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Cover Page Footnote

We would like to posthumously acknowledge Dr. Duck-Hee Kang who contributed to the conceptual design of this study and the writing of the manuscript. Sharvari Kamat, MS analyzed the bioassays. We are grateful to the Meals on Wheels Society of America for their participation. Funding for this study was supported by the University of Texas Health Science Center School of Nursing's Dean Research Award funds.

Research Article

Depression, loneliness, and pet attachment in homebound older adult cat and dog owners

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Abstract

Background: Companion animals may reduce depression and loneliness in socially isolated homebound older adults. However, whether owning a cat or dog is more beneficial in this population remains unknown.

Materials and Methods: Pet attachment and the levels of depressive symptoms and loneliness were examined in 39 homebound older adults who exclusively owned a cat(s) or a dog(s). Cat owners (n = 12) and dog owners (n=27) were assessed for depressive symptoms (Geriatric Depression Scale-Short Form), loneliness (R-UCLA Loneliness Scale), and attachment to pets (Likert scale).

Results: Cat owners reported significantly lower levels of depressive symptoms than dog owners ($t= 2.12$; $p = 0.04$). There were no significant differences between cat owners and dog owners in regards to levels of loneliness ($t = -0.83$; $p = 0.41$). Both cat owners and dog owners reported a high level of attachment to pets (Median=10 of 10).

Conclusions: Although this study provides preliminary evidence that owning a cat to which one is attached is associated with lower levels of depressive symptoms than owning a dog to which one is attached in homebound older adults, the findings should be replicated with longitudinal studies. Findings from such studies may assist homebound older adults in selecting either a cat or dog as a companion pet.

Keywords: older adults, cat, depression, dog, loneliness, pet attachment



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Introduction

Multiple mental and physical comorbid health conditions prevent homebound older adults from leaving their homes (1). As such, homebound older adults are socially isolated and at significant risk for loneliness and depression (1, 2). While existing interventions promote social integration and activities outside the home for older adults, most homebound older adults are functionally disabled, which limits their opportunity to participate in activities outside the home. Although human social support and companionship for socially isolated older adults may be limited, companion pets may reduce depression and loneliness by providing nonhuman social support (3) and companionship (4) that satisfies social needs (5). However, whether owning a cat or dog is associated with less loneliness and depression in this population remains unknown.

- *Depression and Pets*

Depression is a serious mental illness associated with physical and functional disability (6), increased mortality (7) and formalized care placement (8). Major depressive disorder is characterized by depressed mood (feeling sad or empty), diminished interest or pleasure, weight loss, sleep dysregulation, changes in appetite or weight, psychomotor agitation or retardation, fatigue, feelings of worthlessness or inappropriate guilt, problems with concentration and/or thoughts of death (9). Chronic medical conditions, multiple losses, functional decline, and social isolation render homebound older adults at risk for depression (10). As such, approximately 13%-29% of homebound older adults are diagnosed with depression (11, 12).

In a meta-analysis that included five studies, four of which included dogs only, Souter and Miller concluded that animal-assisted interventions were significantly associated with reduced depressive symptoms with a

moderate level of effect (13). In a separate study, researchers investigated the effects of cats on depression and showed that the presence of a cat, as well as interacting with a cat, reduced negative moods of depression in a non-clinical, presumably healthy population of adult cat owners but did not increase “good moods” (14, 15, 16). To our knowledge, no studies have compared homebound older adult cat owners and dog owners in regards to depression, and studies among older community-dwelling cat and dog owners have reported mixed results.

In a secondary analysis of a study that examined 159 community-dwelling older women in the United States who were attached to their pets (17), dog owners had significantly higher levels of depressed mood than cat owners (18). Conversely, Enmarker, Helzén, Ekker, and Berg investigated 12,093 rural-dwelling older adult pet owners (men and women) in Norway who participated in a population survey and found that cat owners reported higher mean values of depression symptoms than dog owners (19). In the Norway study, older men who owned cats reported less depressive symptoms than older women who owned cats, but this same relationship was not found among dog owners. Differences in study populations and study variables make the U.S. and Norway studies difficult to compare. The U.S. study included women with moderate to high levels of pet attachment, whereas the Norway study examined both genders and did not examine the impact of pet attachment on depression outcomes. Disparate findings between the two studies may suggest gender-specific differences in depression outcomes among pet owners, more specifically among cat owners. What remains to be established is whether cat ownership or dog ownership is associated with less depression in older adults who are functionally disabled and unable to leave

their homes and whether depression outcomes vary by gender in this population.

- *Loneliness and Pets*

Loneliness is characterized as an aversive emotional state related to the perception of unfulfilled intimate and social needs (20) that may emerge from a lack of intimacy or companionship (21). Negative implications of loneliness are extensive and are associated with increased functional decline (22), an increased number of physician visits (23), an increased likelihood of formalized care placement (24), and a greater risk for all-cause mortality (25). Owing to social isolation and fewer emotional connections, homebound older adults are at risk for loneliness (26, 27).

Peplau and Perlman suggested surrogate relationships with pets may help older adults cope with loneliness (20). Researchers investigating older adult primary care patients found that pet owners reported less loneliness than non-pet owners, and those living alone without a pet had the greatest odds of reporting loneliness (28). Gulick and Krause-Parello compared levels of loneliness among older women who primarily resided in senior living community settings or attended senior community activities and found no statistically significant differences in levels of loneliness between cat owners and dog owners (18). However, whether owning a cat or dog is associated with less loneliness in socially isolated homebound older adults has not been explored.

- *Attachment to Pets*

Companion pets provide compassion, pleasure, and affection and respond with unconditional love (29). People who are attached to their pets often consider their pets significant family members (30). Affectional bonds with pets are emotionally significant relationships because pets are nonjudgmental members of social networks that provide owners with feelings of being cared for, beliefs that one is loved and valued, and the sense of belonging to a reciprocal network (31, 32).

Although few studies have measured the impact of pet attachment on loneliness and depression, Krause-Parello found that the level of loneliness and the degree of attachment to dogs and cats were significantly and positively related in older women (17). The author concluded that as loneliness increased for older women, pet attachment also increased. In a secondary analysis of the same study, pet attachment support mediated the effects between loneliness and depressed mood. The author concluded that support from a pet assisted older community-dwelling women in coping with loneliness and depressed mood (33). Thus, existing evidence suggests the importance of evaluating pet attachment when examining loneliness and depression in pet owners.

Materials and Methods

The aim of the current cross-sectional study was to compare differences in the levels of depressive symptoms and loneliness and pet attachment between homebound older adults who owned a cat(s) or dog(s).

- *Study Design*

The current study was part of a larger cross-sectional study ($N=88$) that compared homebound older adult pet owners and non-pet owners (34). Because the purpose of the current study was to determine whether a cat or dog was more beneficial in terms of loneliness and depression, the analysis of the current study included participants who exclusively owned a dog(s) or cat(s) but no other pets. Thirty-nine homebound older adult cat owners ($n=12$) and dog owners ($n=27$) were compared according to their levels of pet attachment, depressive symptoms, and loneliness using self-report questionnaires. Prior to data collection, the study was approved by the university's Committee for the Protection of Human Subjects and granted exemption by the university's Animal Welfare Committee.

- *Sample and Setting*

Homebound older adults who were enrolled in the Meals on Wheels (MOW) Senior Nutrition Plan in a rural county in the Southern United States were recruited for voluntary participation in the parent study. MOW recipients must be at least 60 years old and have a functional disability that prevents them from leaving the home (35). The inclusion and exclusion criteria for the parent study were previously reported (34). Briefly, the participants were MOW recipients who were able to complete instruments in English, did not have a neurodegenerative disease, and were not taking hormones or corticosteroids.

- *Instruments*

Depressive symptoms were measured using the GDS Short Form, a 15-item instrument designed to screen for depressive symptoms (e.g., somatic complaints, cognitive complaints, motivation, future/past orientation, self-image, loss, agitation, obsessive traits, and mood) in older adults (36). The GDS Short Form has been used extensively in healthy and cognitively impaired community-dwelling older adults. Scores range from 0 to 15, and higher scores indicate more depressive symptoms (36, 37). GDS Short Form scores greater than 5 indicate an optimal cutoff for the detection of major depression, with a sensitivity of 71.8% and specificity of 78.2% in older adults receiving home health care when compared with the gold standard assessment with the Structured Clinical Interview for the *Diagnostic and Statistical Manual of Mental Disorders-IV* (38). The GDS Short Form is a reliable instrument, as demonstrated by a Cronbach's alpha of .81 in the current study.

Loneliness was measured with the R-UCLA, a commonly used instrument measuring the frequency and intensity of social isolation and dissatisfaction with one's social interactions (39). The questionnaire comprises 10 positively worded items and 10 negatively

worded items. Scores range from 20 to 80, and higher scores indicate higher levels of loneliness. The instrument is considered reliable across various populations (39), and in the current study, Cronbach's alpha was .89.

Attachment to companion pets was assessed by a 10-point Likert scale, rather than one of the standard multivariate pet attachment measures (e.g., the Lexington Attachment to Pets Scale), because other multivariate pet attachment scales have been criticized as unreliable when comparing attachment levels between dog owners and cat owners (40, 41). Participants were asked to rate their attachment to their favorite cat or dog from 0 to 10, with higher scores indicating a higher level of attachment.

- *Data Collection*

Participants were recruited via flyers delivered by MOW volunteers with the daily home-delivered meal. The flyer invited participants who met the inclusion criteria to call the researchers directly and schedule an appointment for informed consent and data collection. The researchers met the participant at the participant's home, obtained informed consent, and subsequently collected demographic and psychosocial data by self-report from the participant. Participants were allowed to have a spouse or other representative present during consent and data collection and were allowed to reschedule data collection if necessary. A \$10 incentive was provided for participation.

- *Data Analysis*

Descriptive statistics were computed for demographic variables by group (cat ownership/dog ownership). An exact version of the chi-squared (χ^2) test was used to account for the small sample size and examine statistical differences between groups for categorical demographic data. A t-test for independent samples was conducted to test differences in outcomes

between cat owners and dog owners. A multiple linear regression model was used to compare depression by pet type and gender and determine whether the difference by pet type varies by gender using the interaction term (Pet Type X Gender). Assumptions of the respective statistical tests were met. Statistical analyses were conducted using SAS 9.4 for Windows, and an alpha level of ≤ 0.05 was considered significant.

Results

• Characteristics of the Sample

The mean age of the total sample was 76 +/- 9 years, ranging from 62 to 95 years (72% female, 100% white, 41% married, and 59% widowed, divorced or single). As shown in Table 1, no statistically significant differences were found between dog owners and cat owners in age, gender, marital status, and education level.

Table 1. Characteristics of cat and dog owners ($N = 39$).

	Cat Owners <i>n</i> =12 (22%) <i>M</i> (<i>SD</i>) <i>n</i> (%)	Dog Owners <i>n</i> =27 (78%) <i>M</i> (<i>SD</i>) <i>n</i> (%)	<i>t</i> Value or Chi-Square Value	<i>p</i> value
Age (years)	77.67 (9.35)	74.63 (8.35)	- 1.01	0.32
Gender			1.55	0.26
Males	5 (42%)	6 (22%)		
Females	7 (58%)	21 (78%)		
Marital status			0.42	0.73
Married	4 (33%)	12 (44%)		
Widowed, Divorced, Single	8 (67%)	15 (56%)		
Education (years)	11.58 (2.02)	12.07 (2.13)	0.67	0.50

Note: *SD* = Standard deviation, *M* = Mean.

• Depressive Symptoms, Loneliness, and Attachment to Pets

Cat owners reported significantly fewer depressive symptoms than dog owners (Table 2; $t = 2.12$; $p = 0.04$). No significant difference was found between cat owners and dog owners in loneliness ($t = -0.83$; $p = 0.41$) or attachment to pets ($t = -0.21$, $p = 0.84$). Table 3 shows descriptive statistics by gender for each type of pet owned, with depression (GDS-SF scores) as the outcome variable. Among cat owners, the men had a lower mean depression score than the women. As noted in Table 4, the multiple linear regression model indicated a significant difference in depression score by pet type ($p = 0.04$), but not by gender ($p = 0.31$). In addition, the interaction term (Pet Type X Gender) was not statistically significant ($p = 0.26$), which indicates the difference in depression scores by the type of pet owned did not vary significantly between men and women.

Table 2. Differences between cat and dog owners in depression and loneliness (N=39)

	<i>Cat Owners</i> N=12 (22%)	<i>Dog Owners</i> N=27 (78%)	<i>t Value</i>	<i>p value</i>	<i>Effect size</i> (Cohen's d)
Depression (GDS-SF)	3.33 (2.84)	5.72 (3.40)	2.12	0.04	0.76
Loneliness (R-UCLA)	43.17 (9.86)	39.71 (12.87)	- 0.83	0.41	0.30
Pet Attachment (Likert Scale)	9.38 (1.23)	9.24 (2.05)	-0.21	0.84	0.08

Note: GDS-SF = Geriatric Depression Scale Short Form, R-UCLA = Revised University of California Los Angeles Loneliness Scale

Table 3. Descriptive statistics by gender for each type of pet owned with depression (GDS-SF scores) as the outcome variable (N=39)

Pet Type	Gender	N	Mean	Std. Dev
Dog Owner	Female	21	5.69	3.36
	Male	6	5.83	3.87
Cat Owner	Female	7	4.43	2.70
	Male	5	1.80	2.49

Table 4. Results from multiple linear regression model that compares depression (GDS-SF) by pet type (cat or dog owner) and gender (N=39)

Source	DF	Type III SS	Mean Square	F Value	Pr > F
Pet Type (Cat or Dog Owner)	1	50.33	50.33	4.77	0.04
Gender	1	11.09	11.09	1.05	0.31
Pet Type X Gender	1	13.79	13.79	1.31	0.26

Discussion

Despite our small sample of homebound older adults, significant differences were found in the level of depressive symptoms between cat and dog owners, with cat owners reporting fewer depressive symptoms. Our findings agree with those reported by Gulick and

Krause-Parello, who found the level of depressive symptoms between attached cat owners and dog owners were significantly different, with cat owners reporting lower levels of depressed mood than dog owners (18). Although the reasons for why older adults in both studies who owned cats had lower depressive symptoms

than those who owned dogs are not clear, one plausible explanation is that cats are independent, which renders them low maintenance, and thus provide great pleasure and feelings of worthiness. For example, a cat does not require training and exercise, factors that may make cat ownership more emotionally satisfying and less physically demanding than dog ownership for older adults, especially for those who are disabled. Alternatively, however, it is possible that older adults with more depressive symptoms seek out dogs (who tend to be naturally social), more so than cats (who tend to be less social), to be more socially engaged and deal with depressive symptoms.

Our finding that cat owners reported less depressive symptoms than dog owners contradict findings from the Norway population study, in which cat owners reported higher levels of depression symptoms than dog owners (19). However, both studies were similar in that men who owned cats (but not dog owners) reported less depressive symptoms than women who owned cats. Our study lacked statistical significance that would indicate that the difference in depression scores by the type of pet varied between men and women; however, the lack of a statistically significant difference in our study was due in part to the small sample size, which reduced the power of the interaction term. As such, future studies that evaluate the impact of gender on depression outcomes are needed, specifically among cat owners.

Although differences and similarities were found between the Norway study and our study, comparing the findings is difficult because participants in our study were functionally disabled older adults who were mostly women, whereas participants in the Norway study were from the general population (functional limitations were not reported) with similar representations of men and women. Given inconsistent findings between the two

studies on depression outcomes between cat and dog owners, further exploration is needed that investigates differential emotional responses to pets that may vary according to an older person's gender, functional ability, and living situation.

Pet attachment provides mutual pleasure and a source of emotional support (42). Attachment figures that provide attachment relationships are needed throughout all phases of life; however, attachment relationships may be limited for older adults owing to a loss of family members and friends (43). The high level of attachment to both cats and dogs in our study suggests the importance of having a pet, regardless of the type of pet, in an isolated and vulnerable homebound older adult population. Additional studies are needed to compare our findings with other homebound older adults. We used a 0-10 visual analog scale to assess pet attachment to minimize the potential pet species-specific bias on existing scales (41). However, the reliability and validity of using a visual analog scale needs to be further explored.

Scores on the R-UCLA Loneliness Scale indicated a moderate level of loneliness in both cat and dog owners with no significant differences between the types of pet owners. However, our study had a small sample, which limited the likelihood of finding differences in levels of loneliness. Weiss (described *social* loneliness as a lack of social integration; owning cats and dogs may not improve social integration for homebound older adults but may decrease *emotional* loneliness by improving attachment relationships (44). The R-UCLA Loneliness Scale that was used in the current study is considered a unidimensional measure of loneliness and may have limited the capacity to assess the different aspects of loneliness (45, 46). Another instrument, the De Jong Gierveld Loneliness Scale, may have been a

more sensitive instrument to determine differences between pet-attachment relationships of cat and dog owners owing to the instrument's multidimensional design that measures both social and emotional typologies of loneliness (47).

Our sample was small and comprised primarily white women who lived in a rural setting; thus, the findings may not be generalizable to other homebound older adults who own cats or dogs. Because of our small sample size, the probability of finding a difference in depressive and loneliness symptoms between cat owners and dog owners when one exists in the population (i.e., power) was small. A small sample increases the probability of type II error, or *not* finding a difference in depressive symptoms when one exists in the population. Although the GDS Short Form is considered a screening tool for depressive symptoms and not diagnostic of depression, cat owners reported levels of depressive symptoms that were below the recommended level to detect major depression. In comparison, dog owners reported levels of depressive symptoms equivalent to major depression (38). However, the level of depressive symptoms for dog owners was minimally above the cutoff score of > 5 to detect major depression. Thus, differences in depressive symptoms between cat and dog owners should be interpreted with precaution. Owing to the cross-sectional methodology, fewer depressive symptoms reported by cat owners when compared with dog owners may be unrelated to owning a pet and may be related to other factors. Additionally, whether the relationship between cat ownership and few depressive symptoms is causal or whether pet owners with depression seek out dogs to alleviate depressive symptoms is unknown.

Considering that up to 29% of homebound older adults have major depression (11) and that cat ownership

was associated with fewer depressive symptoms, our results have potential implications for the choice of pet and potential benefits of cat ownership in homebound older adults. Given the high prevalence of depression in homebound older adults and the association of depression with poor physical and mental health, cat ownership may be beneficial for homebound older adults (6-8, 48, 49). Programs that match older cats with older adults may need to be considered for potential mental health benefits in homebound older adults (50, 51).

Conclusions

Although this study provides preliminary evidence that owning a cat to which one is attached is associated with fewer depressive symptoms than owning a dog to which one is attached in homebound older adults, the findings should be replicated with longitudinal studies. Future studies need to establish whether owning a cat decreases depression and, if so, how cats alleviate depression in homebound older adults. Likewise, future studies need to establish whether homebound older adults with depression select dogs as pets and, if so, determine whether dogs assist homebound older adults in dealing with depression. Findings from such studies may assist homebound older adults in selecting either a cat or dog as a companion pet.

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