Attitude towards pets and depression among residents in Klang Valley, Malaysia: Moderating effect of pet ownership

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Abstract. *Objective*: The objective of the study was to investigate the moderating effect of pet ownership in the relationship between attitude toward pets and depression among residents in Klang Valley. *Methods*: A sample of 238 participants were recruited using stratified random sampling method. The instruments used were the Pet Attitude Scale-Modified (PAS-M) and Patient Health Questionnaire-9 (PHQ-9). Moderation analyses was conducted using SPSS 22.0.0.0 and PROCESS. *Results*: There was a moderating effect of pet ownership in the relationship between attitude toward pets and depression (b = -.093, p = .049). However, the conditional effects of both conditions (i.e., owns a pet, does not own a pet) yielded non-significant relationships respectively. Further, non-significant relationship was reported between attitude toward pets and depression level, regardless of pet ownership. *Conclusion*: Pet ownership may play a role in facilitating mental health (e.g., alleviating depression) when coupled with a positive attitude toward pets. Future studies should consider exploring this area further for the benefit of improving mental health issues (e.g., depression) in Malaysia. *Implication*: The present study has explored further into the field of psychological research on Human Animal Interactions and suggests that more work is needed to understand the relationships between attitude toward pets, pet ownership, and depression among residents in Klang Valley.

Keywords: Attitude, Pet Ownership, Depression, Malaysia.

Introduction

It is estimated that at least 300 million individuals worldwide are currently living with depression, with a spike of 18.4% between the years 2005 and 2015 (Chan, Hutagalung, & Lau, 2017; Cheah, Azahadi, Phang, & Abd Manaf, 2019; Eusof Izzudin, Al-Bedri, Subramaniam, Matthews, & Cheong, 2018; Seger, Chen, Uddin, Wen, & Mie, 2019). Depression is also a major factor of morbidity and disability, with its burden of disease ranking high in many countries (Kader Maideen, Sidik, Rampal, & Mukhtar, 2014). By 2030, it is predicted that depression would be the most common debilitative disorder in high income countries (Kader Maideen et al., 2014; Tan & Yadav, 2013; Yeoh, Tam, Wong, & Bonn, 2017).

In Malaysia, depression is reported to be the most common mental illness, affecting approximately 2.3 million individuals (Chan et al., 2017; Mukhtar & Oei, 2011a, 2011b). From the Malaysian National Health and Morbidity Survey (NHMS) 2015, it was found that 29.9% of adults in Malaysia experience mental health issues, including depression (*NHMS, 2019*; Seger et al., 2019; Yeoh et al., 2017). Such prevalence included an increase from 10.7% in 1996 to 11.2% in 2006, and to 29.2% in 2015 (Wan Mustapha, 2018). As for the NHMS 2019, about half a million (2.3%) of adults in Malaysia were reported to suffer from depression (*The National Health and Morbidity Survey 2019: Non-communicable diseases, healthcare demand and health literacy*, 2019).

In Klang Valley, the prevalence of depression among adults is reported to be 10.3% (Kader Maideen et al., 2014). In addition, a total of 893 suicide cases by hanging alone were recorded between the years 2007 and 2016, with a rising trend between those years (Abd Karim et al., 2018). One explanation for such trend could be the increasing number of depression cases, whereby depression is a risk factor of suicide (Kader Maideen et al., 2014; Seger et al., 2019; Sinniah et al., 2014; Tan & Yadav, 2013).

Furthermore, loneliness is also associated with and is part of depression (Krause-Parello, Wesley, & Campbell, 2014; Stanley, Conwell, Bowen, & Van Orden, 2014). When human social support and emotional attachments decrease, for instance, loneliness (and depression) increase (Krause-Parello, Tychowski, Gonzalez, & Boyd, 2012). When a close human-pet relationship is developed however, the attachment formed could be theoretically perceived as social support. Such attachment could embody relational provisions of human support. These include pets providing humans a sense of security, nurturance, and reassurance (Krause-Parello et al., 2012; Siegel, 2011). In addition, pets could support humans to engage in social integration with other humans of common interest and values for pets (Krause-Parello et al., 2012). Pets could also assist in coping the feelings of social isolation and aiding emotional support, which is related to reducing depression in humans (Brooks et al., 2018; Krause-Parello et al., 2012). Therefore, human-pet attachment seems to play a vital role within human psychological aspects. Pet ownership could provide greater social

needs fulfilment, which is then related to better well-being (e.g., less feeling of loneliness, reduced depressed mood) (Krause-Parello et al., 2012; Matchock, 2015; Resnick & McCune, 2019; Tower & Nokota, 2015).

At present, the question of whether humans could achieve mental health benefits (e.g., decrease in depression) by owning pets remain unanswered yet (Siegel, 2011). Some studies discovered profound benefits of pet ownership, while others showed no advantages, yet others discovered poorer mental health among pet owners compared to non-pet owners (Antonacopoulos & Pychyl, 2015; Islam, Low, Tong, Choo, & Abdullah, 2016; Jacobson & Chang, 2018; Matchock, 2015; Siegel, 2011).

Past studies have also left out in investigating the effect of pet ownership on the relationship between attitude toward pets and depression. For example, previous research focused on attitude toward pets, pet ownership, and depression separately, with other different variables (Cheong, Teoh, & Ng, 2005; Hawkins, Williams, & Scottish, 2017; Lee & Chai, 2015). Other researches also assessed the association between two of the three variables. For example, there were researchers who investigated the relationship between pet ownership and attitude toward pets (Jacobson & Chang, 2018; Martens, Hansart, & Su, 2019), while other researchers looked into the association between pet ownership and depression (Clark Cline, 2010; McConnell, Brown, Shoda, Stayton, & Martin, 2011; Mullersdorf, Granstrom, Sahlqvist, & Tillgren, 2010). Further, to the present investigators' knowledge, no studies had been conducted in exploring attitude toward pets, pet ownership, and/or depression among residents in Klang Valley.

Taken together, the objective of the current study was to investigate the moderating effect of pet ownership in the relationship between attitude toward pets and depression among residents in Klang Valley. The null hypothesis (H_0) was that there was no significant moderating effect of pet ownership in the relationship between attitude toward pets and depression among the residents.

Methods

Research Design
This was a cross-sectional study whereby data collection (via survey method) was conducted between January 2020 and May 2020.

Population and Sample
The target population were residents in Klang Valley. The inclusion criteria included being at least 18 years old and could read and write in English or Malay language. Individuals who were diagnosed with a mental illness during this study were excluded because this could interfere with the study participation and results (Jacobson & Chang, 2018; Teo & Thomas, 2019).

A proportionate stratified random sampling method was targeted, whereby it involved taking random samples from stratified groups, in proportion to the population. Each stratum represented a district in Klang

Valley. There were seven districts or strata, namely Federal Territory of Kuala Lumpur, Petaling, Klang, Gombak, Hulu Langat, Sepang, and Kuala Langat. The population size in Klang Valley and its respective districts were based on the 2010 National Census (*Population distribution by local authority areas and mukims 2010*, 2011). Upon generating the sample size for each stratum (or district) (Table 1), participants were then recruited purely at random (whether physically or online).

Table 1. The Districts in Klang Valley and Their Respective Sample Sizes

District	N_h	n_h (Actual)	n_h (Pilot)
Federal Territory of Kuala Lumpur	1,674,621	26	8
Petaling	1,812,633	28	8
Klang	861,189	14	4
Gombak	682,226	11	3
Hulu Langat	1,156,585	18	5
Sepang	211,361	3	1
Kuala Langat	224,648	4	1
Total	6,623,263	104	30

Note. N_h: population size for h[th] stratum; *n_h*: sample size for h[th] stratum.

Measurements

Demographic Scale

The demographic scale comprised of the participants' basic information. These included their age, gender, nationality, race, marital status, mental illness diagnosis, district, pet ownership (owned or did not own a pet), type of pet, and number of years with their pet.

Pet Attitude Scale-Modified (PAS-M)

The PAS-M is an 18-item questionnaire which measures attitude toward pets among pet owners and non-pet owners (Munsell, Canfield, Templer, Tangan, & Arikawa, 2004). It is the modified version of the Pet Attitude Scale (PAS) by Templer et al. (1981). A Likert-type format is used,

with the responses ranging between 1 (Strongly disagree) and 7 (Strongly agree). The items are phrased both positively and negatively. Negatively phrased questions will also be reverse-coded. Total scores range from 18 to 126. Higher scores indicate a more positive attitude toward pets. In this study, the independent variable or IV is attitude toward pets, which is measured using the PAS-M.

A Cronbach's alpha (α) of .92 was reported in Munsell et al.'s (2004) study while α = .90 was found in Jacobson and Chang's (2018) study, suggesting good internal consistency. In another study, good internal consistency (α = .93) and test-retest reliability (α = .92) were reported (Preylo & Arikawa, 2015). In addition, the PAS-M has the advantage of more precise wording, increasing its credibility to individuals, e.g., participants and researchers (Munsell et al., 2004; Templer & Arikawa, 2011).

As the English and Malay versions of the PAS-M have not been validated in Malaysia, a back translation was conducted. An English-to-Malay translation was conducted first, followed by a Malay-to-English translation. Both translations were carried out by two different bilingual professionals (lecturer and clinical psychologist). Then, 17 discrepancies found between both versions, in terms of the translation and wordings, were compared and examined by another academician with a translation background, before being included into the study. The original authors have stated that permission to use the PAS-M was unrequired (Templer & Arikawa, 2011).

Patient Health Questionnaire-9 (PHQ-9)

The PHQ-9 is a nine-item self-report instrument that measures depressive symptoms (Kroenke, Spitzer, & Williams, 2001; Levis, Benedetti, Thombs, & Collaboration, 2019; Ng, 2014; Sherina, B, & Goodyear-Smith, 2012). A Likert-type format is used, with the responses ranging between 0 (Not at all) and 3 (Nearly everyday). Total scores could range from 0 to 27. Higher scores indicate a higher degree of severity of depression. Sherina et al. (2012) recommended a cut-off point of 10 and above for high scores in depression the PHQ-9. For this study, the dependent variable or DV is depression, which is measured using the PHQ-9. Both English and Malay versions of the PHQ-9 were used, as developed by Sherina et al. (2012).

In Malaysia, the PHQ-9 is a commonly used tool due to its conciseness and ability to screen clinical depression and its severity (Kader Maideen et al., 2014; Ng, 2014; Sherina et al., 2012). Good sensitivity (87%) and specificity (82%) were found (Sherina et al., 2012). Also, Sherina et al. (2012) found good internal consistency (α = .70) for and a satisfactory correlation between the PHQ-9 and General Health Questionnaire (GHQ-12) (r = 0.61). Another local study also found a good internal consistency (α = .67) and test-retest reliability (α = .73) (N Azah et al., 2005).

Data Collection

Pilot study

A pilot study was conducted to examine the feasibility of the approach that was intended to be used in the actual (larger scale) study (Leon, Davis, & Kraemer, 2011). Another reason was to test on whether the PAS-M and PHQ-9 were comprehensible and appropriate for the population in Malaysia, and whether the items were defined well, understood clearly, and fit the norms and values in Malaysia (Abu Hassan, Schattner, & Mazza, 2006). A sample size of 30 participants would be sufficient for this pilot study (In, 2017; Wan Mahmud, Awang, & Mohamed, 2004).

Firstly, the participants were required to read the information sheet and fill up the informed consent form. Then, they would proceed in completing the Demographic Information Form, followed by the PAS-M and PHQ-9. The data collection was conducted via paper-and-pencil and online survey. The content of the survey was the same for both methods. In addition, the participants were allowed to choose their preferred language before filling up the survey. The participants did not receive any compensation upon completing the survey. Prior to data collection, permission to conduct this research was granted by the CRERC Ethics Committee for Psychological Research (CRERC reference number: CUCMS/CRERC/ER/223).

Actual study

The procedure of data collection was similar with the pilot study. At least 84 residents in Klang Valley were required for this study. It was derived based on the sample size tables developed in past researches (Bujang & Baharum, 2016; Machin, Campbell, Tan, & Tan, 2018). The input parameters included two-tailed test with r = .30, alpha level of error probability = .05, and power of .80. The effect size was based on past studies (Clark Cline, 2010; Lee & Chai, 2015). This was also predicted to be enough to achieve statistical significance (Pallant, 2016). A margin of 20% was also added onto the sample size, leading to a minimum number of 104 participants.

Data Analysis

Pilot study

The internal consistency, of both the PAS-M and PHQ-9 was assessed using Cronbach's coefficient alpha (α) via the Statistical Package for the Social Sciences (SPSS), version 22.0.0.0 (IBM, 2013). The validity of the PHQ-9 was not checked as it has been assessed in Sherina et al.'s (2012) study. As for the PAS-M, its face validity was examined by an academician with research background.

Actual study

All data were analysed using the SPSS 22.0.0.0 (IBM, 2013), with a two-tailed significant level of $p < 0.05$. Descriptive analysis was carried out to examine the features of the study data (e.g., frequency counts, means, standard deviations, skewness, kurtosis). In order to assess the normality of the data, the Shapiro-Wilk test and visual inspection of the histogram were used.

Similar analysis was also conducted for attitude toward pets. For moderation analysis, PROCESS was used to investigate the interaction between attitude toward pets and pet ownership on depression (Hayes, 2018). Statistical analysis was also carried to investigate the mean difference of depression level between pet owners and non-pet owners.

Results

Pilot Study
Reliability

In the current study, $\alpha = .90$ for the PAS-M, indicating good internal consistency. As for the PHQ-9, $\alpha = .88$, suggesting good internal consistency.

Validity

As mentioned, the face validity of the PAS-M was examined by an academician with research background. Upon examination, it was concluded that the PAS-M appeared to measure what it purported to measure, based on the "face" of it. Hence, this suggested high face validity.

With that being said, the above results suggested that the study protocol was feasible. Therefore, the actual study was conducted.

Actual Study
Participants

A total of 261 responses were collected. Of these 261, 23 were removed from the sample for the following reasons: 14 were not from Klang Valley, eight were diagnosed with a mental disorder, and one was a duplicate response. Hence, only 238 responses were eligible for data analyses. No missing data were reported. The participants' demographics mentioned are shown in Table 2.

Table 2. Demographic Information of the Participants

Demographic variable	Total (n = 238)		Pet owners (n = 173)		Non-pet owners (n = 65)	
	n	*%*	*n*	*%*	*n*	*%*
Source						
Online	208	87.40	163	95.40	43	66.20
Paper-and-pencil	30	12.60	8	4.60	22	33.80
Language						
English	213	89.50	159	91.90	54	83.10

Malay	25	10.50	15	8.10	11	16.90
Age						
Mean (years)	33.45		34.01		31.97	
SD	10.17		10.23		9.94	
Gender						
Male	48	20.20	29	16.80	19	29.20
Female	190	79.80	144	83.20	46	70.80
Nationality						
Malaysian	231	97.10	169	97.10	63	96.90
Non-Malaysian	7	2.90	5	2.90	2	3.10
Race						
Malay	62	26.10	41	23.70	21	32.30
Chinese	133	55.90	95	54.90	38	58.50
Indian	23	9.70	22	12.70	1	1.50
Others	20	8.40	15	8.70	5	1.70
Marital status						
Single	163	68.50	119	68.80	44	67.70
Married	71	29.80	52	30.10	19	29.20
Divorced	2	0.80	2	1.20	0	0
Widowed	2	0.80	0	0	2	3.10
District						
Wilayah Persekutuan Kuala Lumpur	79	33.20	54	31.20	25	38.50
Petaling	98	41.20	74	42.80	24	36.90
Klang	12	5.00	10	5.80	2	3.10
Gombak	15	6.30	11	6.40	4	6.20
Hulu Langat	18	7.60	12	6.90	6	9.20
Sepang	11	4.60	10	5.80	1	1.50
Kuala Langat	5	2.10	2	1.20	3	4.60
Pet ownership						
Pet owner	173	72.70				
Non-pet owner	65	27.30				
Type of pet/s						
Dog			78	45.10		
Cat			62	35.80		
Others			15	8.70		
Dog and cat			11	6.40		
Dog and others			3	1.70		
Cat and others			2	1.20		
Dog, cat, and others			2	1.20		
Duration with pet/s						
Mean (years)			95.17			
SD			82.09			

Note. n = number of participants; *SD* = standard deviation.

The mean scale score for attitude toward pets among the respondents was 102.85 (SD = 16.58). Also, the mean scale score for depression level was 5.73 (SD = 4.89). When the data was split based on pet ownership, the mean scale score for attitude toward pets among pet owners (n = 173) was 108.32 (SD = 12.96) while the mean scale score for depression level was 5.86 (SD = 5.06). As for non-pet owners (n = 65), the mean scale score for attitude toward pets was 88.28 (SD = 16.43) while the mean scale score for depression level was 5.37 (SD = 4.45).

The moderating role of pet ownership

From PROCESS analysis, a significant interaction effect was found between attitude toward pets and pet ownership, b = -.093, p = .049. This implies that the strength of the relationship between attitude toward pets and depression level depends on pet ownership.

With that, slopes for the relationship at each level of pet ownership (e.g., owns a pet, does not own a pet) were further examined. The results suggested that pet owners evidenced a non-significant slope, b = -.037, p = .19. When one owns a pet, higher attitude toward pets is non-significantly correlated to lower depression level. Besides that, non-pet owners also manifested a non-significant slope, b = .055, p = .14. When one does not own a pet, higher attitude toward pets is non-significantly correlated to higher depression level. Overall, the conditional effects of both conditions (e.g., owns a pet, does not own a pet) yield non-significant relationships respectively.

Additional analyses

The Shapiro-Wilk test showed a significant departure from normality (p < .001), indicating a violation of the assumption of normality. Visual inspection of the histogram suggested such violation too, in which the PHQ-9 scores were positively skewed. Hence, the data were not normally distributed in the target population. However, it has been justified that the score distribution was consistent with past literature, implying the unnecessity of data transformation prior to the relevant tests (Pallant, 2016; Tabachnick & Fidell, 2013; Tomitaka et al., 2018). Further, parametric tests could still be conducted as some analyses (e.g., ANOVAs, OLS regression) are robust against the violation (Tabachnick & Fidell, 2019).

The relationship between attitude toward pets and depression among the total participants was investigated using Pearson correlation coefficient (IBM Corp., 2013; Pallant, 2013). There was non-significant relationship between attitude toward pets and depression, r = .018, n = 238, p = .79, two-tailed. Similarly, no significant relationship was observed among pet owners, (r = -.096, n = 173, p = .21) and non-pet owners (r = .21, n = 173, p = .10).

An independent t-test revealed a significant difference between pet owners (M = 108.32, n = 173) and non-pet owners (M = 88.28, n = 65),

t(236) = -9.85, *p* < .001). In other words, pet owners have significantly higher attitude toward pets than non-pet owners. Additionally, a significant difference between online data collection method (*M* = 104.69, *n* = 208) and paper-and-pencil method (*M* = 90.07, *n* = 30), t(236) = 4.71, *p* < .001), implying that those who completed online have significantly higher attitude toward pets than the latter.

Discussion
Attitude Toward Pets, Pet Ownership, And Depression

The main aim of the present study was to investigate the moderating effect of pet ownership in the relationship between attitude toward pets and depression among residents in Klang Valley, Malaysia. The main findings were as followed:

1. Pet ownership was found as a moderating role in the relationship between attitude toward pets and depression among Klang Valley residents. In other words, pet ownership affects the strength of the relationship between attitude toward pets and depression level.

2. Non-significant relationship was observed between attitude toward pets and depression among the total participants.

3. There was non-significant relationship between attitude toward pets and depression among pet owners.

4. There was non-significant relationship between attitude toward pets and depression among non-pet owners.

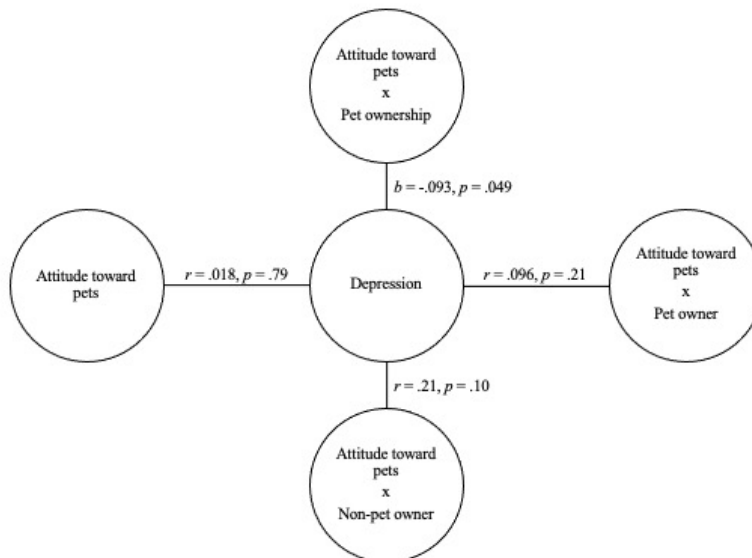The main findings are also illustrated in Figure 1.

Figure 1. Main findings from the present study.

The results have highlighted that pet ownership may seem to play a role in facilitating mental health (e.g., alleviating depression) under the circumstance of involving attitude toward pets. However, when examined further, the relationship is not significant under the condition of being a pet owner and also a non-pet owner.

The initial significant moderation results are supported with previous findings, whereby having pets may improve mental health among humans (Antonacopoulos & Pychyl, 2015; Islam & Towell, 2013; Jacobson & Chang, 2018; Krause-Parello, 2012; Matchock, 2015; Resnick & McCune, 2019). As addressed earlier, loneliness is related to lack of human social support and depression (Krause-Parello et al., 2012; Resnick & McCune, 2019; Siegel, 2011; Stanley et al., 2014). With pets however, these issues could be alleviated. In addition, researchers have also discovered that pet ownership is significantly associated with higher attitude toward animals (Martens et al., 2019). Therefore, with the interaction between the two variables, these could justify the present findings, in which pet ownership could moderate or affect the strength of the relationship between attitude toward pets and depression.

Although a significant moderation effect is originally observed, the correlation between attitude toward pets and depression is later non-significant, regardless of owning or not owning a pet. A reason could be the emergence of the coronavirus disease 2019 (COVID-19) pandemic (Koh et al., 2020; Tull et al., 2020; Yin, Gao, Zhu, & Li, 2020) and its possible impact onto the participants' responses in the PAS-M and PHQ-9, which measure attitude toward pets and depression level respectively (Munsell et al., 2004; Sherina et al., 2012).

The pandemic has led to a wide implementation of unexpected interventions (e.g., stay-at-home orders, social distancing) to curb the spread of the virus (Koh et al., 2020; Tull et al., 2020; Yin et al., 2020). At one point during the pandemic period, the risk of companion animal-to-human transmission was a major concern among the public (Yin et al., 2020) . Therefore, a number of pet owners self-isolated with their pets under the same roof (Bowen, Garcia, Darder, Arguelles, & Fatjo, 2020; Yin et al., 2020). Researchers found that when this human-animal multispecies cohabitation occurred, it could raise emotional and behavioural struggles among both pet owners and pets (Bowen et al., 2020) . For example, Bowen et al. (2020) found that among dogs, making annoying or excessive vocalisation (24.7%) was the most common behavioural issues, followed by fear of loud or sudden noises (16.9%). These led to pet owners experiencing increase in emotional issues (e.g., stress).

In addition, the pandemic seemed to negatively alter the public's view toward animals, whereby animals could carry and transmit the virus to humans. Researchers also observed increased cases of animals being abandoned, returned to shelters, or bring killed (Parry, 2020). During data collection in the present study, at least half of the responses were obtained during the pandemic. With that being said, the pandemic could change how

the participants viewed animals (Bowen et al., 2020; Parry, 2020) and hence, possibly influencing their responses in the PAS-M, and later the relationship between attitude toward pets and depression.

Another thing that should be highlighted is that in the present study, 72.69% of the participants are pet owners. In addition, these pet owners would either have dogs, cats, others, or a mixture of the pet types. With that being said, there could be differences in animal orientations among the participants. According to Blouin (2013), human-animal relationship is better understood via three distinct cultural types or orientations, namely humanistic, protectionistic, and dominionistic orientations. In relation with attitude toward pets, humanistic individuals generally place concern for their own pet/s and partially toward other animals. It is commonly viewed that pet owners would opt for the humanistic orientation, considering that they generally see their pets as a cherished pet and/or child (which might explain on pet owners' attitude toward pets being significantly higher than non-pet owners' attitude) (Blouin, 2015; Fine, 2015). However, there are other pet owners who might adopt protectionistic or dominionistic orientation too (Blouin, 2015) . For example, protectionistic individuals would perceive that if they invest more time and money on animals, they could lack time for other things and encounter financial strains respectively (Blouin, 2015; Siegel, 2011). Hence, when animal orientations differed, this could influence the participants' responses in the PAS-M.

Despite the above, it should be noted that online data collection group displayed significantly higher PAS-M results than paper-and-pencil method group, indicating that the former may have built a perception that pets could benefit their well-being during isolation (e.g., reduce loneliness) (Grajfoner, Ke, & Wong, 2021; Islam & Towell, 2013). With a sudden transition due to COVID-19, adverse outcomes were seen, including increased isolation and depression level among humans (Koh et al., 2020; Shanmugam, Juhari, Nair, Chow, & Ng, 2020; Tull et al., 2020). During data collection, at least half of the responses were obtained during the COVID-19 lockdown, which explained most of them participating the study online. Hence, higher ratings about pets may then be gathered from there.

Strengths

To the present authors' knowledge, this is the first study which examined the moderating effects of pet ownership on the relationship between attitude toward pets and depression among Klang Valley residents. Therefore, this could provide a fresh insight on human-animal interaction (HAI) and depression within this population.

Besides that, the validated Malay version of the PHQ-9 facilitated the measurement and detection of depression among the participants (Sherina et al., 2012). As the Malay language is Malaysia's national language, this allowed more opportunity and comfort to those who preferred responding in this medium (Kader Maideen et al., 2014; Thirusanku & Yunus, 2014).

Another strength would be the methodology applied for this study. As survey method (via paper-and-pencil and electronic methods) was used, it allowed information gathering from a larger cohort, leading to greater statistical power (Jones, Baxter, & Khanduja, 2013; Looi, 2014).

Limitations

A study limitation would be the sampling outcome. Although proportionate stratified random sampling method was targeted, the expected outcome was unreached. This was whereby the number of participants from all seven strata were disproportionate with their respective district population size. With that, the sample for the current study was not representative of the population of Klang Valley, affecting the generalisability of the results. This could be due to the COVID-19 outbreak, which impaired data collection, especially via paper-and-pencil method. As for difference in numbers between races (e.g., lesser number of Malay respondents), a possible reason could be their perception of mental health (Hanafiah & Van Bortel, 2015; Hassan, Abdul Majeed, Mohd Tajuddin, Abdullah, & Ahmad, 2022). In the Malay culture, mental health generally revolves the spiritual and religious factors, whereby the Malays have the tendency to relate mental illness with insanity or illness of the soul. In addition, they may believe that mental illness (e.g., depression) would stem from spirit possession or as a social punishment (Hassan et al., 2022). Thus, this could explain on the low response rate among this ethnic group.

Next, as self-reporting was applied, this could incur recall and self-reporting bias. However, prior and while responding to the questionnaire, the participants were informed to answer as honestly as possible and that all responses will remain private and confidential.

Lastly, as this is a cross-sectional study, this could limit the determination of a temporal relationship between the variables (Kader Maideen et al., 2014). In other words, different results might be established should the variables are investigated longitudinally.

Recommendations

Future researchers can consider conducting a validation study of the PAS-M among the population in Malaysia. To the current researcher's knowledge, no studies have yet to examine its validity among the population in Malaysia. Therefore, by examining its scale validity, this ensures researchers that they are measuring the intended latent dimension among the target population (Pallant, 2016) . In other words, researchers could determine the extent to which the PAS-M indeed measures the latent construct it was developed to evaluate (e.g., attitude toward pets).

Next, should a future study be focusing on residents in Klang Valley, researchers should consider recruiting a sample that represents the target population. By doing so, the results could be generalised to Klang Valley residents.

Lastly, future studies should explore HAI and depression in another angle via experimental studies, specifically on animal-assisted intervention (AAI) and its potential contributions in alleviating mental health issues (e.g., depression), as found in past studies (Chandler, 2012; Fine, 2015; Gilbey & Tani, 2015; Loo & Chew, 2015; Muckle & Lasikiewicz, 2017; Nepps, Stewart, & Bruckno, 2014). As these activities would usually involve another person (e.g., trained volunteer, therapist), participants are given an opportunity to interact with both animals and human (Fine, 2015; Gilbey & Tani, 2015). As hoped, previous research found significant improvement in loneliness and depression levels among the participants (Chandler, 2012; Fine, 2015; Gilbey & Tani, 2015; Nepps et al., 2014). With that said, this could suggest the possibility of involving both animals and other humans into an individual's social life and mental health.

Implications

The present study has explored further into the field of psychological research on HAI. Specifically, the present study suggests that more work is needed to understand the relationships between attitude toward pets, pet ownership, and depression among residents in Klang Valley. The present results seem to indicate pet ownership as a moderating role in improving mental health issues (e.g., depression) among humans.

Also, as highlighted earlier, to the researcher's knowledge, no studies were carried out to examine these variables. Further, discrepancies on pet ownership and its effects on mental health were observed from past studies (Antonacopoulos & Pychyl, 2015; Islam & Towell, 2013; Jacobson & Chang, 2018; Matchock, 2015; Siegel, 2011). Therefore, the present study has shed some light on these aspects, especially on depression.

Conclusion

Drawing upon the results of this study, pet ownership could play a role in facilitating mental health (e.g., improving depression), when there is a positive attitude toward pets. Past studies have found similar promising results, in which owning a pet could improve psychological health among humans (Antonacopoulos & Pychyl, 2015; Grajfoner et al., 2021; Islam & Towell, 2013; Jacobson & Chang, 2018; Krause-Parello, 2012; Martens et al., 2019; Matchock, 2015; Resnick & McCune, 2019; Siegel, 2011). Although a non-significant relationship between attitude toward pets and depression is found under the influence of being either a pet owner or non-pet owner, the COVID-19 outbreak and its psychological effects on the participants could affect their responses in the PAS-M and PHQ-9 (Bowen et al., 2020; Grajfoner et al., 2021; Koh et al., 2020; Parry, 2020; Shanmugam et al., 2020). These could then influence the correlation between attitude toward pets and depression and its significance.

The present study has ventured deeper into the field of psychological research on HAI and mental health, specifically attitude toward pets, pet ownership, and depression. Furthermore, to the researcher's knowledge,

this would be the first study to examine these variables altogether. Also, the discrepancies on pet ownership and its effects on mental health, as observed from past studies (Antonacopoulos & Pychyl, 2015; Islam & Towell, 2013; Jacobson & Chang, 2018; Krause-Parello, 2012; Martens et al., 2019; Matchock, 2015; Resnick & McCune, 2019; Siegel, 2011), have been clarified in the current study. Lastly, there is a pressing need to venture further into other areas, including the validation of the PAS-M and implementation of AAI on mental health. Therefore, future studies should consider investigating these aspects for the benefit of improving mental health issues (e.g., depression) in Malaysia.

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Availability of data and material
Data will be made available upon reasonable request.

Conflict of Interest
Kelly Phang, Abdoul Aziz Fall, and Zubaidah Jamil declare that they have no conflict of interest.

Author's contributions
All authors significantly contributed to the research and preparation of manuscript.

Informed Consent
Informed consent was obtained from all participants for being included in the study.

Ethics Approval
Permission to conduct this research was granted by the CRERC Ethics Committee for Psychological Research (CRERC reference number: CUCMS/CRERC/ER/223).

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