

**The association of pet ownership and attachment with perceived stress among
Chinese adults**

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Abstract

Pet ownership is associated with both positive and negative emotions. Given that not everyone responds to pet care in a stressful way, perceptions of pets may play a role in how owners respond to them. In this study, we explored the relationship between pet ownership and perceived stress. We also examined the effect of care practices and perceptions of pets on perceived stress among Chinese pet owners. A total of 288 Hong Kong Chinese, adult pet owners, aged 18 to 70 years, were recruited. Participants were surveyed using a self-administered questionnaire covering demographics, pet ownership background, pet attachment, and perceived stress. Regression analyses were performed to examine pet attachment in different demographic groups and its relationship with perceived stress. Moderation and mediation analyses were performed to elucidate their underlying mechanisms. After adjusting for demographics and pet ownership background, greater attachment to a pet was associated with lower stress in owners. The perception of pets as family members minimized the stressful burden of pet care. More time spent caring for a pet increased attachment to that animal which in turn reduced stress in owners. The findings suggest that the perception of pets as family members and attachment to pets can help manage and reduce stress in owners.

Keywords: pet attachment, perceived stress, pet ownership, pet care, China

Introduction

Stress can affect all aspects of life. Severe or long-term psychological stress can contribute to serious mental health problems such as depression and psychosomatic illnesses (Iwata, Ota, & Duman, 2013). Growing social and economic demands in recent decades further exacerbate psychological stress in affected individuals, especially in highly crowded places such as Hong Kong where a variety of stressors such as overcrowding and high work pressure exist. These stressors may cause health impairments at individual and population levels. While promising treatments and therapies for mental health problems are available, many people, especially Chinese patients, are reluctant to disclose psychological distress or seek treatment for it (Han et al., 2015; Kelly, Liu, Zhang, Hao, & Wang, 2014; S. Lee et al., 2010; Li, Du, Chen, Song, & Zheng, 2013). There is a need for new approaches and complementary medicines for stress reduction, which in turn may minimize an individual's risk of developing mental health problems.

Having pets/companion animals may help people manage and reduce stress in humans (McNicholas et al., 2005; Rhoades, Winetrobe, & Rice, 2015). These animals may act as attachment figures (Sable, 2013). Pet attachment refers to the level of intimacy and bonding between owners and their animals. Attachment theory, which

posits that under stress humans seek attachment for comfort and safety (Bowlby, 2005), provides a framework to explore the benefits of pet attachment. Evidence shows that the amount of time spent on pet care is positively related to the strength of the human-pet bond (Wood, Giles-Corti, & Bulsara, 2005), and pet ownership is sometimes associated with enhancement of positive emotions such as happiness and self-esteem (Crawford, Worsham, & Swinehart, 2006) and a reduction of negative emotions such as stress, loneliness and depression (Hart & Yamamoto, 2015; Rew, 2000).

Pet attachment behaviors can be classified into three categories: physical proximity, emotional bond, and caretaking behaviors (Poresky, Hendrix, Mosier, & Samuelson, 1987). These behaviors can lead to a reduction in stress through various mechanisms. It has been reported that keeping pets can buffer against stress by lowering levels of stress hormones (Odendaal, 2000) and also through regulation of the hypothalamic-pituitary-adrenal system (Bao, Meynen, & Swaab, 2008). Moreover, pet may buffer against the effects of social isolation (Raina, Waltner-Toews, Bonnett, Woodward, & Abernathy, 1999) by providing a safe haven and a secure base for their owners in times of distress (Zilcha-Mano, Mikulincer, & Shaver, 2012). However, the benefits/effects of pet ownership benefits depend on gender and animal type. Previous studies show that men report lower attachment to pets than women (Winefield, Black,

& Chur-Hansen, 2008). Owners were found to be more attached to their dogs than other pet types, such as cats (C. Westgarth et al., 2010; Winefield et al., 2008).

Previous research mainly focuses on the association of general pet attachment and mental health conditions among pet owners. The effects of individual domains of pet attachment (physical proximity, emotional bond, and caretaking) on the Chinese population have not been studied. Pet ownership was banned in China before 1992 (Headey, Na, & Zheng, 2008), but in recent decades, the number of pet owners, especially dog owners, has increased rapidly in some cities including Hong Kong. Since Chinese people are more collectivistic than Western population (Su, Koda, & Martens, 2018), and they may benefit more from pet attachment and the perception of animals as important family members. Moreover, Hong Kong provides a good setting to conduct stress-related research because of its fast-paced lifestyles and competitive education and work systems. In this highly stressful environment, whether caring for a pet increases or decreases stress warrants investigation. There is also limited knowledge about the associations of owners' perceived roles of pets, amount of time spent with pets, and perceived stress levels. This study therefore aimed to examine the association of perceived stress with overall and individual domains of pet attachment. It also examined the effect of pet care time on owners' stress levels. The moderating effect of

the perceived role of a pet and the mediating effect of pet attachment on the relationship between pet care time and perceived stress were also explored. We hypothesized that the time spent on pet care would be positively associated with level of pet attachment, which in turn would be associated with lower levels of perceived stress among owners. And the relationship between pet care time and perceived stress level would be moderated by the perceived role of the animal.

Methods

Participants and Procedure

This study surveyed 288 Hong Kong Chinese adults who were aged 18 to 70 years, owned a pet, and had the ability to speak and read Chinese. Eligible participants were approached in public parks and recruited by nine final-year nursing students from the Hong Kong Polytechnic University as part of their final-year project. After providing informed consent, participants were asked to complete an anonymous paper-based questionnaire regarding basic demographics, pet ownership history, attachment to their most important pet, and perceived stress levels. A list of free mental health service was provided to participants for future health consultations. Confidentiality and anonymity of all data collected were assured throughout the study.

Ethical approval

The study was approved by the Human Subjects Ethics Sub-committee (HSESC) at the Hong Kong Polytechnic University. (HSEARS20150905002)

Measures

All participants completed a demographic questionnaire which was developed for this study to obtain information about gender, age, and housing type. A pet ownership history questionnaire was also administered to obtain information on pet type (dogs, cats, or other pets), duration of keeping the most important pet, perceived role of the pet (family member, friend, working partner, toy, or unknown or other), and time spent on pet care (0-15, 16-30, 31-60, 61-120, 121-180, or >180 minutes). The Chinese versions of the Companion Animal Bonding Scale (CABS) and the Perceived Stress Scale (PSS) were also administered.

Companion Animal Bonding Scale (CABS)

The Companion Animal Bonding Scale (CABS) (Poresky et al., 1987) was used to assess the extent to which owners were attached to their pets. It consists of eight items relating to the respondent's bonding behaviors with their pets, and each item is scored on a 5-point Likert scale, ranging from (1) never to (5) always. The items are

categorized into three subscales: Emotional Bond (e.g., “*I had a close relationship with my pet.*”), Physical Proximity (e.g., “*My pet sleeps in my room.*”), and Caretaking (e.g., “*I clean my pet.*”) (Triebenbacher, 1999). The scale was translated into Chinese through forward and backward translations of the English version by two bilingual research assistants working independently. The translated scale was administered on a few Chinese pet owners before the main study to ensure the comprehensibility and applicability for use in the local Hong Kong population. The reliabilities of the overall scale and subscales for this study were $\alpha(s) = 0.87$ for overall scale, 0.80 for Emotional Bond, 0.87 for Physical Proximity, and 0.86 for Caretaking.

Perceived Stress Scale (PSS)

The Perceived Stress Scale (PSS) (Roberti, Harrington, & Storch, 2006) was used to measure the extent to which the respondent perceived situations in their life within the past month as stressful. It has 10 items (e.g., *in the last month, how often have you felt nervous and “stressed”/ that things were going your way/ you were on top of things?*), with responses on 5-point Likert scales. Higher scores indicate higher levels of perceived stress. The Chinese version of the scale has demonstrated good validity and reliability in previous research (E. H. Lee, 2012; Wang et al., 2011). Its reliability for this study was $\alpha = 0.85$.

Statistical analysis

Descriptive statistics were calculated to describe the characteristics of the participants. Bivariate analyses were conducted to estimate the coefficients and significance of Spearman correlations among demographics, pet attachment, and perceived stress. Significant correlates pertaining to pet ownership and demographics were considered as covariates in subsequent analyses. Multiple linear regression analyses were conducted to explore the unadjusted and adjusted relationship between perceived stress level and pet attachment, and to identify subject-level factors associated with pet attachment.

To test the moderating effect of the perceived role of the pet (i.e. perceived as family member vs as non-family member) on the association between amount of time spent caring for pet daily (i.e. >1 hour of pet care per day vs. ≤1 hour of pet care per day) and perceived stress, we employed an analysis of moderation (Baron & Kenny, 1986). To investigate moderation by perceived role of pet, we introduced an interaction term expressing the multiplication of the perceived role of pet variable by the daily caring time variable. Evidence of moderation is expressed by the significance of the interaction term. To test the hypothesis regarding pet attachment as a mediator of the

relationship between daily caring time and perceived stress, a mediation analysis was conducted using the PROCESS macro for SPSS (Hayes, 2012; Preacher & Hayes, 2008). The 95% bias corrected confidence interval (CI) of the indirect effect was derived from the 5,000 bootstrapping resamples. Significant indirect effect was denoted by its CI above or below zero.

Results

Participants' characteristics and pet attachment

Among the 288 participants, 112 (38.9%) were males and 176 (61.1%) were females. More than half (54.9%) of the participants were in the age group of 18 to 30 years old. Nearly half (n=136) lived in private housing. Regarding types of pets, 170 (59%) owned dogs, 62 (21.5%) owned cats, and the rest owned other unspecified types of pets. 179 (62.2%) regarded pets as their family members. The amount of time spent on pet care each day ranged from less than 15 minutes to more than 180 minutes. The mean time the most important pet was owned was 73.37 months.

Multiple linear regression was conducted to explore the relationships between pet attachment and variables related to pet ownership and demographics. The results are presented in Table 1. After adjusting for covariates, pet attachment was found to

be associated with dog ownership ($B=2.13$, $p=0.001$), pet perceived as a family member ($B=3.11$, $p<0.001$), daily care time ($B=2.46$, $p<0.001$), and duration of the ownership ($B=0.03$, $p=0.003$).

Association between pet attachment and perceived stress

The coefficients and significance of the correlations between perceived stress, attachment to a pet, and demographics are presented in Table 2. Results showed that the correlation between PSS scores and CABS - Overall scores was negative and significant ($r=-0.16$, $p<0.01$). In terms of the CABS subscales, PSS scores were correlated with the scores on CABS-Emotional Bond ($r=-0.17$, $p<0.01$) and CABS-Caretaking ($r=-0.23$, $p<0.01$) but not with CABS-Physical Proximity ($r=-0.05$, $p>0.05$). Because of significant correlations with gender, age, type of housing, type of pet, daily care time, duration of the ownership, and role of pet, these variables were considered as covariates in subsequent regression analyses.

Table 3 displays the results of unadjusted and adjusted associations between pet attachment and perceived stress. After adjusting for covariates, PSS scores were significantly associated with the scores on CABS-Overall ($\beta=-0.18$, $p=0.026$), CABS-Emotional Bond ($\beta=-0.17$, $p=0.045$), and CABS-Caretaking ($\beta=-0.18$, $p=0.006$).

Moderation: perceived role of pet, daily care time, and perceived stress

Next, we tested the main and interaction effect of daily care time and perceived role of pet on perceived stress. Results showed that perceived stress was positively associated with daily care time ($B=-4.13$, $p=0.003$) but not with perceived role of pet ($B=-0.93$, $p=0.356$). Daily care time and perceived role of pet interacted significantly to predict perceived stress ($B=3.38$, $p=0.040$). Separate t-test comparisons demonstrated that for the group of owners who did not perceive pets as family members, lower perceived stress scores were reported by those who spent more time caring for a pet than those who did not ($M=23.70$, $SD=6.11$ vs. $M=27.84$, $SD=4.77$, Cohen's $d=0.76$, $p=0.001$). By contrast, for the group of owners who perceived pets as family members, owners who spent above or below or equal to one hour on pet care each day did not differ with respect to their perceived stress level ($M=26.16$, $SD=6.72$ vs. $M=26.91$, $SD=5.88$, Cohen's $d=0.12$, $p=0.436$).

Mediation: daily care time, pet attachment, and perceived stress

To find out why more time on pet care contributed to lower levels of perceived stress among people who did not perceive pets as family members, we conducted a mediation analysis to explore the potential pathway linking daily care time to

perceived stress among these owners. We found that the two daily care time groups differed by age ($r=0.21$, $p>0.05$), and thus age was included as covariate in the mediation analysis. Daily care time was negatively associated with perceived stress ($B=-4.02$, $p<0.001$). The direct effect of pet care time on perceived stress, after adjusting for pet attachment, was not significant. The indirect effect (i.e., the effect of pet care time on perceived stress through pet attachment) was significant with the bias corrected 95% CI not including zero, suggesting that greater attachment to a pet, as a result of longer care time, reduced the owner's stress level. Pet attachment accounted for 38.9% of the relationship between daily care time and perceived stress.

Discussion

This study examined the relationship between pet ownership and perceived stress among Chinese owners. We found that dog owners were more attached to their dogs than other pet owners to their pets, and attachment was stronger when the animal was considered as a family member. A previous study of Japanese owners also found that dog owners reported a higher level of attachment to their dogs than cat owners to their cats. Our study also demonstrated that longer duration of ownership and more time spent on pet care both led to greater attachment to the animal. These findings are consistent with previous research showing that dogs are the most common pet in most

countries (Martens, Enders-Slegers, & Walker, 2016; Carri Westgarth et al., 2013) and more owner-pet interactions can strengthen the bonding with each other (Wood et al., 2005).

Consistent with previous studies, we found that higher levels of overall pet attachment are associated with lower level of perceived stress among pet owners. Existing literature predominantly emphasizes the benefit of pet ownership to vulnerable populations such as hospitalized patients, older or mentally ill people (Cherniack & Cherniack, 2014; Stanley, Conwell, Bowen, & Van Orden, 2014). Our findings add to the literature by demonstrating the effect of pet ownership on stress, which is a recognized cause of mental health problems in the general population. We also analyzed the relationships between individual domains of pet attachment and stress perception. We found that perceived stress was significantly associated with emotional bond and caretaking but not physical proximity. Such differences could be because both emotional bond and caretaking refer to the expression of affection and support, whereas physical proximity is primarily related to sleeping arrangement between owners and pets (Triebenbacher, 1999). Although sleeping with pets in beds can increase closeness, it may reduce the sleep quality of owners (Smith, Thompson, Clarkson, & Dawson, 2014; Thompson & Smith, 2014) and also may not be as

beneficial as affection and support to stress reduction, thereby limiting the influences of physical proximity on the owner's stress levels.

Another new finding is that the relationship between daily care time and perceived stress was moderated by perceived role of pet. When owners considered their pets as family members, their perceived stress level was not influenced by daily care time. However, when owners considered their pets as non-family members, the level of perceived stress was lower in those who spent more time on pet care per day. The findings suggest that pet care itself may not cause stress in owners, especially when the owner perceives the pet as his/her family members. According to attachment theory, interacting with attachment figures can relieve stress (Bowlby, 2005). This may explain the protective effect of a pet, when perceived as a family member, in reducing stress among owners.

In line with previous findings, pet attachment was found to play a role in the relationship between daily care time and perceived stress. More time spent on pet care did not directly influence perceived stress levels, but it could reduce stress through greater attachment to pet. Previous studies show that more interactions between humans and pets can reduce levels of stress hormones (Odendaal, 2000) on one hand

and increase happiness hormones such as oxytocin (Ishak, Kahloon, & Fakhry, 2011; Kumsta & Heinrichs, 2013) on the other hand. The owner-pet interactions during pet care, such as eye contact and touching, can increase physical and emotional proximity which are the core elements of attachment (Zilcha-Mano, Mikulincer, & Shaver, 2011). When owners are increasingly attached to their pets, pets can become an important source of comfort and support (Zilcha-Mano et al., 2012) which also can buffer against stress. However, pet attachment explained only 38.9% of the relationship between daily care time and perceived stress, suggesting that other factors play a role in the relationship. Further studies are needed to elucidate the mechanism linking daily care time to perceived stress among pet owners. Moreover, human research shows that caregivers of individuals with disorders or disabilities report significantly greater stress than caregivers of healthy individuals (Adelman, Tmanova, Delgado, Dion, & Lachs, 2014; Cousino & Hazen, 2013). This may also be true for animals. However, we did not ask pet owners whether their animals had any illnesses or physical disabilities. Future research should explore the role and influences of pet illness on the health and well-being of pet owners.

Study limitations

This study has several limitations. Firstly, although we found significant mediation results, this study was based on cross-sectional data and hence we cannot infer any causal relationships between variables. Longitudinal studies are needed to confirm the direction of these relationships. Secondly, we did not collect information about pet owners' income and education, their pets' medical history, and the number of pets currently owned, which could have confounding effects on the associations under investigation. Moreover, the perceived stress and pet attachment levels were self-reported by the owners, which may involve bias and thus may mask the true effect of pet ownership on the perceived stress levels of pet owners. Lastly, this study used a rather small convenience sample, which limits the generalizability of the findings to other populations.

Conclusions

This study examined the effect of pet ownership on the perceived stress levels of Chinese pet owners. We found that dog owners were more attached to their dogs than other pet owners to their pets. When owners perceived their pets as family members, daily time on pet care did not affect the owners' stress level. When owners did not perceive pets as family members, more time on pet care led to greater attachment to pets which in turn reduced stress in the owners. Our findings highlight the potential

benefits of pet ownership for stress reduction. Interventions that foster human-animal interaction and bonding may help manage and reduce stress levels. Future research should explore the experiences and needs of owners when caring for a pet that has been ill for a period.

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Conflict of Interest

The authors state there are no conflicts of interest.

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Table 1. Analysis of factors associated with overall attachment to pet (n=288)

	B (95% CI)	β	p value
Dog (vs Others)	2.13 (0.84, 3.42)	0.16	0.001
Males (vs Females)	-0.56 (-1.81, 0.70)	-0.04	0.383
Private housing (vs Others)	0.51 (-0.74, 1.75)	0.04	0.421
Pet as family members (vs Others)	3.11 (1.72, 4.50)	0.22	<0.001
Age	-0.41 (-0.93, 0.12)	-0.07	0.128
Caring Time (Daily)	2.46 (2.07, 2.86)	0.59	<0.001
Duration of keeping current pet	0.02 (0.01, 0.03)	0.14	0.003

CI: Confidence interval; B: unstandardized regression coefficient; β : standardized regression coefficient.

Note: Statistical significance was determined at p-value < 0.05.

1

2 Table 2. Intercorrelations between pet owners' perceived stress, attachment to pet and demographic variables (n=288)

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	1	2	3	4	5	6	7	8	9	10	11	12
1 Gender	-	- 0.147*	0.064	0.003	0.139*	-0.126*	0.057	0.175**	0.122*	0.129*	0.200**	0.060
2 Age		-	0.188**	-0.137*	0.140*	-0.017	0.178**	0.068	-0.272**	-0.010	0.038	0.204**
3 Types of Housing			-	-0.212**	0.090	-0.153**	0.140*	0.137*	-0.053	0.096	0.162**	0.091
4 Types of Pets				-	-0.394**	0.424**	-0.153**	-0.424**	0.017	-0.438**	-0.440**	-0.096
5 Caring Time (Daily)					-	-0.420**	0.052	0.645**	-0.203**	0.501**	0.627**	0.446**
6 Role of Pets						-	-0.180**	-0.528**	0.002	-0.438**	-0.525**	-0.281**
7 Duration of keeping current pet							-	0.168**	-0.024	0.188**	0.143*	0.087
8 CABS - Overall								-	-0.162**	0.868**	0.902**	0.685**
9 PSS									-	-0.045	-0.169**	-0.231**
10 CABS – Physical Proximity										-	0.695**	0.386**
11 CABS – Emotional Bond											-	0.504**
12 CABS - Caretaking												-

PSS: Perceived Stress Scale; CABS: Companion Animal Bond Scale.

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

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Table 3 Association between pet attachment and perceived stress (n=288)

	Unadjusted B (95% CI)	Unadjusted β	p value	Adjusted B (95% CI)^a	Adjusted β^a	p value
CABS - Overall	-0.13 (-0.23, -0.03)	-0.15	0.01	-0.16 (-0.30, -0.02)	-0.18	0.026
CABS – Emotional Bond	-0.22 (-0.43, -0.01)	-0.12	0.04	-0.31 (-0.61, -0.01)	-0.17	0.045
CABS – Physical Proximity	-0.09 (-0.35, 0.17)	-0.04	0.50	-0.08 (-0.38, 0.23)	-0.04	0.609
CABS - Caretaking	-0.71 (-1.05, -0.37)	-0.24	<0.001	-0.53 (-0.91, -0.16)	-0.18	0.006

CI: Confidence interval; B: unstandardized regression coefficient; β : standardized regression coefficient.

Note: Statistical significance was determined at p-value < 0.05.

^a Adjusted for gender, age, housing type, pet type, duration of keeping current pet, role of pet, and caring time