Assessment of caregiver burden and associations with psychosocial function, veterinary service use, and factors related to treatment plan adherence among owners of dogs and cats

Mary Beth Spitznagel PhD
Melanie D. Cox DVM
Dana M. Jacobson DVM
Angela L. Albers DVM
Mark D. Carlson DVM

From the Department of Psychological Sciences, Kent State University, Kent, OH 44242 (Spitznagel); Stow Kent Animal Hospital, 4559 Kent Rd, Kent, OH 44240 (Cox, Albers, Carlson); and Metropolitan Veterinary Hospital, 1053 S Cleveland Massillon Rd, Akron, OH 44321 (Jacobson).

Address correspondence to Dr. Spitznagel (mspitzna@kent.edu).

OBJECTIVE
To investigate caregiver burden and its potential associations with psychosocial function and veterinary service use among dog and cat owners and with factors related to treatment plan adherence among owners of animals with chronic or terminal disease.

DESIGN
Cross-sectional, observational study.

SAMPLE
124 clients of a small animal hospital.

PROCEDURES
Study participants were recruited by email. Owners of sick animals were blindly matched with owners of healthy animals (62/group) by age, gender, and companion animal species. Respondents completed electronic questionnaires related to demographics and previously described measures of caregiver burden, psychosocial function, and treatment plan adherence. Veterinary medical records were reviewed to verify animal health status and assess veterinary service use (billable and nonbillable contacts with veterinary staff) in the 12 months prior to study enrollment. Variables were tested for association by statistical methods.

RESULTS
Questionnaire scores reflected greater caregiver burden; greater symptoms of depression, anxiety, and stress; and poorer quality of life for respondents with sick animals than for respondents with healthy animals. Greater caregiver burden was associated with scores reflecting poorer psychosocial function and with greater veterinary service use. The number of nonbillable, but not billable, contacts was greater for respondents with high caregiver burden than for those without this finding. Treatment plan factors associated with greater caregiver burden included changes in routine because of the animal's condition and perception that following new rules and routines for management of the condition was challenging.

CONCLUSIONS AND CLINICAL RELEVANCE
Awareness of potential caregiver burden and psychosocial distress in clients with sick companion animals may help veterinarians identify opportunities for an empathic response. Future research should assess directionality of the relationship between these factors. (*J Am Vet Med Assoc* 2019;254:124–132)

Caregiver burden is a term used to describe an individual's response to challenges faced in providing care for a sick family member.[1] Distinct from grief, burden is well described in human caregiving relationships and includes the emotional, physical, social, and financial toll that this role can take on the person providing care.[2] Results of a recent investigation by our group revealed that owners whose companion animals have chronic or terminal illness have increased caregiver burden, compared with owners of healthy companion animals, and that this burden is linked to psychosocial distress including higher stress, greater symptoms of depression and anxiety, and lower quality of life.[3] Although the links between caregiver burden and these factors are understood in human caregiving relationships and have been recently identified in owners of companion animals,[3] to the authors' knowledge, associations of caregiver burden with veterinary service use and factors related to treatment plan adherence have not been investigated.

ABBREVIATIONS

CES-D	Center for Epidemiology Studies Depression Scale
GAD-7	Generalized Anxiety Disorder 7-Item Scale
IQR	Interquartile range
POAS	Pet Owner Adherence Scale
PSS	Perceived Stress Scale
QLESQ-SF	Quality of Life Enjoyment and Satisfaction Questionnaire-Short Form
ZBI	Zarit Burden Interview

Although client distress in and of itself is important to consider, greater knowledge about a client's experience, particularly caregiver burden, could be important for veterinarians. Research suggests that client adherence to a treatment plan is enhanced through the use of a relationship-centered interaction characterized by a veterinarian actively collaborating with a client.[4] Unfortunately, compared with wellness visits, problem-related visits for an animal with illness elicit a greater biomedical focus and altered emotional tone, including fewer statements of reassurance and a more rushed approach from the veterinarian.[5] This style is likely to reduce the veterinarian's connection with the client. The degree of empathy felt by the veterinarian does not necessarily translate into expression of empathy,[6] and identification of caregiver burden in the context of problem-related visits would be an important first step in recognizing opportunities for empathic expression that can help facilitate a relationship-centered interaction with a distressed client.

The client's psychosocial function, or psychological and emotional well-being, could also have implications for stress in the veterinarian. Research in human medicine indicates that greater anxiety and distress are linked to greater use of healthcare,[7,8] suggesting possible overuse or distress-driven (rather than medically necessary) service-seeking. Such client behaviors may increase veterinarian stress, as high workload ranks among the top occupational stressors cited by veterinarians.[9] It is thus critical to better understand caregiver burden in veterinary clients, to determine whether the degree of burden is linked to behaviors that cause stress for the veterinarian, and if so, to identify practical ways to help prevent or reduce it.

The purpose of the study reported here was to investigate caregiver burden in veterinary clients with a dog or cat affected by chronic or terminal disease by comparing measures of burden for these individuals with those for clients with a healthy companion animal. We hypothesized that, as previously shown,[3] clients with a sick companion animal would have greater caregiver burden than those with a healthy companion animal, and that higher burden would be associated with reduced psychosocial function (specifically, higher stress level, greater symptoms of depression and anxiety, and lower quality of life). We further investigated the possibility that caregiver burden in clients can directly affect veterinary service use, with the hypothesis that the number of nonbillable contacts would be higher for clients with greater burden. Finally, we explored a measure of companion animal caregiver adherence to treatment plans to determine whether specific aspects of a treatment plan were associated with caregiver burden, as these may suggest ready points for burden prevention or intervention.

Materials and Methods

The research was conducted and reported in accordance with Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)[10,a] criteria for cross-sectional studies. The measures used have been previously described[1,3,11–15] and were found to have adequate psychometric properties.[3] The study protocol was reviewed and approved by the Institutional Review Board of Kent State University. All participants provided informed consent for study participation.

Sample

Participants were recruited from active clientele listed in the electronic database of a small animal general veterinary hospital. To enroll in the study, clients were required to be ≥ 18 years of age, to be English-speaking, and to have a living dog or cat residing in their home.

Study measures and instruments

Participant age (free text response format), gender (multiple choice response format: male or female), education level (multiple choice response format: 8 years or less, 9 to 11 years, high school graduate, associate's degree [or equivalent], bachelor's degree [or equivalent], master's degree, or doctoral degree), race-ethnicity (multiple choice response format: African-American, Asian-American, Caucasian, Latin American, Native American, or other), annual income (multiple choice response format: < $25,000/y, $25,000 to $50,000/y, $50,000 to $75,000/y, > $75,000 to $100,000/y, or > $100,000/y), number of people and companion animals in the household (drop-down menus with choices from 0 to 20), and companion animal species (multiple choice response format: dog, cat, or other) were collected from all participants by questionnaire. For clients with sick companion animals, information on diagnosis (drop-down choices of common conditions, such as arthritis, cancer, or diabetes [conditions not further specified] as well as an option of other with free text entry) and duration of disease (multiple choice response format: < 1 month, 1 to 6 months, 6 to 12 months, or ≥ 12 months) were also collected by this method. Although 2 income categories included $50,000/y, no participants indicated that this was a problem for survey completion.

Measures of caregiver burden, psychosocial factors, and treatment plan adherence were assessed with previously described questionnaires.[1,3,11–16] Scoring of questionnaires was conducted in accordance with measure instructions through computation of variables in aggregate.

The ZBI[1] is a questionnaire used to measure caregiver burden. The 18-item ZBI adapted for pet owners[3] successfully distinguishes between owners of sick and healthy companion animals and has been shown to have excellent internal consistency (Cronbach α = 0.90) and support for convergent validity evidenced by a high degree of correlation (r_s = 0.69) of its results with those of the POAS.[3,11] Items are rated on a scale of 0 (never) to 4 (nearly always) and included questions such as whether the client feels angry when around the pet and whether, because of the time spent with

the pet, the client does not have enough time for himself or herself. The range of possible scores for the adapted questionnaire is from 0 to 72; results of a recent study[3] by our group suggest a score > 18 on the adapted ZBI indicates the presence of a high level of caregiver burden, with higher values indicative of a greater degree of burden.

The PSS[12] was used to measure self-perceived stress, with a higher total score indicating greater stress. Each item on the 10-question scale is rated from 0 (never) to 4 (very often). There is not a standard cutoff to indicate an increased level of perceived stress; however, typical scores range from approximately 12 to 14 (range of possible scores, 0 to 40).

The CES-D[13] was used to measure depression symptoms. Responses to 20 questions are rated on a scale of 0 (rarely or none of the time) to 3 (most or all of the time). A score ≥ 16 (of a possible 60) indicates risk for clinical depression.

The GAD-7[14] was used to measure anxiety. The scale includes 7 items rated according to the frequency of symptoms from 0 (not at all) to 3 (nearly every day). A score ≥ 10 (of a possible 21) suggests risk for clinically meaningful generalized anxiety.

The QLESQ-SF[15,16] was used to measure quality of life across multiple domains. Ratings for each of the 16 items on the questionnaire range from 1 (very poor) to 5 (very good). Whereas no cutoff score exists for this measure, the mean QLESQ-SF raw score for owners of healthy pets in a previous investigation[3] involving a similar sample was approximately 49 (maximum possible score, 65 [with 3/16 items omitted in total scoring]).

A slightly modified POAS[11] (focused on owner perceptions of the companion animal's illness or disease [rather than disorder] and its treatment) was used to examine for evidence of convergent validity with the adapted ZBI for the study sample and to assess correlation between specific factors related to treatment plan adherence (POAS factors) and adapted ZBI scores. The 15-item scale addresses topics related to caregiving for companion animals, including adherence, concern about the pet, and treatment needs. Responses were scored on a Likert-type scale of 1 (strongly disagree) to 5 (strongly agree), except that an optional response (not applicable) was added to each item of the scale because the present study included healthy control animals for which questions about treatment might not have applied. Items were reverse-scored as necessary and summed for an overall total score (maximum of 75). Higher scores on the POAS reflect greater difficulty with adherence.

Recruitment and data collection procedures

Data were collected online between March 9 and April 5, 2017. An email requesting participation for the study was sent twice (with messages separated by 12 days) to active clients of a small animal general veterinary hospital. A single social media message was also posted on the veterinary hospital's home page. Clients with a healthy companion animal as well as those with a companion animal that had a chronic or terminal illness were encouraged to participate in a study with the aim of gaining a better understanding of how a pet's illness affects its owner.

Prior to enrolling, respondents were required to give permission for researchers to extract data from their companion animal's veterinary records and to use their deidentified data for research. Participants gave consent for the study by typing their name and advancing to the next page to open the study protocol. Only clients who provided informed consent were enrolled, and only those with correctly completed questionnaires were included in data analyses. Participants who provided contact information were entered in a drawing for the chance to win 1 of 3 $100 gift cards for an online retailer.

Clients who met the inclusion criteria and had a dog or cat affected by chronic or terminal disease (verifiable through the veterinary records) were matched to control clients who met the same criteria but owned a healthy dog or cat. Matching was performed on the basis of animal species, participant age (within 2 years), and participant gender through blinded examination of these 3 variables without reference to other data. Remaining owners of healthy animals were excluded from analyses.

Health status of companion animals was determined on the basis of the owner's indication that their dog or cat was sick or healthy and by information in the medical record consistent with that designation. For sick animals, the medical record was required to include evaluation for or treatment of clinical signs suggesting a chronic or terminal illness (eg, diabetes, renal disease, or cancer). Clinical problem category and designation of chronic or terminal disease were assigned through a 2-part process; the client-reported status (response format as described for clinical problem category; multiple choice response format for curable, chronic, or terminal disease or illness), and 1 veterinarian's (MD Carlson) examination of the client report and veterinary records for confirmation. Gold-standard diagnostic testing and formal diagnosis were not required, as the focus of the study was on clients' experience of having a sick companion animal. For healthy animals, records were required to confirm that the animal had been seen for no more than a wellness visit or for circumscribed clinical signs or procedures that required no follow-up during the 12 months prior to study enrollment. All medical records were reviewed by 1 veterinarian (MD Carlson) to verify animal health status.

To measure veterinary service use, data extraction from veterinary records was conducted by the primary author (MBS) with assistance from a veterinary assistant familiar with the hospital's record system, and the number of contacts related to the companion animal specified by the owner on the questionnaire was recorded. Contacts initiated by the client or a member of the client's family in the 12 months prior to study enrollment were included

in the study, and billable (eg, office visits and procedures) and nonbillable (eg, telephone calls or emails about the animal) contacts were counted separately. Total contacts were tallied without distinction between contact with the veterinarian or veterinary staff with the exception of standard follow-up contact initiated by staff members (eg, providing laboratory results), which was considered part of that billable procedure and not counted separately.

Statistical analysis

On the basis of results of a prior study[3] performed to evaluate caregiver burden in owners of companion animals, medium-to-large effect sizes for group differences (owners of sick vs healthy companion animals) were expected. For a significance (α) level of 0.05, power (π) of 0.8, and a medium effect (δ) of 0.5, a sample size of 102 participants was needed (51/group). Oversampling was planned to ensure an adequate sample size with full data.

Descriptive statistics (frequencies or mean ± SD as appropriate) were reported. Demographic variables were compared between groups by independent sample *t* tests (owner age and companion animal age) or χ^2 analyses (owner gender, race-ethnicity, education level, and annual income; number of people in the household; and number of pets in the household). Questionnaires with missing data were excluded from analyses.

Evaluation of distributions for remaining data by means of the Shapiro-Wilk test revealed that all primary measures had nonnormal distributions that could not be fully transformed; thus, nonparametric tests were applied. To ensure that the psychometric properties of the adapted ZBI translated to the study population, analyses to assess internal consistency reliability (calculation of Cronbach α, with a minimum α of 0.70 expected to demonstrate internal consistency[17]) and convergent validity (Spearman correlation analysis for adapted ZBI and POAS scores with a moderate relationship expected[3]) were conducted.

The Mann-Whitney *U* test was used to compare total scores (continuous raw data) for caregiver burden (adapted ZBI score) and psychosocial variables (scores for the PSS, CES-D, GAD, and QLESQ-SF) between groups. Median, IQR, and minimum to maximum scores were determined for each measure. Calculation of T scores on the basis of full sample scores was performed to depict group differences on a single scale. Spearman correlation analyses were conducted to investigate potential relationships between adapted ZBI scores and scores for each psychosocial variable.

To examine veterinary service use, the Mann-Whitney *U* test was first conducted to determine whether the numbers of billable and nonbillable contacts differed between respondents with sick and healthy companion animals. Partial Spearman correlation analyses controlling for PSS, CES-D, GAD, and QLESQ-SF scores were used to examine potential associations between adapted ZBI scores and the number of billable and nonbillable contacts after accounting for the influence of psychosocial factors. The sample was then divided according to the previously proposed cutoff for high caregiver burden (adapted ZBI score > 18)[3] to assess whether the number of billable and nonbillable contacts differed between respondents with and without this finding. Finally, Spearman correlation analysis between adapted ZBI scores and responses to items on the POAS was performed for owners of sick companion animals only. The familywise α for all significance tests was set at 0.05, with the sequentially rejective Holm-Bonferroni correction applied to minimize type I error.[18] Statistical analyses were conducted with commercially available software.[b]

Results

The response rate for study recruitment messages, determined on the basis of number of responses divided by total number of active clients, was 4.45%. A total of 538 clients enrolled in the study. The final sample included 124 participants fully matched by the client's gender and by species of the companion animal (62/group; **Figure 1**). Companion animals for which participants completed questionnaires included 82 dogs (41/group) and 42 cats (21/group).

Fifty-nine of 62 (95%) respondents in each group were female. Participants were nearly all Caucasians and approximately 48 years of age **(Table 1)**. Age did not differ significantly ($P = 0.98$) between respondents with sick and healthy companion animals; similarly, there were no significant differences in education level ($P = 0.08$), race-ethnicity ($P = 0.36$), annual household income level ($P = 0.16$), number of people per household ($P = 0.87$), or number of pets per household ($P = 0.14$) between groups.

Healthy animals were significantly ($P < 0.001$) younger than sick animals (mean ± SD age, 8.47 ± 4.46 years vs 11.26 ± 3.64 years, respectively). Among sick animals, the primary clinical problem was most commonly in the domain of internal medicine (35/62 [56%]), followed by oncology (14 [23%]), neurology or dermatology (5 [8%] each), orthopedics (2 [3%]) and cardiology (1 [2%]). Most (41/62 [66%]) of these animals were deemed to have chronic illness; 21 (34%) were considered to have terminal illness. Duration of the disease was ≥ 12 months, 6 to 12 months, 1 to 6 months, and < 1 month for 35 (56%), 11 (18%), 9 (15%), and 7 (11%) sick animals, respectively.

Caregiver burden and psychosocial function

Examination of psychometric properties of the adapted ZBI revealed a Cronbach α of 0.88, indicating internal consistency reliability. Evidence supporting convergent validity by correlation with POAS results ($r_s = 0.64$) was also found. On the basis of adapted ZBI scores, high caregiver burden was found in 27 of 62 (44%) respondents with a sick companion animal and 5 of 62 (8%) respondents with a healthy companion

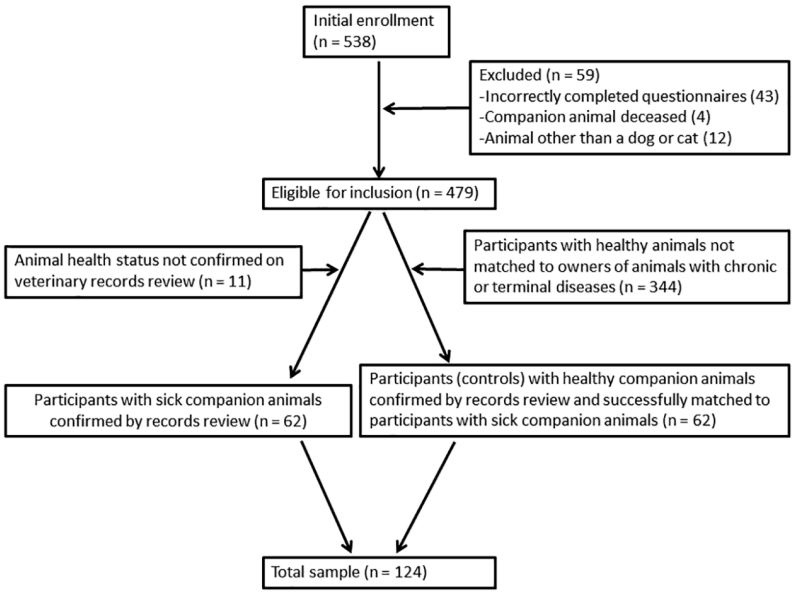

Figure 1—Study flow diagram depicting selection and inclusion of clientele from a small animal general veterinary practice for participation in a study to investigate caregiver burden and its potential associations with psychosocial function and veterinary service use among companion animal (dog and cat) owners and with factors related to treatment plan adherence among owners of animals with chronic or terminal disease. Participants meeting basic inclusion criteria (age > 18 years, English-speaking, presence of a living dog or cat in the home, and provision of informed consent) initially enrolled in the study in response to an electronic (email or hospital website) invitation.

Table 1—Demographic characteristics for 124 study participants with sick (n = 62) and healthy (62) companion animals enrolled in a study to assess caregiver burden and its potential associations with psychosocial function, veterinary service use, and factors related to treatment plan adherence among owners of dogs and cats.

	Companion animal status		
Variable	Sick (n = 62)	Healthy (n = 62)	*P* value
Age	48.11 ± 12.70	48.18 ± 12.48	0.98
Caucasian race	62 (100)	60 (97)	0.36
Education			0.08
High school or lower	16 (26)	19 (31)	—
College degree	37 (60)	28 (45)	—
Graduate degree	9 (15)	15 (24)	—
Annual household income			0.16
< $25,000	9 (15)	5 (8)	—
$25,000–$50,000	7 (11)	18 (29)	—
$50,000–$75,000	15 (24)	12 (19)	—
> $75,000	31 (50)	27 (44)	—
People in household			0.87
1	15 (24)	11 (18)	—
2	23 (37)	28 (45)	—
≥ 3	24 (39)	23 (37)	—
Animals in household			0.14
1	10 (16)	23 (37)	—
2	17 (27)	13 (21)	—
≥ 3	35 (56)	26 (42)	—

Respondents were selected from 538 clients of a small animal general veterinary hospital who enrolled in the study in response to an electronic (email or hospital website) invitation. Individuals with sick pets were blindly matched to controls who owned healthy pets on the basis of age (within 2 years), gender, and companion animal species. Data are reported as mean ± SD or number (percentage).

Values of $P < 0.05$ were considered significant.

— = Not applicable.

animal. Respondents with a sick animal had significantly ($P < 0.001$) higher adapted ZBI scores than did those with a healthy animal. Scores for perceived stress as assessed with the PSS (n = 62 and 59 respondents for the owners of sick and healthy animals, respectively; $P < 0.001$), depression symptoms identified on the CES-D (n = 62 and 54, respectively; $P < 0.01$), and symptoms of anxiety indicated on the GAD-7 (n = 62 and 53, respectively; $P < 0.001$) were all higher for respondents with a sick animal, whereas quality of life scores on the QLESQ-SF were lower for this group (n = 62 and 58, respectively; $P < 0.01$) than for those with healthy animals. These differences remained significant after Holm-Bonferroni correction. Descriptive statistics **(Table 2)** and standardized T scores for each questionnaire **(Figure 2)** are shown for owners of sick and healthy animals.

Spearman rank-order correlation analysis revealed significant relationships between adapted ZBI scores and scores for each of the psychosocial function questionnaires ($P < 0.001$ for all comparisons; **Table 3**). Greater caregiver burden was associated with higher levels of perceived stress, greater symptoms of depression and anxiety, and lower quality of life as assessed by these methods. These correlations remained significant after Holm-Bonferroni correction.

Veterinary service use

The number of billable contacts in the 12 months prior to study enrollment was significantly ($P < 0.001$) greater for respondents with sick companion animals (n = 62; median score, 7; IQR, 2 to 10) than for those with healthy animals (62; median score, 1; IQR, 0 to 2). The same pattern was observed for nonbillable contacts (median score, 10.5; IQR, 4 to 14.25 and median score, 1; IQR, 0 to 2 for respondents with sick and healthy animals, respectively; $P < 0.001$). These differences remained significant after Holm-Bonferroni correction.

Partial correlation analysis for association between the number of nonbillable contacts and adapted ZBI scores revealed significant ($P = 0.001$) positive correlation ($r_s = 0.31$). The same analysis for billable contacts also identified significant ($P = 0.02$) positive correlation ($r_s = 0.23$). Segregation of the data on the basis of the previously suggested cutoff[3] for adapted ZBI scores indicated that 32 respondents had high caregiver burden (median score, 23.5; IQR, 20 to 29.75) and 92 did not (median score, 10; IQR, 6 to 13). Respondents with high burden had a significantly ($P = 0.001$) higher number of nonbillable contacts in the 12-month assessment period (median, 8.5; IQR, 1 to 9) than did those without this factor (median, 2; IQR, 0 to 7.75), and the

Table 2—Descriptive statistics for measures of caregiver burden and psychosocial function for the 124 study participants in Table 1.

		Companion animal group					
		Sick			Healthy		
Measure	Range of possible scores	No. of responses	Median (range) score	IQR	No. of responses	Median (range) score	IQR
ZBI (adapted)	0–72	62	17 (4–56)*	12–23.5	62	8.5 (0–38)*	4–13
PSS	0–40	59	19 (3–31)*	13–22	62	11 (0–27)*	7.75–17
CES-D	0–60	54	19 (1–41)†	8.25–27	62	10 (0–39)†	5–15.25
GAD-7	0–21	53	6 (0–20)*	3–11.5	62	3 (0–18)*	0–6
QLESQ-SF	0–49	58	47 (23–65)†	38–52.5	62	53 (26–65)†	42–61

The adapted ZBI,[1,3] PSS,[12] CES-D,[13] GAD-7,[14] and QLESQ-SF[15,16] were used to measure caregiver burden, perceived stress, depression symptoms, anxiety, and quality of life, respectively.

*Values differ significantly ($P < 0.001$) between groups. †Values differ significantly ($P < 0.01$) between groups. The *P* values remained significant following Holm-Bonferroni correction.

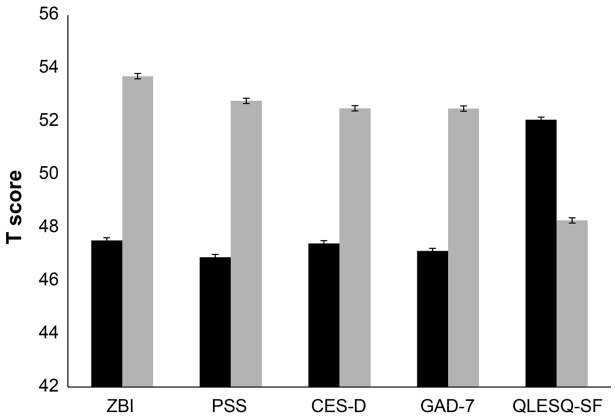

Figure 2—Scores for caregiver burden (assessed by adapted ZBI[1,3]) and psychosocial factors (perceived stress as measured by the PSS,[12] depression symptoms identified by CES-D,[13] anxiety symptoms indicated by GAD-7,[14] and quality of life as measured by QLESQ-SF)[15,16] for respondents with sick and healthy companion animals (n = 62/group; gray and black bars, respectively). Not all respondents with sick animals completed every questionnaire (3 to 9 data points were missing for various psychosocial factor scores). Results are shown as mean ± SE standardized T scores.

Table 3—Spearman correlation matrix of associations between adapted ZBI scores[1,3] (a measure of caregiver burden) and scores for questionnaires used to assess various psychosocial factors.

Variable	ZBI	PSS	CES-D	GAD-7
ZBI	—	—	—	—
PSS	0.56	—	—	—
CES-D	0.52	0.72	—	—
GAD-7	0.50	0.74	0.75	—
QLESQ-SF	–0.59	–0.72	–0.77	–0.69

Values are shown as r_s. All correlations shown are significant ($P < 0.001$) following Holm-Bonferroni correction.

difference remained significant after Holm-Bonferroni correction. However, the number of billable contacts was not significantly ($P = 0.11$) different between respondents with (median, 4.5; IQR, 2.25 to 13.75) and without (median, 2; IQR, 1 to 6) high burden.

Variables related to treatment plan adherence

Results of correlation analysis between adapted ZBI scores and responses to each of the items on the modified POAS for participants with sick companion animals were summarized (**Supplementary Table S1**, available at avmajournals.avma.org/doi/suppl/10.2460/javma.254.1.124). Ratings for perception that the animal's quality of life was compromised ($r_s = 0.47$), the respondent's feeling that his or her daily routine was changed because of the animal's illness or disease ($r_s = 0.43$), and the perception that following new rules and routines for management of the illness or disease was challenging ($r_s = 0.43$) were each positively correlated with the ZBI scores ($P < 0.001$ for all comparisons [significant after Holm-Bonferroni correction]).

Discussion

In the present study, we evaluated measures of caregiver burden in a subset of a small animal general veterinary hospital clientele who owned companion animals (dogs or cats) with or without chronic or terminal disease. We hypothesized that, as in a previous study[3] by our group, survey respondents with sick companion animals would have greater burden as measured by the adapted ZBI[1,3] than respondents with healthy companion animals, and that the degree of burden would be linked to reduced psychosocial function (as measured by the PSS,[12] CES-D,[13] GAD-7,[14] and QLESQ-SF[15,16]) and greater use of veterinary services (defined as any contact with veterinary staff noted in the medical record), particularly the number of nonbillable contacts, within a 1-year period. We also explored potential associations between specific factors related to treatment plan adherence for sick animals (POAS factors[11]) and the degree of burden. Our results indicated that high caregiver burden was present in many (27/62 [44%]) respondents with a sick companion animal, and that greater burden was associated with poorer psychosocial function and greater use of veterinary services. Addition-

ally, respondents with high caregiver burden had greater use of nonbillable, but not billable, veterinary services, compared with other respondents. Finally, we identified potentially modifiable factors related to treatment plans for sick animals that were significantly correlated with the measure of caregiver burden, suggesting possible areas where steps might be taken to prevent increased burden or provide intervention.

Our findings that greater caregiver burden was associated with poorer psychosocial function, including higher stress, greater symptoms of depression and anxiety, and lower quality of life were in agreement with results of our previous study,[3] with the overall pattern of findings supporting that results for owners of pets with chronic disease recruited via social media may be generalizable to a sample of veterinary clinic clientele. The findings of the present study extended beyond those of other work (eg, a study by Linek et al[19]) revealing a link between a pet's chronic disease and quality of life for the owners by broadening examination of owner psychosocial function into clinically treatable domains (ie, depression, anxiety, and stress). Of note, the typical degree of caregiver burden and measures of psychosocial distress for owners of healthy and sick companion animals were somewhat lower than those for the sample of companion animal owners (recruited online through a social media chain referral and purposive sampling method) in our initial investigation[3]; for example, the average level of burden reported by owners of sick companion animals in the previous study was approximately 25, but < 20 for the present study. This apparent difference might have reflected regression toward the mean or differences in recruitment methods between the 2 studies. Evidence suggests that higher rates of depression and lower subjective well-being are linked to greater online social media use in some populations.[20,21] However, despite differences in recruitment techniques for these 2 studies, the same pattern of findings emerged, with significant differences across all measures between respondents with sick and healthy companion animals. Additionally, clinically meaningful depression symptoms[13] and levels of stress greater than typically found[12] were identified by respondents who owned sick animals in both studies, suggesting that these findings are robust to recruitment technique.

The study results hold important implications for veterinarians as well as their clients. Awareness that a client with a sick companion animal might have a high level of caregiver burden and be experiencing psychosocial distress could increase the opportunity for the veterinarian to provide an empathic response. This is important, as highlighted by studies[6,22] in the field of veterinary communications that have shown empathy expressed toward a client leads to higher gratification for both the client and veterinarian. Moreover, as previously mentioned, the problem visit—likely the more common type of encounter when a companion animal has a chronic or terminal illness—tends to feature a focus on biomedical issues[5] at a time when greater attention to the client's experience may be needed to facilitate treatment plan adherence.[4] Cognizance of the client's experience in providing care for a sick pet allows greater understanding of the client's perspective, which may improve communication, potentially leading to improved client adherence to the treatment plan and possibly job satisfaction for the veterinarian.

Research in human medicine has identified a high rate of health-care use by individuals in human caregiving relationships and in the context of stress.[7,23] To our knowledge, this is the first study to investigate such factors for owners of companion animals with chronic or terminal disease or illness. As expected, a significantly greater number of billable (ie, office visits and procedures) and nonbillable (ie, communications including phone calls and email messages) contacts were made by clients with a sick companion animal, compared with results for clients who owned healthy animals (range of differences, approx 7- to 10-fold). Whereas greater service use would be expected for patients with a chronic or terminal illness, the present study revealed that clients with high caregiver burden required a greater number of nonbillable contacts than did those without high burden. Moreover, burden appears to be a key issue, given that robust correlations with veterinary service use were observed even after controlling for the psychosocial factors measured in the current work. In contrast, the use of billable services did not significantly differ between pet owners with and without high burden. The study did not address causality; however, we consider that the lack of difference in billable contacts and stronger correlation between caregiver burden with the number of nonbillable (relative to billable) contacts suggested the association was not driven by severity of the companion animal's illness alone and that caregiver burden was likely a contributing factor in the need for nonbillable communications. This finding was important because high workload is identified by veterinarians as a primary occupational stressor,[9] and results of the present study provided evidence that clients with greater burden contributed to this workload more substantially than clients who did not have this finding, including those with sick companion animals that were seen for a similar number of billable services. This underscored the importance of establishing methods to identify and reduce caregiver burden in the veterinary clients.

The findings in the present study also provided support for use of the previously proposed cutoff for adapted ZBI scores[3] because differentiating between clients with (score > 18) and without (score ≤ 18) high caregiver burden in this manner allowed us to identify meaningful distinctions in client behavior. When this cutoff was applied, nearly half of the respondents with sick companion animals (27/62 [44%]) were identified as having high burden, whereas few (5/62 [8%]) respondents with healthy companion animals exceeded this threshold. Detection of any amount of caregiver burden among owners of

healthy animals may give initial pause; however, it is important to note that the adapted ZBI is not specific to illness but more generally rates the perceived difficulty of providing care for the animal. Owning a companion animal necessarily involves a caregiving role, and other factors may underlie burden. For example, companion animals that are not yet housebroken or animals with behavioral problems would likely contribute to caregiver burden. Conversely, not every client with a sick companion animal necessarily experiences high burden. Factors such as belief that the animal's disease is in good control, individual differences in self-efficacy or coping skills, financial means to cover treatment costs, ability to share caregiving duties with others in the home, and a multitude of other variables could attenuate caregiver burden. Understanding which factors contribute to caregiver burden is an important topic for future consideration.

Although little is known at this time about factors that lead to caregiver burden in owners of sick companion animals, efforts may still be made to alleviate it. For practices with access to expertise in veterinary social work, referral to a professional may be an option. However, this service is not available in all locations. By identifying potentially modifiable patient care–related factors linked to client caregiver burden, the present study provided a starting point for understanding and possibly addressing this complex issue. These associations suggested that prevention of burden might actually start in the examination room. Greater burden was significantly associated with the degree to which clients felt their daily routine was altered and with greater perception that rules and routines associated with patient management were challenging to follow. As such, client burden might be in part alleviated by addressing these issues. Results of a previous study[4] revealed the likelihood of treatment plan adherence for a client given a clear recommendation is approximately 7 times that for a client who receives an ambiguous recommendation. In addition to providing clear communications, we speculate that collaborating with the client to develop a treatment plan with consideration of the client's typical routine could decrease caregiver burden. Future investigations are needed to determine whether an approach designed to allow a client to better integrate their companion animal's care into daily life can decrease the incidence or severity of burden and facilitate treatment plan adherence. Although a client's perception of an animal's quality of life cannot always be positive or improved, our finding that caregiver burden was associated with the degree to which participants felt their pet's condition affected its quality of life was in alignment with a recent report[24] that emphasized the importance of engaging clients in conversations about quality of life.

One possible limitation of the present study was that we chose to sample veterinary clients from a large general practice. This choice was made to avoid a rarefied sample that might be drawn from specialty practices (eg, oncology or dermatology), but our results may not apply across all veterinary clientele with a sick companion animal. Another potential limitation was that we only required that a client perceive their companion animal as sick and that veterinary records confirm presence of or treatment for clinical signs suggesting a chronic or terminal illness. Because the focus of the study was the client's experience of managing companion animal care and because many veterinary clients might have been unable to pay for gold-standard diagnostic testing, we did not require this type of disease confirmation for study inclusion. It was our hope that our recruitment and inclusion criteria would provide a sample of veterinary clients with diverse socioeconomic backgrounds; however, some bias may have been present owing to the voluntary nature of recruitment as well as the need for respondents to have access to, and some degree of comfort with use of, electronic media. Demographic characteristics of the sample, including the overall high level of education and household incomes and largely Caucasian representation, were additional limitations that could affect the broader applicability of these results. Additionally, individuals who had an especially close bond with their companion animal could have been overrepresented, as clients would have needed enough interest in the topic of companion animal caregiving to enroll in the study. Of note, although not all veterinary clients may have such traits, it is possible that this sample was an accurate representation of owners who choose to provide care for a companion animal with chronic or terminal disease rather than immediate euthanasia. Other client characteristics may have influenced results; for example, individuals providing care for an animal with declining clinical status or very poor prognosis could have had a negative affective response to the study topic and opted not to enroll. We also did not assess for other potentially important factors, such as client mental health history and past experience in caregiving for a companion animal, which could have influenced results. More research is needed to fully appreciate the characteristics of typical caregivers for sick companion animals. Knowledge about the nature of individuals who choose to provide care for a companion animal with a chronic or terminal disease may help to optimize patient care and the caregiver experience. Finally, not surprisingly, sick animals in the current sample were older than healthy animals; implications of patient age (eg, length of ownership and differences in human-animal attachment[25]) should also be considered and controlled for in future studies.

Further research should be conducted with a focus on understanding directionality of the relationship between caregiver burden and psychosocial function in veterinary clients; the cross-sectional design of the present study prevented assessment of whether the burden of caregiving leads to reduced psychosocial function or whether individuals with poorer psychosocial function prior to becoming caregivers are more likely to experience high burden when fulfilling this role. Pinpointing risk factors for

caregiver burden and identifying cost-efficient strategies to help prevent or reduce such burden will be important. It is also critical to more fully examine whether and how client caregiver burden impacts veterinary staff workload and, in turn, occupational stress in veterinarians. If such associations exist, interventions to decrease client caregiver burden should be assessed for downstream effects on work-related stress in veterinarians.

Acknowledgments

Study activities were conducted through Kent State University and Stow Kent Animal Hospital.

Not funded by any external source. The authors declare that there were no conflicts of interest.

The authors thank Ms. Danielle Krizo for technical assistance with veterinary record data extraction.

Footnotes

a. STROBE checklist for cross-sectional studies. Available at: www.strobe-statement.org/?id=available-checklists. Accessed May 23, 2017.
b. SPSS, version 23.0, IBM Corp, Armonk, NY.

References

1. Zarit SH, Reever KE, Bach-Peterson J. Relatives of the impaired elderly: correlates of feelings of burden. *Gerontologist* 1980;20:649–655.
2. Tremont G. Family caregiving in dementia. *Med Health R I* 2011;94:36–38.
3. Spitznagel MB, Jacobson DM, Cox MD, et al. Caregiver burden in owners of a sick companion animal: a cross-sectional observational study. *Vet Rec* 2017;181:321.
4. Kanji N, Coe JB, Adams CL, et al. Effect of veterinarian-client-patient interactions on client adherence to dentistry and surgery recommendations in companion-animal practice. *J Am Vet Med Assoc* 2012;240:427–436.
5. Shaw JR, Adams CL, Bonnett BN, et al. Veterinarian-client-patient communication during wellness appointments versus appointments related to a health problem in companion animal practice. *J Am Vet Med Assoc* 2008;233:1576–1586.
6. McArthur ML, Fitzgerald JR. Companion animal veterinarians' use of clinical communication skills. *Aust Vet J* 2013;91:374–380.
7. Frostholm L, Fink P, Christensen KS, et al. The patients' illness perceptions and the use of primary health care. *Psychosom Med* 2005;67:997–1005.
8. Hilbert A, Martin A, Zech T, et al. Patients with medically unexplained symptoms and their significant others: illness attributions and behaviors as predictors of patient functioning over time. *J Psychosom Res* 2010;68:253–262.
9. Nett RJ, Witte TK, Holzbauer SM, et al. Risk factors for suicide, attitudes toward mental illness, and practice-related stressors among US veterinarians. *J Am Vet Med Assoc* 2015;247:945–955.
10. von Elm E, Atman DG, Egger M, et al. Strengthening The Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies. *J Clin Epidemiol* 2008;61:344–349.
11. Talamonti Z, Cassis C, Brambilla PG, et al. Preliminary study of pet owner adherence in behaviour, cardiology, urology, and oncology fields. *Vet Med Int* 2015;2015:618216.
12. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav* 1983;24:385–396.
13. Radloff LS. The CES-D scale: A self-report depression scale for research in the general population. *Appl Psychol Meas* 1977;1:385–401.
14. Spitzer RL, Kroenke K, Williams JB, et al. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med* 2006;166:1092–1097.
15. Endicott J, Nee J, Harrison W, et al. Quality of Life Enjoyment and Satisfaction Questionnaire: a new measure. *Psychopharmacol Bull* 1993;29:321–326.
16. Stevanovic D. Quality of life enjoyment and satisfaction questionnaire-short form for quality of life assessments in clinical practice: a psychometric study. *J Psychiatr Ment Health Nurs* 2011;18:744–750.
17. Tavakol M, Dennick R. Making sense of Chronbach's alpha. *Int J Med Educ* 2011;2:53–55.
18. Holm S. A simple sequentially rejective multiple test procedure. *J Scand Stat* 1970;6:65–70.
19. Linek M, Favrot C. Impact of canine atopic dermatitis on the health-related quality of life of affected dogs and quality of life of their owners. *Vet Dermatol* 2010;21:456–462.
20. Kross E, Verduyn P, Demiralp E, et al. Facebook use predicts declines in subjective well-being in young adults. *PLoS One* 2013;8:e69841.
21. Pantic I, Damjanovic A, Todorovic J, et al. Association between online social networking and depression in high school students: behavioral physiology viewpoint. *Psychiatr Danub* 2012;24:90–93.
22. Shaw JR, Adams CL, Bonnett BN, et al. Veterinarian satisfaction with companion animal visits. *J Am Vet Med Assoc* 2012;240:832–841.
23. Brodaty H, Hadzi-Pvlovic D. Psychosocial effects on carers of living with persons with dementia. *Aust N Z J Psychiatry* 1990;24:351–361.
24. Knesl O, Hart BL, Fine AH, et al. Veterinarians and humane endings: when is it the right time to euthanize a companion animal? *Fron Vet Sci* 2017;4:45.
25. Smolkovic I, Fajfar M, Mlinaric V. Attachment to pets and interpersonal relationships: can a four-legged friend replace a two-legged one? *J Eur Psychol Stud* 2012;3:15–23.