Article

Development and Validation of the Pet-Related Stress Scale

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Abstract: Results of studies examining relations between human–animal interactions and human health and wellbeing have been inconsistent. This may be due, in part, to the scarcity of measures developed to assess levels of stress experienced when living with a pet (i.e., pet-related stress). This study developed and validated the Pet-Related Stress Scale (PRSS), a measure of general, multispecies pet-related stress among US pet owners. We conducted confirmatory factor analysis using the R software package to evaluate the psychometric properties of the PRSS and test competing model structures. We assessed validity through bivariate analyses between the PRSS and psychological stress, general stress, social support, and coping self-efficacy. Then, we conducted multiple group analysis to evaluate measurement invariance across age, race, Latine ethnicity, sexuality, gender, and gender modality. A three-factor model of pet-related stress (economic, psychological, and social stress) was the best fit for the data. Our results support convergent and divergent validity. However, the PRSS did not demonstrate measurement invariance across demographic groups. The PRSS is a promising measure of economic, psychological, and social stress related to owning pets that needs additional testing and refinement for use with marginalized populations most impacted by social disparities.

Keywords: human–animal interaction; companion animal; pets; pet owner; pet guardian; dog; cat; stress; measure

1. Introduction

The majority of homes in the United States (66%) include at least one pet [1–3], helping foster the growth and recognition of human–animal interaction (HAI) research as an important topic for social scientists [4–6]. Historically, HAI research (the study of relationships and interactions between humans and nonhuman animals [7]), has primarily consisted of studies designed to better understand how pet ownership, animal interactions, and/or attachment with companion animals promote human health and wellbeing [8–10]. To this end, numerous measures have been developed to quantify peoples' attachments and bonds to animals [11–13].

Partly due to the assessment tools utilized and varying methodologies, results of studies examining the association between HAI and human health and wellbeing have been inconsistent [7]. Several studies have reported numerous psychological and physical benefits of pets, including their ability to act as a buffer against depression [14–18], anxiety [19,20], and stress [8,21–26], as well as support wellbeing [27–31] and longevity [32,33]. Yet, other studies have found no significant associations between pets and outcomes such as mental health (e.g., [34]), resilience (e.g., [35]), and physical health (e.g., [19]). Other

researchers have, in fact, found associations between HAI and *poorer* mental health [36–41], greater feelings of loneliness [36,42], and lower self-esteem scores [43].

These inconsistent results mandate the need for further research to help explain how, and for whom, HAI confers benefits and/or risks. For example, one potential explanation for the positive association between HAI and negative mental health is that pet ownership may involve additional stress that exacerbates other life stressors and/or mental health symptoms. It is possible that negative aspects of pet ownership and/or additional psychological stress associated with pets may create barriers to or disrupt the mechanisms hypothesized to be associated with pet benefits (i.e., social support, comfort via physical touch [44]). Buller and Ballantyne [45], for example, found that adult pet owners reported that their pets' behavioral problems had negative effects on their own relationships (e.g., stress, sadness), as well as negative direct and indirect effects on their relationships with other household members. Other potential challenges of pet ownership, in addition to behavioral problems, may include access to veterinary care [46–48] and housing [49,50], and guilt stemming from conflicts between work commitments and pet caretaking [30,51,52].

Furthermore, several studies suggest that the effects of pet ownership are nuanced by owner factors including age, economic status, gender, sexuality, and if they hold marginalized identities. Studies exploring differences in perceived benefits and potential stressors of pets based on owners' sex, for example, suggest a difference between men and women. To illustrate, while Defelipe et al. [53] found that men with pets report feeling less sad than those without pets, no differences were found between women with or without pets. Yet, a study by Hajek and König [54] found that women with pets report less isolation and loneliness than men with pets. Differences between men and women regarding pet caretaking have also been found, with women reporting higher levels of involvement with veterinary care, feeding, and grooming [55,56]; all of which can contribute to the stress associated with pet ownership.

Owners' age can also influence the experience of pet ownership. While numerous studies exploring pet ownership among older adults, for example, have reported benefits [57–59], other studies suggest that the added responsibilities, time commitment, and financial demands can overshadow any positive effect [60–63]. Similarly, while several studies suggest that LGBTQ+ people often find pets to be a source of support and helpful in mitigating the many stressors they face [30,64,65], some LGBTQ+ people find that the environmental stressors and adversities they face make pet ownership onerous and can create barriers to accessing community services and support [30,38]. Pets also act as barriers to receiving community social services for some individuals experiencing homelessness or intimate partner violence [66–69].

Moreover, some studies suggest a link between pet ownership and financial strain [70] and housing instability [71,72]. The intersection of race and housing inequalities within the United States may create unequal pet-related stress levels for owners of different races [50,73]. For example, Rose et al. [50] found that neighborhoods with predominantly Black/African American residents were significantly less likely to permit pets in rental units than neighborhoods with predominantly white residents, suggesting that pet-related stressors may disproportionately impact marginalized communities.

To assess pet-related challenges, several measures have been created to measure specific issues associated with pet ownership. For example, measures have been designed to assess pet owners' grief, bereavement, and continued bonds following the death of a companion animal [74,75]. Further examples include the assessment of pet owners' caregiver burden when caring for a pet [76], guilt related to pet ownership [51,52,77], and challenges for owners with cancer associated with caring for a pet [78,79]. Yet, to our knowledge, no measurement has been created to assess general stress associated with pet ownership. As a result, studies that measure associations between HAI and human health and wellbeing may over- or underestimate the impact of HAI on pet owners by failing to account for pet-related stressors. Although HAI researchers have recognized the need to examine both the benefits and risks associated with relationships with companion

animals [37,80,81], this is a significant gap in HAI research and assessment. To address this void, the current study was designed to develop and validate the Pet-Related Stress Scale (PRSS).

Current Study

This study details the development and validation of the Pet-Related Stress Scale (PRSS), designed to capture the general stress related to living with, and caring for, a pet of any species (i.e., pet-related stress) among pet owners living in the United States. To achieve this objective, we (a) identified and refined potential items to represent pet-related stress, (b) conducted confirmatory factor analyses to establish the factor structure of the measure (i.e., unidimensional vs. a three-factor model), (c) assessed convergent and divergent validity of the measure with relevant constructs, and (d) tested whether the measure performed similarly across demographic groups. We hypothesized that the construct of pet-related stress is best measured as multidimensional, consisting of three factors: economic stress, psychological stress, and social stress. We further hypothesized that all domains of pet-related stress would be positively associated with general perceived stress and psychological stress, and would not be significantly associated with constructs of coping self-efficacy. Lastly, we expected that the hypothesized social stress domain would be negatively associated with social support.

2. Materials and Methods

2.1. Study Procedures

Data used for this cross-sectional study were collected as a part of a broader international study that sought to measure pet-related stress across pet owners living in the United States and the United Kingdom. All study procedures were approved by the Virginia Commonwealth University Institutional Review Board in September of 2021 (HM20022392). Responses were collected via an online survey hosted on REDCap between October 2021 and August 2022. Participants were recruited via convenience sampling by distributing virtual flyers through social media (e.g., Twitter, Instagram, Facebook) and online interest groups pertaining to pet owners. Members of the research team also shared flyers within their professional networks, such as individuals working at the ASPCA or local animal shelters. Participants were eligible to participate if they (a) were 18 years of age or older, (b) were a resident of the United States or United Kingdom, (c) currently lived with at least one pet, and (d) could write and read English. Interested participants followed the link and/or QR code listed on the flier to the survey and completed a screening questionnaire. If they met the eligibility criteria, they were then provided with an information sheet that provided details about the study procedures. Only individuals who consented to participate were able to move forward with the survey. All scales were completed at one time point. Following the completion of the survey, participants were provided with a list of national resources that may be of interest to pet owners (e.g., national mental health resources, low-cost veterinary services). Compensation was not available for participants in this study.

2.2. Participants

We recruited a convenience sample of 591 individuals who were eligible to participate. We limited the sample for these analyses to individuals living in the United States because the purpose of this study was to validate this measure among pet owners living in the United States and the sample of participants from the United Kingdom was small (*n* = 83). Of the 508 individuals in the United States who were eligible to participate, 469 provided their consent to participate. Individuals with missing data on any items of the PRSS were removed from the dataset, which limited our final sample to 386 adult pet owners living in the United States.

Table 1 reflects the demographic characteristics of our participants. In general, the majority of our sample consisted of White, non-Latine, cisgender women who had obtained

a bachelor's degree or graduate degree. The mean age in our sample was 39.65 years (*SD* = 12.54). The majority of participants lived with multiple different species, with the next two largest groups being those who lived with dogs only or cats only.

Table 1. Demographic characteristics (*N* = 386).

Variable	Categories	*n*	%
Race/Ethnicity	Arab	1	0.3
	Asian/Pacific Islander	7	1.8
	Black	4	1
	Latina/Latino/Latine	13	3.4
	White	332	86
	Multiple Race/Mixed Race	28	7.3
	Prefer to self-describe	1	0.3
Gender	Agender	14	3.6
	Cisgender man	27	7.0
	Cisgender woman	291	75.4
	Genderfluid	2	0.5
	Genderqueer	5	1.3
	Nonbinary	12	3.1
	Transgender man	2	0.5
	Not sure or questioning	16	4.1
	Multiple options selected	6	1.6
	Missing	4	1
Sexual Orientation	Gay	8	2.1
	Lesbian	10	2.6
	Bisexual	35	9.1
	Two-Spirit	1	0.3
	Queer	13	3.4
	Straight/Heterosexual	267	69.2
	Pansexual	3	0.8
	Asexual	5	1.3
	Demisexual	3	0.8
	Not sure or questioning	9	2.3
	Prefer to self-describe	1	0.3
	Multiple options selected	29	7.5
	Missing	2	0.5
Current Living Situation	Rented Apartment/Flat/House	131	33.9
	House/Condo I own	213	55.2
	Relative's home	19	4.9
	Friend's home	1	0.3
	Home of a romantic/sexual partner	8	2.1
	Abandoned building or squat	1	0.3
	Other	2	0.5
	Multiple options selected	11	2.8
Urbanicity	Rural	56	14.5
	Suburban	206	53.4
	Urban	124	31.1
Pet Type	Dog only	140	36.3
	Cat only	97	25.1
	Reptile only	1	0.3
	Rodent only	2	0.5
	Other pet only	1	0.3
	Owns multiple species	145	37.6

2.3. Measures

2.3.1. Pet-Related Stress Scale

First, the research team developed an initial pool of 59 items, assessed on a 5-point Likert scale, to measure pet owners' stress related to living with a pet. Because there are no current measures assessing this construct, the items were drawn and adapted from existing measures of related constructs, such as pet bereavement [74], parental stress [82,83], caregiving burden [76], and teacher stress [84]. Additionally, the initial pool of items was informed by qualitative interviews conducted with pet owners discussing stress caused by living with a pet [2,30,71,85]. The items were intentionally written to be applicable to all pet owners, rather than focusing on any particular species of pet.

Then, the pool of items was sent to eight researchers and one practitioner with expertise in human–animal interaction for expert review. The qualifications for expert reviewers included publication record, affiliation with HAI organizations, participation in relevant academic conferences, and/or the number of years practicing in a relevant field (e.g., veterinary medicine, community-serving organizations). Experts were asked to (a) review the scale; (b) rate each item on its relevance to the construct of pet-related stress; (c) assess the overall clarity and comprehensiveness of the scale; (d) offer feedback on the response format, clarity of item phrasing; and (e) offer suggestions for the addition or deletion of items to refine the scale. Expert reviewers were also provided alternative item structures (i.e., "It bothers me that", "I am stressed about"). To facilitate this process, all experts were sent a link to a REDCap survey that consisted of closed- and open-ended questions. We received feedback from eight experts. The feedback provided by the experts was used to refine the scale to a total of 45 items and to determine the best item structure ("I worry...") and response options (Never, A little, Sometimes, Most of the time, All of the time). The revised version of the scale used in this study can be found in Appendix A.

2.3.2. Measures for Convergent and Divergent Validity

General perceived stress was measured using the 10 item Perceived Stress Scale (PSS [86]). This scale assesses the degree to which participants perceive life events experienced within the past month as stressful on a 5-point Likert scale, ranging from never to very often. We used the two-factor model of perceived stress, as recommended by Koğar and Koğar [87]; this yielded two sum scores that reflected perceived helplessness (i.e., "How often have you been upset because of something that happened unexpectedly?") and self-efficacy (e.g., "How often have you been able to control irritations in your life"). Higher scores on each subscale reflect higher perceived levels of helplessness and self-efficacy. Internal consistency of the perceived helplessness ($\omega = 0.89$) and self-efficacy ($\omega = 0.84$) subscales were good.

Psychological stress was assessed using the Brief Symptom Inventory-18 (BSI-18 [88]). The BSI-18 is a commonly used measure of acute psychological symptoms across three subscales (i.e., depression, anxiety, somatization), as well as a total score that reflects overall psychological stress. The analyses in this study only included the construct of psychological stress reflected by the total score. We opted to select an average score of psychological stress, rather than specific mental health symptoms, to better align with dimension of ongoing pet-related stress measured by the PRSS. The full measure includes 18 items, measured on a five-point Likert scale from 0 (not at all) to 4 (extremely; e.g., "nervousness or shakiness inside", "feeling no interest in things", "feeling nervous when you are left alone", "poor appetite"). One item (i.e., "thoughts of ending your life") was removed at the request of the Institutional Review Board, given that appropriate crisis management would not be feasible. Higher scores on the BSI-18 reflect higher levels of psychological stress. Internal consistency of the BSI-18 in our sample was excellent ($\omega = 0.93$).

Social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS [89]). This 12-item scale measures social support derived from family, friends, and significant other(s) across a 7-point Likert response scale, ranging from strongly disagree to strongly agree. All 12 items were averaged to reflect a total score of perceived

social support, with higher scores indicating higher levels of social support. Sample items include "I can count on my friends when things go wrong", "I get the emotional help and support I need from my family", and "There is a special person with whom I can share my joys and sorrows". In our sample, internal consistency of the MSPSS was excellent ($\omega = 0.96$).

Coping self-efficacy was assessed using the reduced-item version of the Coping Self-Efficacy Scale (CSE [90]). This version of the CSE consists of 13 items that are categorized into three factors: problem-focused coping (6 items; e.g., "Break an upsetting problem down into smaller parts"), stopping unpleasant emotions and thoughts (4 items; e.g., "Take your mind off unpleasant thoughts"), and deriving support from friends and family (3 items; e.g., "Get friends to help you with the things you need"). An overall score of coping self-efficacy was computed by summing individual items; higher scores on the CSE indicate higher levels of coping self-efficacy. Internal consistency of the CSE in our sample was excellent ($\omega = 0.97$).

2.4. Analysis Plan

To test the factor structure of the PRSS, we conducted a confirmatory factor analysis in R open source software (Version 2023.06.0+421). Our sample size of 386 participants was sufficient to conduct this analysis [91]. Descriptive analyses of the items revealed that very few (<20) participants utilized the highest two response options for any item. We conducted the confirmatory factor analysis (CFA) using a diagonally weighted least means (WLSMV) estimator, as typically recommended for ordinal data [92,93]. The limited endorsement of the highest response options prevented the CFA from running using the WLSMV estimator; therefore, we collapsed the response options into a 3-point Likert scale (i.e., Never, A little, Sometimes/Most of the time/All of the time). Additionally, we conducted a sensitivity analysis using a robust maximum likelihood (MLR) estimator, as recommended for non-normal data [94]. The MLR estimator allowed us to retain the original 5-point Likert response option structure. Model fit was assessed using the following evaluation values: nonsignificant chi-square test or a chi-square/df ratio less than 3 [95], CFI and TLI values above 0.95 [96], and RMSEA and SRMR values below 0.08 [97].

Based on the prior literature and our hypotheses, we compared a three-factor model to a unidimensional model to determine which factor structure fits the data best using the WLSMV and MLR estimators. After determining the estimator and model structure that best fit the data, we assessed convergent and divergent validity of the PRSS with other constructs. Specifically, we conducted several bivariate correlations, using the Pearson correlation coefficient, between the PRSS (using mean scores from the best factor structure identified in previous steps) and constructs of general stress, psychological stress, social support, and coping self-efficacy.

Finally, we conducted multiple group analysis to evaluate measurement invariance across age, race/ethnicity, sexual orientation, gender identity, and gender modality. We collapsed age into three categories to reflect young adulthood (18–29 years), middle adulthood (30–49 years), and older adulthood (50+ years). Gender identity was collapsed into three categories of man, woman, and nonbinary. Due to limited numbers of individuals in each identity category for race/ethnicity, sexual orientation, and gender modality [98,99], we dichotomized these variables and compared the following categories: White, non-Latine vs. minoritized racial/ethnic groups (see the Discussion and Limitations sections for comments on the strengths and limitations of this approach); heterosexual/straight vs. nonheterosexual sexual orientation; and cisgender vs. transgender/gender diverse identity. To test measurement invariance, we examined the best-fitting model across groups (i.e., configural invariance) and then compared the unconstrained model with a model that constrained factor loadings (i.e., metric invariance) and thresholds (i.e., scalar or strong invariance) to be equal across groups. Given our sample size, we followed recommendations to use the change in CFI as the metric for assessing measurement invariance, rather than the

chi-square difference test [100]. Measurement invariance across groups was supported if change in CFI was less than or equal to 0.01.

3. Results

3.1. Factor Structure

The fit statistics for the three-factor and unidimensional models can be found in Table 2, with results provided with each estimator. Although we found that the three-factor model was a better fit using the WLSMV estimator than the MLR estimator, we opted to move forward with the MLR estimator in order to retain the original response option structure. The three-factor model still demonstrated adequate fit using the MLR estimator.

Table 2. Confirmatory factor analysis results.

Estimator	Model	χ^2	df	χ^2/df	CFI	TLI	RMSEA [90% CI]	SRMR	χ^2 Diff	AIC	BIC
WLSMV	Unidimensional	1692.82 ***	209	8.10	0.808	0.788	0.137 [0.131, 0.143]	0.193	n/a	n/a	n/a
	Three-Factor	411.82 ***	227	1.81	0.977	0.975	0.046 [0.039, 0.054]	0.078		n/a	n/a
MLR	Unidimensional	1409.26 ***	148	9.52	0.668	0.616	0.149 [0.142, 0.156]	0.162	1044.9 ***	14,735	14,901
	Three-Factor	364.36 ***	144	2.53	0.942	0.931	0.063 [0.055, 0.071]	0.059		13,698	13,880

*** $p < 0.001$. Note. df = degrees of freedom; CFI = comparative fit index; TLI = Tucker–Lewis fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean squared residual; χ^2 diff = chi-square difference test; AIC = Akaike information criterion; BIC = Bayesian information criterion; n/a = not applicable; WLSMV = weighted least square mean and variance adjusted; MLR = maximum likelihood with robust standard errors.

To achieve the best fitting model, we removed 26 redundant items and items with low factor loadings (<0.40), yielding a final 19-item measure. Items that were removed can be found in Table 3. The results of the CFA for the more parsimonious measure suggest that the hypothesized three-factor model (i.e., economic stress, psychological stress, and social stress) fit the data well. We found good internal consistency for the economic stress factor ($\omega = 0.88$), which included items relating to the stress of affording items and services to appropriately care for pets. The psychological stress factor also demonstrated good internal consistency ($\omega = 0.89$), with included items relating to concerns about the pet's health and welfare, the owner's own health and welfare, and pet behavioral problems. We found excellent internal consistency ($\omega = 0.93$) for the social stress factor, which included items relating to pet-related difficulties in relationships or the pet's negative impact on owners' engagement in social events. All items included in the three-factor model had acceptable factor loadings, ranging from 0.44 to 0.89. Items for each factor can be found in Table 4. All three factors were significantly and positively correlated with each other. Additionally, due to high residual errors between items, six items had correlated residual errors in the three-factor model. All significant correlations can be seen in Figure 1.

Using the same items from the best fitting three-factor model, we tested a unidimensional model using both the WLSMV and MLR estimators. Results indicated that the unidimensional model was not a good fit for the data with either estimator (see Table 2 for the fit statistics). Results from a chi-square difference test found that the three-factor model was a significantly better fit than the unidimensional model: $\Delta\chi^2 = 1044.9$, $p < 0.001$.

Table 3. Deleted items.

I worry about affording medication for my pet(s). [a]
I worry that other people in my life do not like my pet(s). [b]
I worry about my pet(s)' behavior. [b]
I worry that my pet(s) keep me from spending time with my family. [c]
I worry about my pet(s) not getting along with a significant other/individual(s) I am dating. [c]
I worry about being responsible for the care of my pet(s).[b]
I worry about my pet(s) being alone for too long. [b]
I worry that my pet(s) is a financial burden. [a]
I worry about how awful it would be if my pet(s) died. [b]
I worry that I might need to give up my pet(s). [b]
I worry about not being able to travel because of my pet(s). [c]
I worry about my pet(s) physically harming me (ex: biting, scratching, tripping over pet). [b]
I worry about my pet(s) causing arguments between me and my friends. [c]
I worry about not being able to take care of my pet if I am hospitalized or need long-term care. [b]
I worry about finding pet-friendly housing.[a]
I worry about my pet(s) causing arguments between me and a significant other(s)/individual(s) I am dating. [c]
I worry about my pet(s) keeping me from spending time with a significant other(s)/individual(s) I am dating. [c]
I worry about being able to afford to repair or replace items damaged by my pet(s).[a]
I worry about my pet(s) making too much noise. [b]
I worry about my pet(s) hurting someone else. [b]
I worry about my pet(s) behaving poorly in public. [b]
I worry about my pet(s) causing arguments between me and a family member. [c]
I worry about my pet(s) hurting visitors/people when they come to my home. [b]
I worry about not being able to find housing because I am a pet owner. [a]
I worry about my pet(s) seriously injuring me. [b]
I worry that my pet is not healthy. [b]

[a] Economic factor; [b] Psychological factor; [c] Social factor.
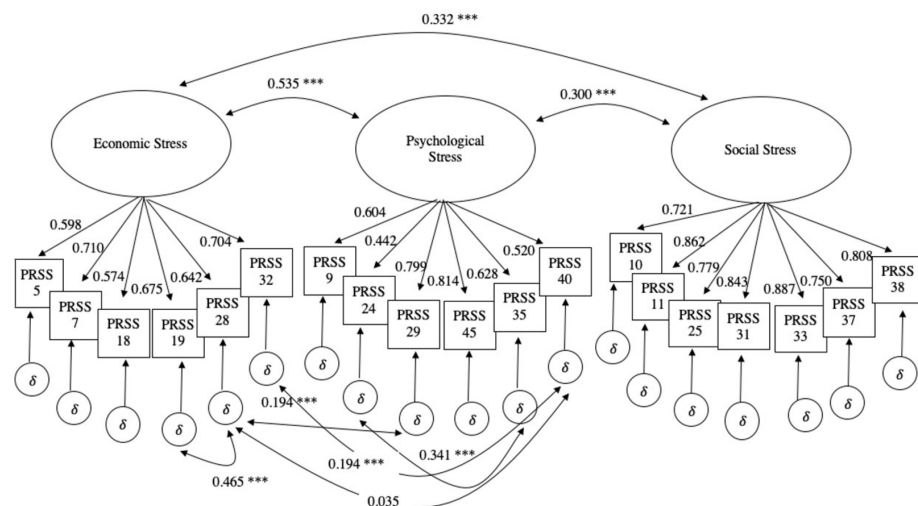
Figure 1. Three-factor model and significant correlations, *** $p < 0.0001$.

Table 4. Final items and factor loadings.

Factor	Item	Factor Loadings
Economic	I worry about affording fees to reclaim my pet(s) from a shelter if they run away.	0.598
	I worry about being able to provide food for my pet(s).	0.708
	I worry about being able to afford pet-related housing fees (e.g., pet rent, pet deposit).	0.574
	I worry about not being able to afford necessary services for my pet(s) (e.g., grooming, behavior training).	0.676
	I worry about paying for veterinary care for my pet(s).	0.638
	I worry that I can't afford things that would make my pet(s) happy (e.g., toys, treats).	0.709
Psychological	I worry about what would happen to my pet(s) if I died.	0.602
	I worry about my pet(s) running away.	0.440
	I worry about my pet(s) getting sick.	0.799
	I worry about my pet getting hurt (e.g., by an animal, a person, a car).	0.572
	I worry that my pet(s) is not happy.	0.440
	I worry about my pet(s) dying.	0.835
Social	I worry that my pet(s) prevents me from doing things I'd like to do.	0.723
	I worry about not attending social events because of my pet(s).	0.862
	I worry that my pet(s) restricts my personal life.	0.781
	I worry about having to turn down invitations to stay home with my pet(s).	0.842
	I worry that I can't go out because of my pet(s).	0.885
	I worry about having to leave social events to go home to my pet(s).	0.749
	I worry that my pet(s) keeps me from spending time with friends.	0.810

3.2. Convergent and Divergent Validity

We found significant positive correlations between psychological stress and economic ($r = 0.33$, $p < 0.001$), psychological ($r = 0.38$, $p < 0.001$), and social ($r = 0.14$, $p < 0.001$) domains of pet-related stress. Similarly, there was a significant positive association between perceived helplessness, a domain of general perceived stress, and the economic ($r = 0.34$, $p < 0.001$), psychological ($r = 0.39$, $p < 0.001$), and social ($r = 0.17$, $p = 0.002$) domains of pet-related stress. Self-efficacy was negatively related to the economic ($r = -0.30$, $p < 0.001$) and psychological ($r = -0.29$, $p < 0.001$) domains of pet-related stress, but was not significantly related to the social domain ($r = -0.07$, $p = 0.17$). We did not find a significant association between social pet-related stress and social support ($r = -0.10$, $p = 0.06$). We also did not find significant associations between coping self-efficacy and economic ($r = -0.07$, $p = 0.18$), psychological ($r = -0.11$, $p = 0.06$), or social ($r = 0.01$, $p = 0.88$) pet-related stress.

3.3. Measurement Invariance

The results of the measurement invariance testing for the three-factor model can be found in Table 5. Although the three-factor model fit the data of the overall sample well, we did not find support for configural invariance across any of the demographic groupings tested. More specifically, the model did not fit the data well among young adults, older

adults, non-White and/or Latine individuals, nonheterosexual/LGBQ+ individuals, or transgender/gender diverse individuals.

Table 5. Measurement invariance results.

Model	χ^2	df	CFI	TLI	RMSEA [90% CI]
Multiple group by age					
Young Adults, *n* = 84	271.97 ***	144	0.86	0.83	0.10 [0.08, 0.12]
Middle Adults, *n* = 230	260.29 ***	144	0.95	0.94	0.06 [0.05, 0.07]
Older Adults, *n* = 87	248.62 ***	144	0.87	0.84	0.10 [0.08, 0.12]
Configural Invariance	780.88 ***	432	0.91	0.89	0.08 [0.07, 0.09]
Multiple group by race/ethnicity					
Non-White and/or Latine, *n* = 55	279.55 ***	144	0.83	0.79	0.132 [0.11, 0.16]
White, non-Latine, *n* = 346	302.76 ***	144	0.95	0.94	0.06 [0.05, 0.07]
Configural Invariance	582.31 ***	288	0.93	0.91	0.07 [0.06, 0.08]
Multiple group by sexual orientation					
Heterosexual/Straight, *n* = 278	266.08 ***	144	0.95	0.94	0.06 [0.05, 0.07]
Nonheterosexual/LGBQ, *n* = 121	292.29 ***	144	0.89	0.86	0.09 [0.08, 0.11]
Configural Invariance	558.37 ***	288	0.93	0.92	0.07 [0.06, 0.08]
Multiple group by gender modality					
Cisgender, *n* = 331	339.69 ***	144	0.94	0.93	0.07 [0.06, 0.07]
Transgender/Gender diverse, *n* = 66	242.82 ***	144	0.87	0.84	0.10 [0.08, 0.13]
Configural Invariance	582.51 ***	288	0.92	0.91	0.07 [0.07, 0.08]
Multiple group by gender					
Woman, *n* = 303	323.95 ***	144	0.93	0.92	0.07 [0.06, 0.08]
Man, *n* = 31	201.12 ***	144	0.89	0.87	0.12 [0.08, 0.15]
Gender diverse, *n* = 67	233.68 ***	144	0.87	0.84	0.10 [0.07, 0.12]
Configural Invariance	758.75 ***	432	0.92	0.90	0.08 [0.07, 0.09]

*** $p < 0.001$

4. Discussion

The purpose of this study was to develop and assess the psychometric properties of the PRSS. Results of the CFAs supported the hypothesis that the PRSS is a good fit for the data as a multidimensional scale, consisting of three factors: economic stress, psychological stress, and social stress. These three factors of pet-related stress coincide with the literature suggesting that owning and/or living with pets may contribute to financial stress [30,60,70,101], housing instability [49,50,71,72,102–104], emotional distress [30,36–40,105], and challenges among relationships with others [30,36,42,43,73]. We discuss additional findings below.

As hypothesized, we found support for positive associations between general stress and psychological stress and all three factors of the PRSS. This is consistent with previous research suggesting that stress related to pet caregiving may be just one factor in broader experiences of social stress, such as experiences of marginalization [106]. As expected, the PRSS was not statistically associated with social support or coping self-efficacy. We expected no association between the PRSS and coping self-efficacy; however, the null finding related to social support contradicts our hypothesis. Previous research has suggested that social support can be a very important factor in helping individuals cope with stress that may arise from pet caregiving [106,107]. It is possible that experiencing social stress related to pet ownership is not necessarily associated with lower self-perceived social support or altered social behaviors. For example, despite worrying about how the responsibilities of pet caregiving may limit their ability to attend social events and socialize, pet owners may still perceive that their social network is available in times of need or may have developed alternative methods (e.g., video or phone calls) to maintain relationships despite any limitations. It is also possible that pet owners' social networks consist of individuals who are accepting of their social limitations related to pet caregiving, and, thus, they still feel supported by their network even though having to care for their pet restricts them from attending social events or spending time with friends.

It is important to note that the PRSS is intended to be a measure of average, ongoing pet-related stress over the past month, similar to other commonly used measures of mental health or wellbeing. We recognize that stress is a dynamic process and individuals can experience changes in acute levels of stress on a daily basis [108–110]. It is possible that pet owners may experience changes in their acute levels of pet-related stress; for example, a temporary environmental change, such as road construction outside of a pet owner's home, may cause a dog to bark, which may impact acute stress levels. Given that measuring pet-related stress is still a nascent area, it may be useful for future research to consider the best ways to measure acute and chronic stressors related to living with a pet.

We did not find measurement invariance across sociodemographic groups. This could be a result of a relatively small sample size and small group sizes for some of the sociodemographic categories. However, this suggests that the PRSS should be used with caution because we were unable to confirm that it is the best factor structure for all sociodemographic groups. Furthermore, the lack of statistical support for measurement invariance could be affected by our coding procedures: the small group sizes for many of the sociodemographic groups required us to dichotomize several variables by combining categories. For example, we grouped all participants from marginalized racial and ethnic groups into one category (i.e., non-White, including Latine participants) to compare with a group of White, non-Latine participants. Due to our small sample size, we could not test measurement invariance by sociodemographic characteristics in another way. Not only may this approach have led to our null findings, but also, as argued by Jenkins and Rudd [111], this approach may have overlooked intricate experiences rooted in identity. Future research should further test the psychometric properties of the PRSS among samples that are more representative of the US pet-owning population and test for invariance in these population groups to determine whether the scale needs modification to achieve invariance across sociodemographic groups. Appropriate replication of any modifications to confirm measurement invariance should then be conducted [112]. Additionally, researchers should consider how membership in multiple marginalized identity groups can intersect and potentially compound one's experience of pet-related stress [111,113].

4.1. Limitations

There are important limitations that should be considered in the context of this study's findings. First, as mentioned previously, our sample lacked diversity in race, ethnicity, socioeconomic status, gender, and sexual orientation. Our sample does not reflect the overall diversity of the pet-owning population, but is typical of respondents in other HAI studies [114,115]. This is especially important to consider in light of the fact that one of the

three factors identified related to economic stressors, which may be heightened among pet owners who belong to marginalized groups [50,73]. Additionally, evidence suggests that relationships with pets may differ by gender [116,117], and our sample largely consisted of cisgender women. Due to a lack of translation resources, our study materials and scales were only provided in English; this may have limited the cultural diversity of our sample by excluding respondents who were not fluent in English. Additionally, the use of convenience sampling and our inability to compensate participants for their time may have led to a biased sample of pet owners who were particularly motivated to volunteer their time to complete the survey. This may have resulted in the skewness of our data, in which few participants reported experiencing high levels of pet-related stress. These findings may not be generalizable to the overall population of pet owners; therefore, future research should test this measure among more diverse and representative samples. We also had few participants who lived with species other than dogs and cats and, thus, were unable to test the PRSS's invariance across animal species.

4.2. Implications and Future Directions

The PRSS provides an opportunity for researchers to better assess the multidimensional nature of human–pet relationships, which will contribute to progression within the field of HAI and related fields. As discussed above, previous research has consistently identified stressful aspects of pet caregiving, yet the field lacked a validated scale to consistently measure this construct. We encourage researchers to utilize the PRSS in future studies assessing the health implications of pet ownership. Future research might also explore our unexpected findings related to the lack of significant association between social support and pet-related stress by assessing the role of social support networks in navigating experiences of pet-related stress. The PRSS may also be useful in practice, such as among human health providers who serve patients with pets, as well as among veterinary providers for their clientele in identifying factors that may contribute to pet-related stress or resources that may ameliorate this stress.

However, the PRSS should be used with caution until further psychometric testing can evaluate measurement invariance within larger, more diverse samples. Additionally, given the low endorsement of high response options (i.e., sometimes, most of the time, all of the time), future research may benefit from testing this measure with a 3-point Likert scale, or other response option configurations. It may also be helpful to test the response options among pet owners from various socioeconomic backgrounds; it is possible that our highly educated and well-resourced sample may not experience high levels of pet-related stress, while other groups of pet owners may experience higher levels of pet-related stress and, thus, utilize the highest response options. Future research should also conduct psychometric testing of this measure among pet owners who live with species that are not dogs and cats to assess whether the model is appropriate for use with pet owners of other species.

5. Conclusions

This study addressed an urgent gap in the field of HAI research by developing the PRSS, a measure that assesses feelings of economic, psychological, and social stress related to living with a pet among pet owners in the US. Our results support the reliability and validity of the PRSS, although we encourage further psychometric testing to ensure the PRSS is appropriate for use with diverse pet-owning populations. It is vital that studies include constructs related to the potential negative aspects of pet ownership, such as pet-related stress, to elucidate the multifaceted ways in which interactions with pets may contribute to human health and wellbeing.

Appendix A

Pet-Related Stress Scale

Directions: Please think about the pet(s) you are currently living with when answering the following questions. Read each statement below and select the option that best describes how much each pet-related situation has worried you **over the past 30 days.**

I worry…					
1. About affording fees to reclaim my pet(s) from a shelter if they run away.	Never	A little	Sometimes	Most of the time	All the time
2. About not being able to provide food for my pet(s).	Never	A little	Sometimes	Most of the time	All the time
3. About what would happen to my pet(s) if I died.	Never	A little	Sometimes	Most of the time	All the time
4. That my pet(s) prevents me from doing things I'd like to do.	Never	A little	Sometimes	Most of the time	All the time
5. About not attending social events because of my pet(s).	Never	A little	Sometimes	Most of the time	All the time
I worry…					
6. About being able to afford pet-related housing fees (e.g., pet rent, pet deposit)	Never	A little	Sometimes	Most of the time	All the time
7. About not being able to afford necessary services for my pet(s) (e.g., grooming, behavior training).	Never	A little	Sometimes	Most of the time	All the time
8. About my pet(s) running away.	Never	A little	Sometimes	Most of the time	All the time
9. That my pet(s) restricts my personal life.	Never	A little	Sometimes	Most of the time	All the time
10. About paying for veterinary care for my pet(s).	Never	A little	Sometimes	Most of the time	All the time
I worry…					
11. I worry about my pet(s) getting sick.	Never	A little	Sometimes	Most of the time	All the time
12. About having to turn down invitations to stay home with my pet(s).	Never	A little	Sometimes	Most of the time	All the time
13. That I can't afford things that would make my pet(s) happy (e.g., toys, treats).	Never	A little	Sometimes	Most of the time	All the time
14. That I can't go out because of my pet(s).	Never	A little	Sometimes	Most of the time	All the time
15. About my pet getting hurt (e.g., by an animal, a person, a car)	Never	A little	Sometimes	Most of the time	All the time

I worry...					
16. About having to leave social events to go home to my pet(s).	Never	A little	Sometimes	Most of the time	All the time
17. That my pet(s) keeps me from spending time with friends.	Never	A little	Sometimes	Most of the time	All the time
18. That my pet(s) is not happy.	Never	A little	Sometimes	Most of the time	All the time
19. About my pet(s) dying.	Never	A little	Sometimes	Most of the time	All the time

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