States = 824, United Kingdom = 627) completed all items (all items were marked within the survey as mandatory responses). Negatively scored items on the SCS-R were reverse scored. Item means were calculated for the PALS, SCS-R and PWI-A. The HAIS uses an item sum calculated by adding the 12 positive interactions and subtracting the two negative interactions. The K10 uses the item sum. Factor analyses using a varimax rotation were applied to the HAIS, PALS, and SCS-R to confirm the factor structure identified in previous research. The authors of each measure report a single-factor structure (for the PALS a four-factor structure is used, but for the present study only one factor was used). A single-factor structure provided the best account of variance in the data for each of the HAIS, PALS, and SCS-R in the present study, indicating that the single-factor structure presented a cohesive account of the items as representing the measurement of a singular variable or concept.

Demographic data were generated for the sample, using ANOVAs and Chi Square tests to examine any potential differences between the three countries in terms of demographics. Bivariate correlations were run for all measures, using the split cases function in SPSS to report correlations for each country. Given that significant differences were identified between countries for a number of the demographic variables and in terms of some of the correlations, dummy codes were created for countries. T-tests were also performed to determine if species of animal was a predictor of responses to the five measures. Given that all participants nominated either a dog or a cat for their point of reference in completing both the HAIS and the PALS, while many also lived with other species, dog or cat co-habitation were treated as the two reference categories. Having performed all of these initial tests, two hierarchical regressions were then run. In each the country dummy codes were entered in the first block to control for differences between countries in terms of demographics. In the second block the SCS-R, HAIS, PALS and species of animal (dog or cat) were entered (only for the K10, given there was no significant relationship between the PWI-A and species of animal). In one regression the dependant variable was the PWI-A, and in the second the dependant variable was the K10. Finally, given findings from the regressions, ANOVAs and Independent Samples t-tests were run to identify any specific relationships between demographic variables and the measures.

3. Results

3.1 Demographics of sample

As can be seen in Table 1, for some of the demographic variables there were differences between countries. The average age of participants in the United States was significantly older than participants in Australia or the United Kingdom. Participants in the United States were more likely to be heterosexual than would be expected in a standard distribution, and participants in Australia were less likely. Participants in the United Kingdom were more likely to be single than would be expected in a standard distribution. Participants in the United States were more likely to be retired than would be expected in a standard distribution. The average degree of religiosity reported by participants in the United States was significantly higher than participants in Australia or the United Kingdom. Finally, participants in the United States were less likely to be vegan or vegetarian than would be expected in a standard distribution.

Table 1a. Participant Demographics

		Australia	United States	United Kingdom	<i>p</i>
Age		<i>M</i> =31.85, <i>SD</i> =11.97	<i>M</i> =57.06, <i>SD</i> =16.16	<i>M</i> =34.67, <i>SD</i> =12.90	.001
Gender	Male	142	469	138	.001
	Female	484	351	484	
	Non-binary	8	3	5	
Trans	Yes	20	30	22	
	No	614	793	605	
Intersex	Yes	11	33	17	
	No	596	757	575	
	Unsure	21	21	29	
	Prefer not to say	6	12	6	
Sexuality	Heterosexual	502	753	532	.001
	Gay	9	15	12	
	Bisexual	72	27	49	
	Pansexual	18	0	2	
	Asexual	9	8	6	
	Lesbian	8	8	19	
	Queer	18	12	7	
Disability*	Chronic illness	84	257	82	
	Mental health	231	100	197	
	Learning impairment	42	44	33	
	HIV	3	3	5	
	Other	53	169	73	
Relationship Status	Single	162	237	201	.001
	Dating	79	25	52	
	In a relationship	391	561	374	
Human Co-habitants*	Partner	371	518	358	
	Children	297	251	316	
	Friends	30	26	26	
	Extended family	147	85	101	
	Housemate	42	46	17	
	No human co-habitants	53	149	60	
Employment Status	Working full time	281	269	329	.001
	Working part time	159	65	144	
	Home duties	73	28	36	
	Not employed	45	59	39	
	Retired	15	343	17	
	Student	55	12	32	
	Living with disability, unable to work	6	47	30	
Religiosity		<i>M</i> =1.63, <i>SD</i> =0.88	<i>M</i> =2.35, <i>SD</i> =1.01	<i>M</i> =1.60, <i>SD</i> =0.81	.001
Household Income	AUD\$0 – 18, 200	43			
	AUD\$18, 201 – 37, 000	85			
	AUD\$37, 001 – 80, 000	186			
	AUD\$80, 001 – 180, 000	262			
	AUD\$180, 001+	55			
	USD\$0 – 25, 000		150		
	USD\$25, 001 – 50, 000		213		
	USD\$50, 001 – 75, 000		154		
	USD\$75, 001 – 100, 000		122		
	USD\$100, 001+		174		
	GPDL£0 – 12, 000			174	
	GPDL£12, 001 – 32, 999			369	
	GPDL£33, 000 – 50, 999			279	
	GPDL£51, 000 – 70, 999			182	
	GPDL£71, 000 – 90, 999			123	
GPDL£91, 000+			137		

Table 1b. Participant Demographics

		Australia	United States	United Kingdom	<i>p</i>
Cultural, ethnic or racial category or Indigenous status	Aboriginal	52			
	Torres Strait Islander	9			
	Both Aboriginal and Torres Strait Islander	11			
	Neither	559			
	American Indian or Alaskan Native		12		
	Asian or Pacific Islander		19		
	Black, not Hispanic		27		
	Hispanic		30		
	White, not Hispanic		713		
	Other		13	7	
	Arabic			44	
	Asian			39	
	Black/Carribbean/African			5	
	Chinese			43	
	Mixed ethnic group			3	
	Romany			461	
	White			25	
Other					
Dietary	Vegan	114	100	122	.001
	Vegetarian	31	65	35	
	Neither	494	659	470	
State/region of residence	Victoria	238			
	New South Wales	131			
	South Australia	59			
	Tasmania	22			
	Western Australia	45			
	Queensland	123			
	Australian Capital Territory	12			
	Northern Territory	1			
	New England		40		
	Middle Atlantic		141		
	East North Central		96		
	West North Central		56		
	South Atlantic		184		
	East South Central		52		
	West South Central		97		
	Mountain		68		
	Pacific		79		
	Scotland			79	
	Northern Ireland			44	
	Wales			41	
	North East			181	
	North West			140	
	Yorkshire			58	
	West Midlands			96	
	East Midlands			69	
	South West			140	
	South East			219	
East of England			61		
Greater London			136		
Animal Co-habitants*	Dogs	443	488	406	
	Cats	253	307	193	
	Birds	82	70	51	
	Reptiles or fish	94	62	76	
	Rodents	20	26	46	
	Rabbits or guinea pigs	42	30	71	
Other	41	55	57		
Animal has chronic illness	Yes	49	97	58	
	No	582	726	569	

* Categories not mutually exclusive

There were also differences between the three countries in terms of scores on the six measures, as can be seen in Table 2. Participants in the United States reported significantly lower scores on the K10, HAIS and PALS, and significantly higher scores on the SCS-R and PWI-A. Participants in all three countries reported higher scores on the K10, HAIS, PALS than in previous research, and lower scores on the PWI-A than in previous research.

Table 2. Descriptive statistics for the five measures by country

		<i>M</i>	<i>SD</i>	<i>P</i>
K10	Australia	27.21	9.46	.001
	United States	22.19	10.65	
	United Kingdom	28.34	9.06	
HAIS	Australia	34.16	10.01	.001
	United States	30.79	10.67	
	United Kingdom	33.55	10.56	
PALS	Australia	4.24	0.64	.001
	United States	4.11	0.70	
	United Kingdom	4.25	0.68	
SCS-R	Australia	3.23	0.72	.001
	United States	3.46	0.75	
	United Kingdom	3.18	0.66	
PWI-A	Australia	66.1	1.67	.001
	United States	70.6	1.93	
	United Kingdom	64.3	1.75	

Table 3. Correlations reported by country

		HAIS	PALS	SCS-R	PWI-A
Australia	K10	.209**	.203**	-.602**	-.325**
United States		-.041	.138**	-.566**	-.169**
United Kingdom		.114**	.223**	-.587**	-.426**
Australia	HAIS		.686**	.069	-.049
United States			.580**	.189**	.070
United Kingdom			.614**	.024	-.047
Australia	PALS			-.042	.035
United States				.060	.120**
United Kingdom				-.021	.031
Australia	SCS-R				.534**
United States					.476**
United Kingdom					.561**

* $p = .01$ ** $p = .001$

3.2 Relationships between key variables

Correlations between the six measures are reported by country, as outlined in Table 3. Notable is that weak positive correlations were reported between psychological distress and animal attachment in all three countries. Greater psychological distress was related to greater bonds with and love for animals. Conversely, in all three countries there was a strong negative correlation between psychological distress and social connectedness. Greater psychological distress was related to lower levels of connectedness with other humans. In terms of species of animal for whom participants responded to the measures of human-animal interaction and attachment, 64%

chose to focus on a dog, and 36% chose to focus on a cat. Using species of animal as a predictor variable, bonds with and love for dogs was higher ($M = 4.28$, $SD = 0.63$) than it was for cats ($M = 4.17$, $SD = -0.66$), t (??) = 3.11, $p = .001$. Participants who chose to focus on dogs reported lower levels of psychological distress ($M = 2.50$, $SD = 1.01$) than did participants who chose to focus on cats ($M = 2.63$, $SD = 1.02$), $t = 2.705$, $p = .003$. There was no statistically significant relationship between animal chosen and the other measures.

3.3 Explaining variance in psychological distress and wellbeing

Results of the regression in which psychological distress was the dependent variable, as outlined in Table 4, indicate that there was a collective significant effect of the human-animal interaction, attachment, social connectedness, and species of animal ($F(3, 2090) = 36.199$, $p = .001$, $R^2 = .40$). Entered in the first block, country accounted for none of the variance. Entered in the second block, social connectedness explained the largest proportion of unique variance, ($\beta = -.594$, $p = .001$), with animal attachment explaining a smaller proportion of unique variance ($\beta = .205$, $p = .001$), and the species of animal explaining a small proportion of unique variance ($\beta = .077$, $p = .001$). Human-animal interactions made no statistically significant contribution to explaining variance in the model.

Table 4. Regression values for PWI-A

Model		Unstandardized		Standardized	t	Sig.
		Coefficients		Coefficients		
		B	Std. Error	Beta		
1*	(Constant)	6.751	.072		93.919	.000
	Country	-.028	.057	-.013	-.494	.621
2**	(Constant)	1.281	.345		3.710	<.001
	Country	-.014	.047	-.006	-.288	.773
	HAIS	-.025	.005	.142	-5.086	<.001
	PALS	.344	.079	.128	4.366	<.001
	SCS-R	1.269	.054	.522	23.395	<.001

* $df=1$ ** $df=5$

Results of the regression in which personal wellbeing was the dependent variable, as outlined in Table 5, indicate that there was a collective significant effect of human-animal interaction and attachment, and social connectedness ($F(3, 2090) = 14.146$, $p = .001$, $R^2 = .30$). Entered in the first block, country accounted for none of the variance. Entered as the second block, social connectedness explained the largest proportion of unique variance, ($\beta = .522$, $p = .001$), with both human-animal interaction ($\beta = .142$, $p = .001$) and attachment ($\beta = .128$, $p = .001$) each explaining a small proportion of unique variance.

3.4 Individual differences in psychological distress and wellbeing

Of the demographic variables explored as likely predictors, gender, relationship and cohabitation status, and disability were significantly related to the measures. Women as compared to other genders reported statistically higher levels ($p = .001$) of interactions with animals, bonds with and love for animals, and psychological distress, and conversely statistically lower levels ($p = .001$) of connectedness with other humans and personal wellbeing. Similarly, people living with a mental illness as compared to people not living with a mental illness reported statistically higher levels ($p = .001$) of interactions with animals, bonds with and love for animals, and psychological

distress, and conversely statistically lower levels ($p = .001$) of connectedness with other humans and personal wellbeing. People who were not in a relationship as compared to people who were in a relationship reported statistically lower levels ($p = .001$) of personal wellbeing and human connectedness, and conversely statistically higher levels ($p = .001$) of bonds with and love for animals and psychological distress. Finally, people who lived only with animals, as compared to those who lived with both humans and animals reported statistically lower levels ($p = .001$) of psychological distress and wellbeing, and statistically higher levels ($p = .001$) of interactions with animals and bonds with and love for animals.

Table 5. Regression values for K10

Model		Unstandardized		Standardized		
		Coefficients		Coefficients		
		B	Std. Error	Beta	t	Sig.
1*	(Constant)	2.528	.042		59.812	.000
	Country	.027	.034	.022	.811	.418
2**	(Constant)	3.729	.200		18.672	<.001
	Country	.025	.026	.020	.976	.329
	HAIS	.004	.003	.039	1.505	.133
	PALS	.321	.044	.203	7.334	<.001
	SCS-R	-.824	.029	-.594	-28.104	<.001
	Species (Dog or Cat)	.159	.042	.077	3.738	<.001

* $df=1$ ** $df=5$

4. Discussion

The findings reported in this paper provide support for the suggestion that love for, and bonds and interactions with animals, make a unique contribution to human wellbeing and psychological distress, echoing previous research (e.g., Diaz Videla, 2020; McConnell et al., 2011; Meehan et al., 2017). The findings reported in this paper, however, offer unique insights that enrich this previous research. First, in terms of research question one and the focus on differences between the three countries, while country of residence indicated differences in terms of the demographic variables and the measures, it did not explain any unique variance in terms of social connectedness and human-animal interactions and attachment with regard to either psychological distress or wellbeing. This is perhaps not surprising given despite their differences they are three westernised countries, suggesting that the use of research from one country to draw assumptions about another similar country may be valid in the context of future research.

In terms of the second research question focused on whether or not human-animal interactions and attachment explained unique variance, it was indeed the case that while connections with other humans explained the greatest amount of variance, love for and bonds and interactions with animals did explain unique variance. As predicted, bonds with animals were associated with greater psychological distress and greater overall wellbeing, while interactions with animals were associated with greater overall wellbeing but had no relationship to psychological distress. The findings with regard to wellbeing require closer examination. Human wellbeing was positively related to human connectedness and was also positively related to both animal bonds and interaction. What might we make of this? First, it would appear that interacting with animals has a positive impact on human wellbeing. In other words, it is not just feeling love for animals that creates positive effects, but also the interactions we have with animals. Of course, the two are closely intertwined, such that through feeling love for animals

we are more likely to interact positively with them, and those interactions help foster our attachment to animals. Different to the relationship between animal attachment and psychological distress, then, we might suggest that the positive relationship between interactions with animals and human wellbeing more clearly signals the benefits of animal-human interactions. In other words, as noted above, the relationship between animal attachment and psychological distress remains somewhat unclear, requiring further investigation. By contrast, the benefits of interactions with animals for human wellbeing appear clearer.

In terms of the third research question, which focused on individual differences in terms of the benefits of animal companionship, while many of the items in the HAIS focus on one-to-one interactions, it is potentially the case that for many people who also cohabit with other humans, interactions with animals occur in the context of relationships with other humans. The findings suggest as much, given that people who were not in a relationship reported lower personal wellbeing and human connectedness, and greater love for animals but not higher animal interaction. Further, interactions with animals likely extend beyond the home to other spaces where people who are fond of animals are present (such as dog parks, or in interactions with the animal companions of friends or family in their homes). This would suggest that interactions with animals are often a social exercise, highlighting why such interactions add something related to, but are also distinct from, connectedness to other humans. By contrast, it might be conjectured that bonds with animals are a much more personal phenomenon, and thus that their contribution to human connectedness remains less than clear, including in terms of the negative relationship between psychological distress and animal bonds.

Further in terms of research question three, we might conjecture that for people who were connected to other humans there were psychological benefits, but for people who were not closely connected to other humans, living with animals did not mitigate psychological distress. This was particularly true for both women and people living with a mental health disability, and people who lived with cats. Perhaps it is the case that psychological distress associated with not being connected to other humans led people to living with an animal in the hope that it would mitigate their distress. This conjecture, however, is not entirely born out upon closer analysis of the data, which suggests that those who lived only with animals reported lower levels of psychological distress. It may of course be the case that such people enjoyed close human connections in other aspects of their life, as well as uniquely benefiting from living solely with animals. Again, this finding suggests the importance of further research.

4.1 Limitations

Despite the many interesting findings explored above, some limitations must be noted. While country of residence did not explain any unique variance in either of the models, there were nonetheless differences between the countries. Future comparative research would benefit from utilising more demographically similar samples, to determine whether there are indeed similarities between westernised countries as suggested in the present paper, or whether there are other, subtle differences. Such differences may include views about the meaning of animal companionship, support for human-animal interactions, and the value accorded to animal attachment for human wellbeing. Beyond the comparison of westernised countries, it is important that future research explores similarities and differences between a diversity of countries, especially given that previous research has found a diversity of attitudes towards animals across countries in Europe and the Middle East (Randler et al., 2021). Further, given that in all three countries the majority of participants were white, heterosexual, and cisgender, it is important that future research examines more diverse samples of participants, again given that

previous research suggests that migrants, refugees, and/or gender or sexuality diverse people experience unique relationships with and connections to animal companions (Riggs et al, 2017; Riggs et al., 2021).

It is also worth noting that we continue to need to refine, and/or develop new, measures and methods of assessing the phenomena reported on above. For example, it might be that psychological distress is associated with the point in an animals' life-span, where those with older, or terminally ill, animals experience fewer benefits from their relationships, though of course this would also needed to be situated in a lifecourse perspective, such that the net benefits of animal companionship would be compared with the potential disbenefits of caring for older or chronically ill animals. Similarly, it might be that that different genders score their bonds with animals differently, with men reporting less significant bonds due to cultural prescriptions about masculinity. More nuanced measures along with diverse methods of investigation are very much needed in this area. Finally in terms of measures, it is important to note that only human interactions with animals were measured in the present study. Also including animal interactions with humans might offer additional insights into the benefits of animal-human interactions for human wellbeing.

4.2 Conclusion

In conclusion, the findings reported in this paper suggest that bonds and interactions with animals do make a unique contribution to human wellbeing, while also suggesting the need for further research that continues to unpack the specificities of the unique benefits of animal companionship to humans, and specifically why bonds with animals appear to be associated with greater psychological distress. Equally important, however, is that any such research also begins the process of mapping out what benefits animals derive from their relationships with humans. Given that much of the research, including the present study, focuses on benefits to humans, it is important – for both animals and humans – that we consider what it is that is unique, and what this uniqueness brings to the lives of animals.

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