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Testing the Psychometric Properties of the Pet Attachment and Life Impact Scale (PALS) Among a Sample of Sexual and Gender Minority Emerging Adults

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There has been increased research attention on the benefits associated with attachment bonds between humans and their companion animals, such as for human physical health, mental health, and overall quality of life. However, there is a lack of human-animal attachment measures that have been psychometrically evaluated across diverse samples. The current study addressed this gap by testing the psychometric properties of the Pet Attachment and Life Impact Scale (PALS). Our sample included 154 sexual and gender minority emerging adults who had lived with a dog and/or cat in the past year and responded to the PALS regarding a dog or cat (M_{age} = 19.34 years, SD_{age} = 1.12 years; 37% racial/ethnic minority; 50% gender minority; 98.7% sexual minority). We collapsed the lowest three response options due to low endorsement; to conduct invariance testing, items 11, 20, 28, and 37 were deleted due to high correlations between items. Confirmatory factor analyses found that a modified three-factor model, excluding the Negative Impact items, fit our data best. We found support for strong measurement invariance across gender modality, racial/ethnic majority vs. minoritized groups, participation prior to or after the COVID-19 pandemic onset, and pet type groups. All three PALS factors (Love, Regulation, Personal Growth) were correlated with human social support from friends, and the Love factor was positively associated with emotional comfort from pets, providing evidence of construct validity. Given the potential role of attachment bonds with companion animals in promoting human health and wellbeing, future research should continue to evaluate the psychometric properties of the PALS and measurement equivalence across a broader range of demographic groups to ensure meaningful interpretation of pet attachment scores.

Keywords: human-animal bond, human-animal interaction, attachment, LGBTQ, measurement

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It is estimated that more than half of U.S. households include at least one pet (Mueller et al., 2021). This high rate of multi-species cohabitation has prompted increased research attention in studying the bonds between humans and their companion animals, as well as the potential benefits and risks that are associated with human-animal relationships across the lifespan. One commonly studied domain of the human-animal bond is pet attachment. Multiple scholars have used attachment frameworks typically applied to mother-child relationships (e.g., Ainsworth, 1989; Bowlby, 1973, 1980, 1982) to understand and test the emotional bond between a pet and their guardian (Kurdek, 2008; Sable, 2013; Zilcha-Mano et al., 2011). Across studies, stronger attachment to pets has been associated with several indices of human health and wellbeing, such as lower levels of perceived stress (Wu et al., 2018); higher quality of life (Marsa-Sambola et al., 2017; Teo & Thomas, 2019); lower depression, anxiety, and psychological stress (Teo & Thomas, 2019); and greater physical activity (Gadomski et al., 2017).

Several instruments have been developed to measure pet attachment (e.g., Lexington Attachment to Pets Scale, Johnson et al., 1992; Pet Attachment Questionnaire, Zilcha-Mano et al., 2011). However, extensive psychometric testing of these scales across diverse samples has been limited. Many scholars have noted that the lack of psychometrically tested measures in human-animal interaction science prevents researchers from making meaningful comparisons across studies (Bures et al., 2019; Esposito et al., 2011; McCune et al., 2014; Rodriguez et al., 2018; Tomlinson, Pittman, et al., 2022). Furthermore, studies that have tested the psychometric properties of existing measures have failed to include representative samples that are inclusive of systemically marginalized populations, such as racialized minorities and/or transgender or gender expansive individuals. Due to this limitation of many human-animal interaction (HAI) studies, the use of these measures without validation with diverse and underrepresented samples could result in erroneous conclusions that do not accurately capture the unique experiences of marginalized individuals (Boateng et al., 2018; Byrne & van de Vijver, 2010). Therefore, the purpose of this study was to test the psychometric properties of one commonly used measure of pet attachment, the Pet Attachment and Life Impact Scale (PALS; Cromer & Barlow, 2013), in a diverse sample of sexual and gender minority (SGM) emerging adults.

SGM Emerging Adults

The SGM community is comprised of individuals who identify as LGBTQ+ (i.e., lesbian, gay, bisexual, transgender, queer, and other minoritized sexual and gender identities). Sexual minorities are those who identify with a sexual orientation that falls outside the scope of, or does not align with, the cisheteronormative dominant culture (e.g., bisexual, queer, gay, pansexual); gender minorities are individuals whose gender identity (e.g., transgender, nonbinary, genderfluid) or expression (e.g. pronouns, behavior, outward appearance) is different, or is perceived as different, than the sex they were assigned at birth (i.e., label assigned by a medical professional at birth, such as male, female, or intersex; American Psychological Association, 2015; Schrager et al., 2019). Despite evidence that rates of pet ownership among SGM adults are comparable, if not higher, than rates of pet ownership among cisgender and heterosexual adults (67-78%; Community Marketing & Insights, 2019; Harris Interactive, 2010), there have been very few studies that have investigated how attachment to pets is related to health and wellbeing among SGM individuals. Results from qualitative studies suggest that relationships with companion animals may be an important source of social support and comfort for SGM adults (Putney, 2014; Rosenberg et al., 2020; Schmitz, Carlisle, & Tabler, 2021; Schmitz, Tabler, et al., 2021). Additionally, attachment bonds with pets may help in coping with stress, mental health issues, and SGM-related minority

stressors (e.g., victimization, rejection from peers or family, discrimination; McDonald, Matijczak, et al., 2021).

The emotional bond and attachment formed with companion animals may be particularly salient for SGM individuals in the emerging adulthood developmental phase. Typically spanning from 18 to 25 years, emerging adulthood is a developmental period characterized by identity exploration, greater autonomy, and instability (Arnett et al., 2014). For SGM emerging adults, the stressors associated with emerging adulthood may be even more challenging to navigate because they are compounded with additional SGM-related stressors (e.g., rejection by family and/or peers; Matijczak et al., 2021; McDonald, Murphy, et al., 2022; McDonald, O'Connor, et al., 2021; Tomlinson et al., in press; see Hall, 2018, for a review). Given higher rates of adversity among SGM emerging adults, it is likely that one's attachment to their pet may be experienced differently within this population; indeed, quantitative and qualitative research with SGM emerging adults supports this hypothesis (McDonald, Matijczak, et al., 2021; Riggs et al., 2018). Understanding the utility of HAI measures in the population is of particular importance given increasing rates of LGBTQ+ identities among youth between the ages of 13-17 years and emerging adults between the ages of 18-24 years, which is estimated to be approximately 9.5% and 30%, respectively (Conron, 2020; The Williams Institute, 2019). It is critical that HAI researchers evaluate measures of attachment to pets to determine whether measures function similarly across demographic groups, including those with SGM identities, to ensure that conclusions drawn from use of these measures are accurate.

Pet Attachment and Life Impact Scale (PALS)

The PALS was developed to measure attachment to pets (i.e., receiving comfort and security from pets) and how pets impact human lives positively and negatively and has been used in several studies (e.g., Barlow et al., 2012; Behler et al., 2020; Volsche & Gray, 2016; Wilson et al., 2021). The original item pool included 39 items and was generated from an unpublished qualitative study of undergraduate students in the U.S. regarding the impact of pets on their lives (Cromer & Barlow, 2013). Utilizing principal axis factor analysis, Cromer and Barlow (2013) tested the psychometric properties of the original item pool and found that the construct was best represented by a 35-item, four factor structure. The PALS was then tested using confirmatory factor analysis, and the results supported the 4-factor model of: Love (i.e., receiving love from pets), Regulation (i.e., using pets as a source of emotion regulation), Personal Growth (i.e., personal or emotional growth that has occurred as a result of pet ownership), and Negative Impact (i.e., negative impact of pet ownership). Validity testing further demonstrated this distinction. The first three factors of the PALS, but not the Negative Impact factor, all demonstrated good convergent validity with other measures of HAI (i.e., Anthropomorphism Scale, Albert & Bulcroft, 1988; Companion Animal Bonding Scale, Poresky et al., 1987; Lexington Attachment to Pets Scale, Johnson et al., 1992; CENSHARE Pet Attachment Scale, Holcomb et al., 1985). Finally, Cromer and Barlow (2013) found that the Love and Negative Impact (reverse scored, higher values represented *less* negative impact) factors were weakly, yet positively correlated with perceived human social support from significant others, family, and friends.

The Cromer and Barlow (2013) study reported on the initial scale development and validation of the PALS; however, there are a few notable limitations. First, although their findings suggested that the Negative Impact factor was not related to the other dimensions of attachment, the authors did not test or report on alternative factor models to determine whether the data were best represented by another factor structure, such as a 3-factor model. Second, the researchers did

not examine measurement invariance (i.e., whether the underlying structure of the PALS is equivalent across groups) of the PALS factors. They relied on multivariate analysis of variance (MANOVA) to examine differences in PALS scores based on pet ownership status, type of pet, and participants' gender. Although they found differences in scores on the PALS based on gender (i.e., male, female), pet ownership status, and pet type (Cromer & Barlow, 2013), failure to test for measurement equivalence across these variables means that we cannot be confident that the differences in mean scores are not the result of the PALS (i.e., the construct of pet attachment) having a different meaning or structure across groups (Putnick & Bornstein, 2016). The authors also reported that they assessed differences in PALS scores based on "gender"; however, they only reported differences based on binary "male" and "female" participants. This is a significant limitation of their validation study as their results may mask nuanced differences between broader gender and sexual identities, inclusive of gender diverse and expansive individuals.

Since the initial validation study, the PALS has been used in eight peer-reviewed, published studies. Prior studies have linked higher levels of pet attachment with feeling closer to one's pet (Behler et al., 2020) and have found positive associations between pet attachment and human social support (Behler et al., 2020; Cromer & Barlow, 2013), psychological and social wellbeing (Schwarzmüeller-Erber et al., 2020a), positive mood (Schwarzmüeller-Erber et al., 2020b), and anthropomorphizing one's pet (Behler et al., 2020; Cromer & Barlow, 2013). In addition, multiple studies have identified differences in attachment based on gender (i.e., binary sex; Behler et al., 2020; Schwarzmüeller-Erber et al., 2020a) and type of HAI (i.e., recreational horseback riding versus dog ownership; Schwarzmüeller-Erber et al., 2020b). However, among the eight peer-reviewed, published studies that have cited Cromer and Barlow (2013) since the initial validation study and utilized the PALS as a measure, we are aware of only six studies that have reported the psychometric properties of the measure (e.g., Behler et al., 2020; Schwarzmüller-Erber et al., 2020a, 2020b, 2021; Tomlinson, Pittman, et al., 2022; Volsche & Gray, 2016).

Across peer-reviewed studies reporting on the psychometric properties of the PALS, five studies reported information on the reliability of the measure within the study's sample, which was assessed via Cronbach's alpha. Coefficient alpha is limited in its ability to determine whether the measure assesses the construct of interest and is not an adequate assessment of internal consistency (Hayes & Coutts, 2020). To our knowledge, only one peer-reviewed study has investigated the factor structure and validity of the PALS since Cromer and Barlow's (2013) initial validation study. Specifically, Tomlinson, Pittman, et al. (2022) reported on the psychometric properties of a measure of emotional comfort from companion animals and used the PALS to assess construct validity. In their study, confirmatory factor analysis of the PALS confirmed that a 3-factor model (i.e., Love, Regulation, Personal Growth) best represented the data; using this model of the PALS, the authors found evidence to support construct validity. However, details regarding the factor analysis were not reported.

Improving Measurement Validity

There is significant need for continued psychometric testing of the PALS. The lack of measurement invariance testing of the instrument draws into question whether meaningful comparisons of mean scores of the PALS can be made across demographic groups and whether the differences in scores are due to discrepancies in how the measure functions across groups. The predominant assumption of binary gender/sex identities in HAI studies (e.g., Cromer & Barlow, 2013; Schwarzmüeller-Erber et al., 2021) also highlights that sexual and gender minority communities (e.g., LGBTQ+) may not be represented in scale development and differences based

on SGM identities have not been explored in analyses. For example, of the 8-peer-reviewed published studies that have used the PALS measure since the initial validation study, only two studies reported information about SGM identity (McDonald, Murphy, et al., 2022; Tomlinson, Pittman, et al., 2022) and another study reported sexual orientation but utilized binary gender identity categories (i.e., male/female; Volsche & Gray, 2016). As the field of HAI increases in rigor and breadth, it is important that researchers move toward including samples from a variety of sociocultural backgrounds (e.g., racial/ethnic identities, sexual/gender identities, socio-economic statuses; Applebaum et al., 2021; Mueller et al., 2021; Rodriguez et al., 2021). To this end, it is vital that researchers extensively test the psychometric characteristics of existing measures, such as the PALS, among underrepresented samples such as SGM adults.

Current Study

The purpose of the current study was to expand knowledge by examining the psychometric properties of the PALS in a sample of SGM emerging adults. Specifically, our goals were to: (a) test the original PALS four-factor structure and competing factor structures in a sample of SGM emerging adults, (b) test measurement invariance across demographic characteristics (i.e., race/ethnicity, sexual orientation, gender modality, pet species, and participation prior to or after the onset of COVID-19 pandemic), and (c) examine construct validity of the PALS. To test the validity of the PALS, we examined associations between the PALS and constructs of emotional comfort derived from companion animals and human social support, separately. We had competing hypotheses as to the factor structure of the PALS based on results from Cromer and Barlow (2013). We hypothesized that we would find either a four-factor structure that confirmed the structure Cromer and Barlow (2013) found (i.e., Love, Regulation, Personal Growth, Negative Impact) in their measure development study or we would find a three-factor structure that did not include the Negative Impact factor fits best. Given the similarities in constructs and prior evidence that interactions with pets may be a source of emotional and social support and may facilitate relations with other humans (Graham & Glover, 2014; McDonald, Matijczak, et al., 2021; Wood et al., 2015, 2017), we hypothesized that pet attachment would be positively associated with both of these constructs.

Methods

Participants

The current study included participants recruited for a study examining stressors and supports experienced by sexual and gender minority (SGM) youth. The overarching study recruited individuals who were between 15 and 21 years of age, self-identified as LGBTQ+, and communicated via spoken English, with an intended sample size of 240 pet owners. Given the limited number of participants under the age of 18 (i.e., $n = 5$) and due to the unique characteristics of HAI in emerging adulthood (Graham et al., 2019; McDonald, Matijczak, et al., 2021), only participants between the ages of 18 and 21 years and who lived with a dog or cat in the past year *and* responded to the PALS regarding a dog or cat were included in the analysis for the current paper. We limited our sample to those who had lived with and responded to the PALS about a dog or cat as only a few participants reported living with or responded to the PALS about a different species (i.e., only 4 participants did not live with a dog/cat and only 10 participants who lived with a dog/cat responded to the PALS regarding a different species). Thus, our final sample reflects 154 emerging adults ($M_{age} = 19.34$ years, $SD_{age} = 1.12$ years) who reported on either their dog ($n = 90$, 58.4%) or cat ($n = 64$, 41.6%). The majority of participants (98.7%) self-identified as a sexual minority (e.g., lesbian, gay, bisexual), 50.0% selected at least one gender minority identity (e.g.,

transgender, nonbinary) while the other 50.0% of participants were cisgender, and approximately 37.0% of our sample identified as a member of a minoritized racial/ethnic group. Additional demographics are provided in Table 1. Although our final sample size was smaller than the intended sample size, a prior simulation study by Wolf et al. (2013) suggests that with multiple indicators for each factor and moderately strong factor loadings (i.e., >.65), our sample size of 154 is greater than the minimum required for a confirmatory factor analysis.

Measures

Pet Attachment and Life Impact Scale (PALS)

The PALS is a 35-item measure that was developed to assess the impact companion animals have on the lives of pet owners and pet owners' attachment to pets (Cromer & Barlow, 2013). The measure includes four subscales: love (17 items; e.g., "My pet is part of my family," "My pet gives me unconditional love"), regulation (9 items; e.g., "My pet teaches me to trust," "My pet provides stability for me"), personal growth (5 items; e.g., "My pet teaches me responsibility," "I have learned compassion from my pet"), and negative impact (4 items; e.g., "My pet is a financial hardship," "Having a pet is stressful"). Participants ranked on a 5-point Likert scale (from *not at all* to *very much*) how strongly each statement reflected the impact their companion animal had on their life. The items comprising the total score (ω = .95) and the love, regulation, and personal growth, but not negative impact subscales (ω = .87, .88, .81, .52, respectively) demonstrated adequate internal consistency.

Comfort from Companion Animal Scale (CCAS)

Emotional comfort from companion animals was measured using the 11-item Comfort from Companion Animals Scale (CCAS; Zasloff, 1996). The measure includes items such as, "My pet makes me feel trusted" and "My pet provides me with companionship" to assess the emotional comfort individuals receive from their pets. Participants responded to each item on a 4-point Likert scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). We utilized the unidimensional structure (i.e., deleting items 3, 5, and 8; collapsing response options to *strongly agree* and *do not strongly agree*) as it fit best among a similar sample of SGM emerging adults (Tomlinson, Pittman, et al., 2022). Preliminary confirmatory factor analyses suggested that this model fit our data well, $X^2(20) = 26.45$, root mean square error of approximation (RMSEA) = .05, comparative fit index (CFI) = 1.00, Tucker-Lewis index (TLI) = 1.00, standardized root mean square residual (SRMR) = .05. Therefore, this modified unidimensional latent model was utilized in our analyses (ω = .90).

Perceived Social Support (MSPSS)

Perceived social support from humans was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS), a 12-item measure that assesses support received from family, friends, and significant others (Zimet et al., 1988). Participants ranked items (e.g., "I can talk about my problems with my family," "I can count on my friends when things go wrong," "I have a special person who is a real source of comfort to me") on a 7-point Likert scale ranging from 1 (*very strongly disagree*) to 7 (*very strongly agree*). Subscale scores for each of the social support domains (i.e., family, friends, significant others) and the total score were computed as an average; internal consistencies across all subscales (ω = .90, .88, .92, respectively) and the total score (ω = .81) were adequate in our sample. Prior HAI research utilizing the MSPSS has found that scores are positively correlated with measures of human pet attachment (e.g., Antonacopoulos & Pychyl, 2010; Cromer & Barlow, 2013).

Table 1

Participant Demographics (N = 154)

Variable name	Variable categories	*n*	%
Race/Ethnicity	Arab/Arab American	1	0.6
	Asian/Asian American	2	1.3
	Black/African American	22	14.3
	Latina/Latino/Latinx	8	5.2
	Multiracial/Mixed Race	23	14.9
	White	97	63.0
	Prefer to self-describe	1	0.6
Gender identity	Agender	4	2.6
	Cisgender man	14	9.1
	Cisgender woman	63	40.9
	Genderfluid	3	1.9
	Genderqueer	4	2.6
	Nonbinary	15	9.7
	Transgender man	17	11.0
	Transgender woman	3	1.9
	Not sure/questioning/prefer to self-describe	3	1.9
	Identified with multiple categories	23	14.9
Sexual orientation	Asexual	2	1.3
	Bisexual	39	25.3
	Demisexual	1	0.6
	Gay	13	8.4
	Lesbian	18	11.7
	Pansexual	13	8.4
	Queer	19	12.3
	Straight/heterosexual	2	1.3
	Not sure or questioning	1	0.6
	Identified with multiple categories	46	29.9

Pet type [a]	Lived with		Primary caretaker[b]		Consider pet family member[b]	
	n	%	*n*	%	*n*	%
Cat	87	56.5	45	51.7	81	93.1
Dog	106	68.8	33	31.1	103	97.2
Fish	12	7.8	10	83.3	8	66.7
Lagomorph	7	4.5	4	57.1	6	85.7
Reptile	7	4.5	5	71.4	5	71.4
Rodent	5	3.2	4	80.0	5	100.0
Tarantula	1	0.6	0	0	0	0

[a] Participants who lived with a cat/dog in the past year could report information on up to three pets. The frequencies reported here indicate that some participants lived with multiple pets, including non-dog/cat species. The categories are not mutually exclusive.
[b] Percentages are based on total number of participants that lived with the specific pet type.

Procedures

Participants were recruited from April 2019 to May 2021 within an urban city in the mid-Atlantic region of the United States. Recruitment efforts included posting and/or distributing flyers in the community, at our community partners' office spaces, online via social media and listservs, and at LGBTQ-related community events. Individuals who were interested in participating in the study contacted the project coordinators via telephone or email. Project coordinators completed a screening interview with participants over the phone to confirm eligibility, and those who were eligible to participate scheduled a time and location (i.e., either in a private office space at the university or at one of the local community partner agencies) to meet with study staff. The research assistants obtained informed consent from all participants prior to proceeding with data collection. Participants had the option to complete a self-administered survey via RedCap on a laptop provided by study staff or to have the research assistant administer the survey verbally. All participants chose to self-administer the survey while the research assistant was present to answer questions and to facilitate study procedures, but the research assistant was not able to view participant responses. After the onset of the COVID-19 pandemic, all interviews that occurred after March 16, 2020, were conducted using the video-conference platform Zoom (version 5) to adhere to local public health guidelines. These procedures applied to 27.3% of our sample. All participants were compensated either in cash (for in-person interviews) or by check (for Zoom interviews). The compensation rate was calculated based on estimates of how long participation would take, and were established in consultation with our community partners who were serving LGBTQ+ youth and young adults and who partnered in our research. All study procedures, including the change to video-conferencing procedures, were approved by the research team's university IRB (HM20014415).

Analysis Strategy

All analyses were conducted in Mplus (version 8.6). All items were ranked on a Likert response scale and were thus treated as ordered categorical variables. The weighted least squares mean- and variance-adjusted estimator (WLSMV) accounted for the unequal distance between ordinal categories (Beauducel & Herzberg, 2006; Rhemtulla et al., 2012). The WLSMV estimator in Mplus does not allow empty cells in the bivariate table. Preliminary analyses suggested that the three lowest response options on the PALS (i.e., "not at all," "somewhat," and "moderately") needed to be collapsed into one category due to low endorsement (Curran et al., 2014; Rutkowski et al., 2019). For example, on average 5.97% of the sample endorsed "not at all," 8.91% endorsed "somewhat," and 11.82% endorsed "moderately." Therefore, we collapsed the lowest three response options and retained the two highest response options: "very much" and "quite a bit." Further, in order for measurement invariance testing to run without error, two items from the love subscale and two items from the regulation subscale were deleted from the PALS due to high correlations between items (see Table 2). Therefore, subsequent analyses were conducted using the remaining 31 items.

Table 2
PALS Items and Factor Structure

Factor	35 item CCAS (Cromer & Barlow, 2013)	
	# of items	Items included
Love	17	1. My pet is part of my family. 2. A pet completes the family. 3. My pet gives me unconditional love. 4. My pet gives me something to love. [a] 5. My pet gives me something that I can form a close emotional bond with. 6. My pet is my companion. 7. My pet and I have a special relationship. 8. My pet is loyal. 9. My pet provides comfort for me. 10. I like to cuddle with my pet. 11. I like my pet mostly because it is cute.[a] 12. It's worth giving up other things in life in order to have a pet. 13. Pets take a lot of time, but it is worth it. 14. My pet is my friend. 15. My pet cheers me up. 16. I keep a picture of my pet with me. 17. My pet is fun and entertaining.
Regulation	9	1. My pet teaches me to trust. 2. My pet calms me down. 3. I take my pet with me to visit people.[a] 4. My pet allows me to feel needed. 5. My pet is someone to lean on and be with me when no one else is there for me. 6. My pet provides stability for me. 7. My pet understands me like no on else has.[a] 8. Talking to my pet makes me feel better. 9. My pet offers protection/safety.
Personal growth	5	1. Having a pet has helped my health. 2. I am more affectionate because of my pet. 3. I have learned compassion from my pet. 4. Having a pet has helped me to understand loss and letting go. 5. My pet teaches me responsibility.
Negative impact	4	1. Having a pet is stressful.[a] 2. Having a pet has negatively impacted me emotionally.[a] 3. I am worse off because I have a pet.[a] 4. My pet is a financial hardship.[a]

[a] Item deleted.

Confirmatory Factor Analyses and Measurement Invariance

We conducted confirmatory factor analysis (CFA) to test the four-factor structure of the PALS suggested by Cromer and Barlow (2013) and to compare the fit to alternative models. We tested the hypothesized correlated four-factor structure against an alternative correlated three-factor model excluding the negative impact subscale, and a unidimensional model. Each model was evaluated based on multiple relative fit indices: chi-square, RMSEA, CFI, TLI, and SRMR. Based on recommended fit guidelines, we considered a non-significant chi-square, RMSEA < .05 and CFI and TLI > .95 to indicate good model fit (Hu & Bentler, 1999), and RMSEA < .08 and CFI and TLI > .90 to suggest adequate model fit (Hooper et al., 2008). The competing nested models were compared using chi-square difference tests; significant p-values suggest that the model with additional parameters and fewer degrees of freedom is a significant improvement in model fit (Asparouhov & Muthén, 2006).

Once we established the best-fitting model, we used multiple group analyses to test measurement invariance across gender modality (i.e., the extent to which an individual's gender identity relates to their sex assigned at birth; used to refer to our dichotomization of gender identity into cisgender and gender minority; Ashley, 2019), sexual orientation (gay/lesbian, bisexual/pansexual, queer/asexual/demisexual/multiple identities), race/ethnicity (White vs. racialized minority), whether participation occurred prior to or after the onset of the COVID-19 pandemic, and pet type (dog vs. cat). We included the COVID-19 variable because our data collection period spanned pre- and post-pandemic onset. Although there is limited current research that has examined changes in attachment to pets pre- and post-pandemic, we chose to explore whether the measure is invariant across timing of participation. The requirement of the WLSMV estimator to not include empty cells required limiting the invariance testing to these groups (Rutkowski et al., 2019). Measurement invariance was examined in two steps. First, configural invariance was evaluated by comparing whether the same factor structure (e.g., three factors) provided a good model fit across all groups. Next, this configural model was compared to the scalar invariance model in which factor loadings and thresholds were constrained across groups. Invariance models were evaluated based on change in CFI (**Δ**CFI) due to the chi-square difference test's sensitivity to sample size (Cheung & Rensvold, 2002). If **Δ**CFI was less than or equal to .01, then the null hypothesis (i.e., measure is invariant across groups) was not rejected. Scalar invariance is required to be able to meaningfully compare means across subgroups.

Structural Equation Models

Structural equation models were used to assess the validity of the PALS by testing correlations between the PALS factors and the CCAS and MSPSS separately. We used the best-fitting PALS structure and correlated this with the best-fitting factor structure of the CCAS. Additionally, we correlated the PALS factors with the total and subscale scores of the MSPSS. A final set of analyses further tested the validity of the PALS by examining whether the PALS factors were uniquely associated with the CCAS after adjusting for the effects of covariates. We included gender modality (0 = cisgender, 1 = gender minority), sexual orientation (0 = bisexual/pansexual, 1 = gay/lesbian/queer/asexual/demisexual/multiple identities), race/ethnicity (0 = racialized minority; 1 = White), whether participation occurred prior to (= 0) or after (= 1) the onset of the COVID-19 pandemic, and type of pet (1 = dog, 2 = cat) as covariates in this model. We used groupings from two similar validation studies by Frost and Meyer (2012) and Tomlinson, Pittman, et al. (2022) to inform the sexual orientation groups used in the current study; however, we ultimately had to dichotomize our covariate groups to increase power. Inclusion of covariates will

provide a more nuanced examination of the PALS' validity, determining the relationship between the PALS and the CCAS above and beyond the effects of the demographic covariates.

Results

Structure of the PALS

We originally tested a four-factor model; however, the model failed to converge due to problems with items on the Negative Impact factor. Specifically, we found that item 16 had a high correlation with multiple items due to empty cells in the bivariate table, which is a limitation of the WLSMV estimator, and item 29 had a very low factor loading (i.e., -0.10). As the Negative Impact factor only has four items, removing both problematic items resulted in the overall model being non-identified. Therefore, we excluded the Negative Impact factor from subsequent analyses. Next, we tested a three-factor model (i.e., Love, Regulation, Personal Growth; see Table 2). The modified three-factor model (with items deleted due to empty cells that prevented invariance testing) fit the data well (see Table 3), and factor loadings were all above the conventional cut-off of 0.4 (Brown, 2014; see Figure 1). We compared the three-factor model to a unidimensional model to confirm that a multi-dimensional model fit best. Chi-square difference test results were significant (see Table 3), suggesting that the three-factor model was a significant improvement in model fit. Therefore, subsequent analyses utilized the three-factor model.

Table 3

Fit Indices of Competing Factor Structure Models of the Pet Attachment and Life Impact Scale

Model	X^2	*df*	X^2 diff	RMSEA	CFI	TLI	SRMR
Unidimensional model	554.39***	324		.068	.961	.958	.080
3 factor model	501.34***	321	35.65***	.060	.969	.967	.075
4 factor model	Model did not converge						

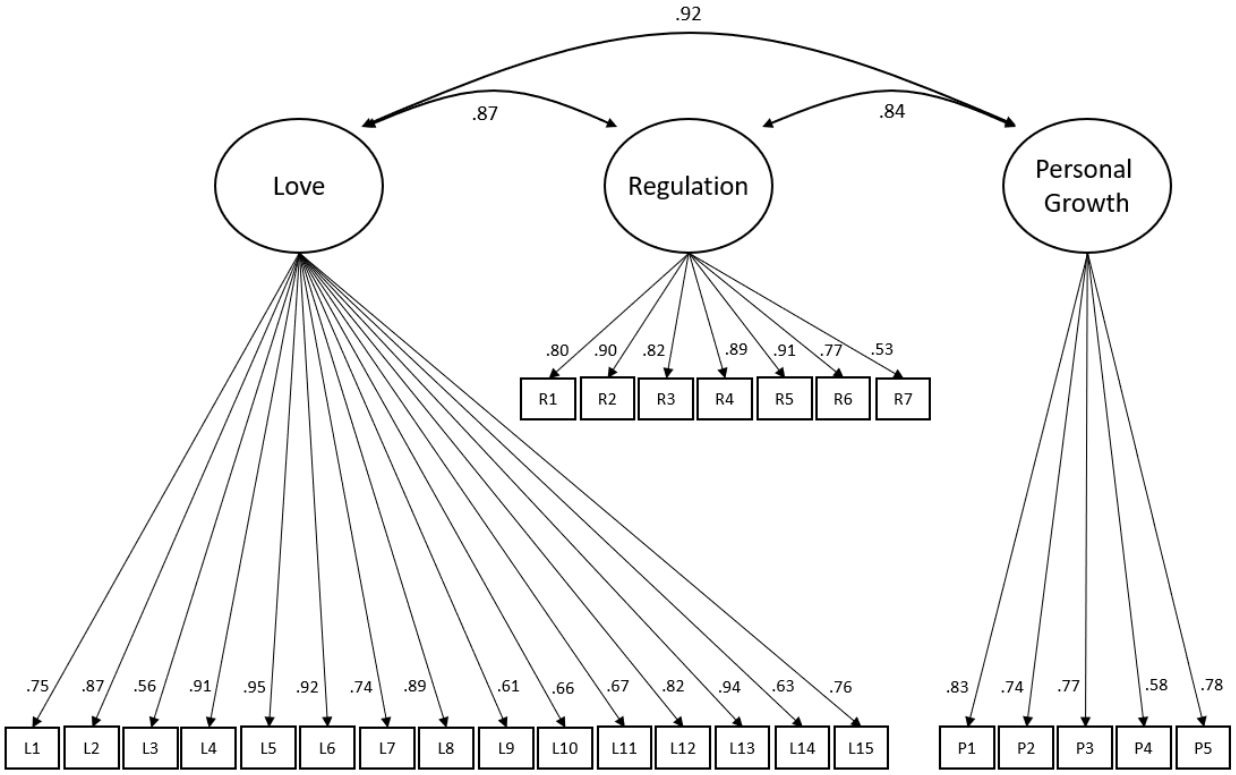
Note. $N = 154$. *df* = degrees of freedom; RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker-Lewis fit index; SRMR = standardized root mean squared residual.
***$p < .001$.

Measurement Invariance

We conducted multiple group analyses to assess whether the structure differed between subgroups across sexual orientation, gender modality, racial/ethnic majority versus minority groups, participation prior to or after the onset of the COVID-19 pandemic, and pet type. We were unable to test invariance across sexual orientation groups due to empty cells in the bivariate table and the potential for a linear dependency among the latent variables for those who identified as gay or lesbian. Examination of the correlation matrix between the latent variables identified the correlation between Regulation and Personal Growth factors to be high (i.e., .972) in this group. To test invariance across gender modality, we first tested the three-factor model separately for both groups. The model fit well for cisgender individuals and gender minority individuals (see Models G1 and G2 in Table 4). Configural invariance was supported as the factor structure was equivalent between the two groups and fit the data well (see Model G3 in Table 4). Next, we assessed scalar invariance by constraining the factor loadings and item thresholds across groups. **Δ**CFI was minimal (<.001), providing evidence that the 3-factor model is invariant across gender modality groups (see Model G4 in Table 4).

Figure 1

Standardized Confirmatory Factor Analysis (CFA) Model of the PALS



Note. All parameters are standardized. One-headed arrows represent factor loadings, and double-headed arrows represent correlations between factors.

The same process was repeated to assess invariance across race/ethnicity, participation prior to and after the onset of the COVID-19 pandemic, and pet type groups. The three-factor model fit well across both individuals who were White and individuals who were a racialized minority (see Model R1 and R2 in Table 4). Configural (see Model R3 in Table 4) and scalar (see Model R4 in Table 4) invariance was also supported across racial/ethnic groups. Additionally, the three-factor model fit the data well across groups based on participation timing (i.e., before vs. after the onset of the COVID-19 pandemic; see Model C1 and C2 in Table 4). The same factor structure fit both groups well, indicating configural invariance (see Model C3 in Table 4), and model fit did not change by adding constrained factor loadings and equal thresholds across subgroups (**Δ**CFI < .001), providing evidence of scalar invariance (see Model C4 in Table 4). A final set of multiple group analyses were conducted with pet type groups. Similarly, the fit statistics indicated that the three-factor model fit well across pet types (see Model P1 and P2 in Table 4). Further, configural invariance (see Model P3 in Table 4) was supported, and a **Δ**CFI < .01 provided evidence of scalar invariance (see Model P4 in Table 4) across pet type groups.

Table 4
Fit Indices for Measurement Invariance Tests of the Three Factor Model of the PALS

Model	X^2	*df*	RMSEA	CFI	TLI
Multiple group by gender identity [a]					
Cisgender only, *n* = 80 (G1)	408.21**	321	.058	.964	.961
Gender minority only, *n* = 74 (G2)	379.31**	321	.050	.986	.985
Configural invariance (G3)	787.20***	642	.054	.978	.976
Scalar invariance (G4)	827.82***	690	.051	.979	.979
Multiple group by race/ethnicity [a]					
White only, *n* = 97 (R1)	405.69**	321	.052	.982	.980
Minoritized race/ethnicity only, *n* = 57 (R2)	403.11**	321	.067	.964	.961
Configural invariance (R3)	806.73***	642	.058	.976	.974
Scalar invariance (R4)	859.13***	690	.056	.975	.975
Multiple group by participation prior to or after the onset of the COVID-19 pandemic [a]					
Prior to onset only, *n* = 112 (C1)	432.33***	321	.056	.973	.971
After the onset only, *n* = 42 (C2)	364.56*	321	.057	.982	.981
Configural invariance (C3)	779.00***	642	.053	.979	.977
Scalar invariance (C4)	822.28***	690	.050	.980	.980
Multiple group by pet type [a]					
Dog only, *n* = 90 (P1)	410.73**	321	.056	.973	.971
Cat only, *n* = 64 (P2)	375.84*	321	.052	.981	.979
Configural invariance (P3)	784.58***	642	.054	.977	.975
Scalar invariance (P4)	833.23***	690	.052	.977	.976

Note. N = 154 for all models. *df* = degrees of freedom; RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker-Lewis fit index.
[a] Model fit statistics are based on the three factor structure.
*$p < .05$. **$p < .01$. ***$p < .001$.

Structural Equation Models

A structural equation model evaluated the validity of the PALS by examining correlations between the three factors (Love, Regulation, Personal Growth) and a related construct, emotional comfort from companion animals as measured by the CCAS, χ^2 (554) = 731.79, $p < .001$; RMSEA = .05; CFI = .98; TLI = .98; SRMR = .07. All three factors were significantly correlated with the latent CCAS factor (Love: $r = .90$, Regulation: $r = .85$, Personal Growth: $r = .88$, ps $< .001$). Based on Cromer and Barlow's (2013) CFA study, we also examined correlations between the factors of the PALS and human social support scores (i.e., support from significant others, family, friends, and a total score). This model fit the data well, χ^2 (417) = 573.52, $p < .001$; RMSEA = .05; CFI = .97; TLI = .97; SRMR = .07. Love ($r = .26$, $p = .001$) and Personal Growth ($r = .19$, $p = .025$) were significantly and positively correlated with human social support from friends. Although

statistically non-significant and weak, Love (r = -0.02) and Regulation (r = -0.11) were negatively correlated with support from family (see Table 5).

Table 5

Correlations Between PALS Factors and Human Social Support

Variable	1	2	3	4	5	6	7
1. MSPSS total	-						
2. MSPSS significant other	.73***	-					
3. MSPSS family	.75***	.22**	-				
4. MSPSS friends	.63***	.30***	.24***	-			
5. PALS love	.13	.11	-0.02	.26**	-		
6. PALS regulation	.01	.05	-0.11	.12	.87***	-	
7. PALS personal growth	.12	.08	.03	.19*	.92***	.84***	-

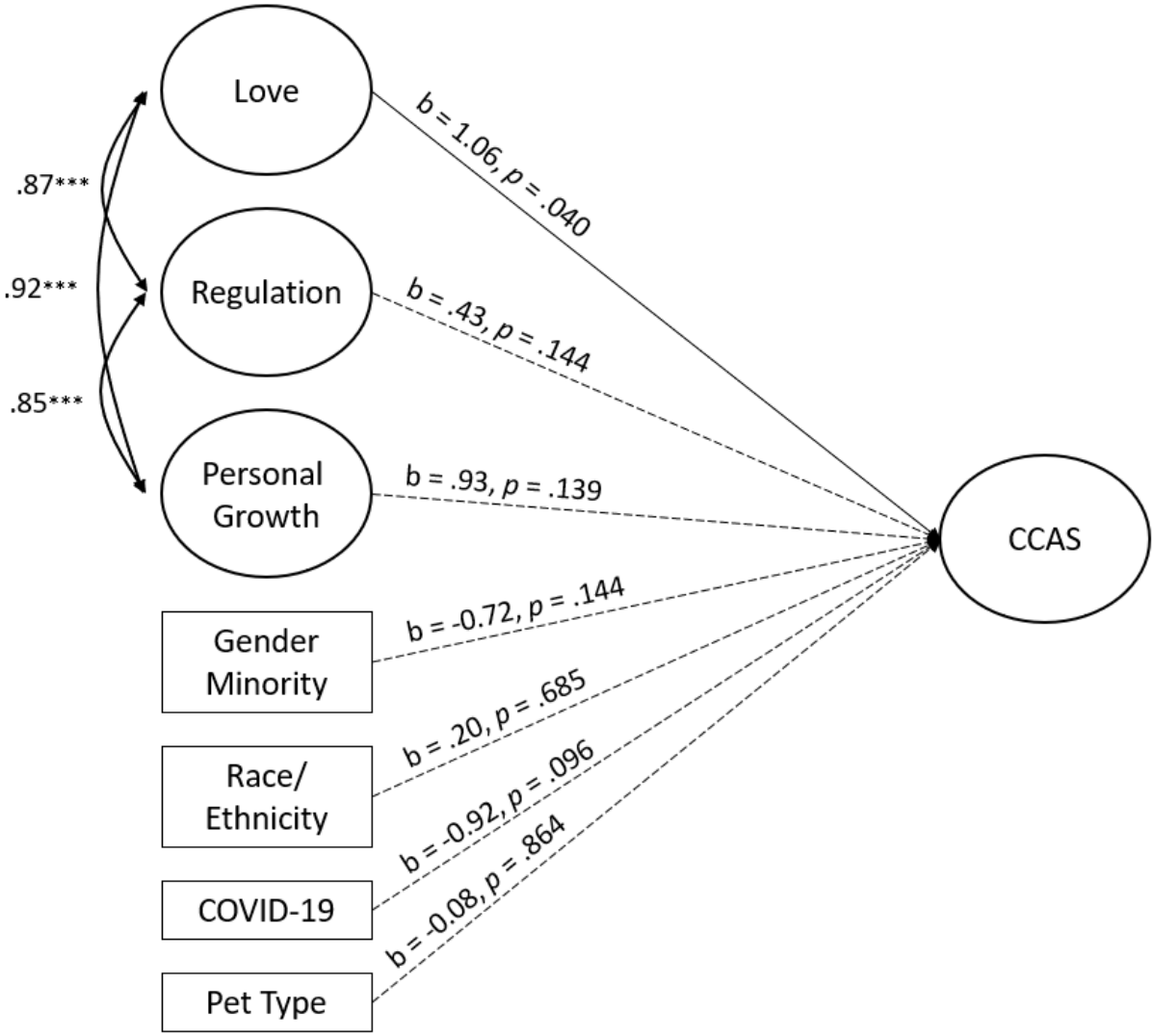
* $p < .05$. ** $p < .01$. *** $p < .001$.

A final structural equation model examined associations between the PALS factors and the CCAS, adjusting for covariates. This model fit the data well, χ^2 (724) = 895.54, $p < .001$; RMSEA = .04; CFI = .98; TLI = .98; SRMR = .09. The construct validity of the PALS was supported by the unique associations between the PALS and the CCAS while adjusting for the effects of covariates. Although neither the Regulation factor (β = .17, p = .132) nor the Personal Growth factor (β = .34, p = .141) were significantly associated with the CCAS, the Love factor (β = .41, p = .042) was significantly associated with the CCAS (see Figure 2).

Discussion

Attachment to pets is an important and frequently assessed construct within the HAI field; however, there is a lack of studies that test the psychometric properties of HAI measures using contemporary approaches. Among existing studies, marginalized groups, such as SGM populations, are often underrepresented or unaccounted for in these samples. To our knowledge, this is the first study to use latent variable modeling to explore the factor structure of the PALS among a sexual and gender diverse sample of emerging adults. We found that a modified 27-item three-factor version of the PALS fit our data best. To achieve adequate fit, eight items were deleted. One item was deleted as it was a poor indicator of the construct, an additional item was deleted as it resulted in convergence issues due to empty cells in the bivariate table, and six items were deleted because they prevented invariance testing due to high correlations between items (see Table 2). However, the original 35-item version and the modified 27-item version were highly correlated (r = 1.00) and had the same internal consistency (ω = .95). The response categories were also collapsed to address empty cells within the bivariate table as a result of low endorsement rates of the lowest response options (i.e., not at all, somewhat, moderately).

Figure 2
Unstandardized Structural Equation Model of Relations Between the CCAS and the PALS Factors



Note. The parameters provided in the figure are unstandardized estimates. One-headed arrows represent regression paths, and double-headed arrows represent correlations between factors. For the regression paths, solid lines represent statistically significant associations; dotted lines represent non-significant relations. To reduce complexity, residuals and residual covariances are not reported in the figure.

Of the eight items that were deleted, four of those items were deleted as a result of removing the Negative Impact factor from the analysis. This is consistent with other studies that have utilized the PALS in that our results suggest that the items on the Negative Impact factor, in contrast to the other factors, may not adequately reflect the construct of pet attachment (Behler et al., 2020; Cromer & Barlow, 2013; Schwarzmüller-Erber, 2020a, 2020b). For example, item 29 had a low factor loading (-0.10), which suggests that it was not strongly associated with Negative Impact.

Additionally, in the present study, the internal consistency of the Negative Impact factor was low (ω = .52). Other studies utilizing the PALS have also found the items of the Negative Impact factor had low internal consistency (e.g., Behler et al., 2020; Schwarzmüller-Erber, 2020a, 2020b), and Cromer and Barlow (2013) found that correlations between the Negative Impact factor and the Love, Personal Growth, and Regulation factors were low (*r*s < .20). Taken together, these findings suggest that the items on the Negative Impact factor may not adequately assess the overarching construct and, instead, may assess a distinct and unrelated aspect of relationships with pets (e.g., negative aspects of living with and/or caring for pets); moreover, the indicators are problematic.

As previously described, the PALS measures human-animal attachment, which has been defined as an emotional bond established between a human and non-human animal (Budge et al., 1998). Based on human attachment theory, attachment may be characterized by security and insecurity (i.e., anxious, ambivalent, avoidant patterns of behavior); however, insecure patterns of attachment are still defined as variations in emotional bonding with the attachment figure. For example, the "gold standard" infant attachment assessment, the Strange Situation, observes infants' patterns of behavior towards the mother upon her return after the infant is left in a novel room with a stranger (Ainsworth et al., 2015; Chae et al., 2018). Additionally, human adult attachment measures often include items that assess the level of comfort or ease in which individuals depend on others (e.g., "I prefer not to be too close to romantic partners."; ECR-R, Fraley et al., 2000) to assess secure versus insecure attachment patterns. Absent from human attachment measures, and most human-animal attachment measures (e.g., Pet Attachment Questionnaire, Zilcha-Mano et al., 2011; Lexington Attachment to Pets Scale, Johnson et al., 1992) are items or constructs associated with negative impacts of caring for a child or caregiving burden, as this does not fall within the scope of attachment bonds (Ainsworth, 1973; Bowlby, 1982; Ravitz et al., 2010). Although the Negative Impact items may not be related to pet attachment, recent studies suggest that living with companion animals is associated with additional pet-related stressors, such as caregiving burden and financial strain (Applebaum et al., 2020; Buller & Ballantyne, 2020; Enders-Slegers & Hediger, 2019; Graham et al., 2019; McDonald, Matijczak, et al., 2021). Given that two of the four Negative Impact factor items are related to caregiving burden (i.e., "Having a pet is stressful" and "My pet is a financial hardship"), it is important that future studies continue to examine the factor structure of the PALS to assess whether the Negative Impact factor may be better utilized as a distinct construct and/or more accurately characterized as an assessment of caregiving burden. This further testing of the PALS can refine what the measure assesses and has implications for how attachment to pets is defined theoretically in comparison to human attachment theory.

Participants in our sample tended to endorse only the highest response options, which led to the collapsing of response categories. This skewed distribution of responses has also been found in other studies that have utilized the PALS. For example, mean total scores have ranged from 3.91-4.08 on a 5-point response scale (Behler et al., 2020; Schwarzmüller-Erber, 2020a, 2020b), although Volsche and Gray (2016) reported a broader range of scores (i.e., 2.65-4.65; μ = 3.91, *SD* = .36). Cromer and Barlow also found that their participants reported a range of scores across the four subscales (i.e., μ = 2.86-4.30; *SD* = .61-.96), and that the range of scores was dependent on pet type. Specifically, those who reported on a dog had the highest scores across subscales (i.e., μ = 3.00-4.28; *SD* = .61-.92) compared to cats (i.e., μ = 2.56-4.41; *SD* = .50-.94) and other types of pets (i.e., μ = 2.06-4.30; *SD* = .69-.99). However, to our knowledge, no study has examined the use of the PALS response scale. This is an important area for future HAI research, as ceiling effects are a common methodological issue in research on relationships with companion animals (e.g.,

Bibbo et al., 2019; Cassels et al., 2017). It is important that HAI researchers carefully consider how participants utilize the PALS response scale, consider whether it is appropriate for diverse populations, and test the utility of the response scale across population groups (e.g., minoritized racial/ethnic groups, SGM groups) and developmental periods. Future examination of the PALS response scale should also seek to revise the items to ensure the inclusion of items that reflect low and high ranges of the construct. Therefore, we highlight the need for future studies to confirm the factor structure and test modifications to the response scale prior to recommending a revised measure and/or response scale. Ongoing evaluation of the PALS will help ensure that the factor structure is consistent across population groups and the response scale is utilized similarly and comparably and can detect variations in the construct of interest (Lee et al., 2002; Liu et al., 2017; Mellor & Moore, 2014).

Measurement Invariance

Our study provided an initial test of measurement invariance of the PALS. We were unable to test invariance across sexual orientation due to the potential for linear dependence among the latent variables within the gay/lesbian group. This suggests that the factor structure may differ between sexual orientation groups. The linear dependency between Regulation and Personal Growth suggests that the items on these factors may overlap and measure the same dimension of attachment to pets for gay and lesbian emerging adults. Therefore, further examination of how the PALS functions across sexual orientation groups is needed.

Our model demonstrated scalar invariance across gender modality, racial/ethnic majority versus minority groups, participation prior to or after the onset of the COVID-19 pandemic, and pet type groups. This suggests that the PALS consistently assesses the level of attachment to pets for individuals similar to those in our sample and whose identities are dichotomized as they were in this study. Without measurement invariance, prior studies that have found mean differences in attachment to pets based on binary gender (e.g., Behler et al., 2020; Cromer & Barlow, 2013; Schwarzmüeller-Erber et al., 2020a), race/ethnicity (e.g., Brown, 2002; Jacobson & Chang, 2018), and pet type (Cromer and Barlow, 2013; Hawkins et al., 2017; Muldoon et al., 2019) cannot be certain whether those differences were due to measurement error or true differences on level of attachment to pets. Caution should be taken in interpreting our invariance results given the collapsed categories used and the exploratory nature of our test of invariance based on participation before or after the onset of the pandemic. This highlights the importance of continuing to assess measurement equivalence in HAI research to ensure findings are meaningful and interpretable across diverse groups. Additionally, future longitudinal studies assessing changes in attachment to pets from pre- and post-pandemic with the same participants is necessary to further assess whether individuals' attachment to pets changed following the onset of the pandemic.

Construct Validity

We found evidence of construct validity through examining relations between the PALS and the CCAS. All three factors of the PALS were significantly correlated with the CCAS, which provides support for construct validity. Additionally, we tested relations between the PALS and the CCAS, adjusting for the effects of covariates. Only the Love factor was uniquely associated with the CCAS above and beyond the effects of the covariates. Our results build on Cromer and Barlow's (2013) findings to provide additional support for construct validity with other domains of HAI; however, given that their study only considered construct validity via correlations between the PALS and other HAI measures, it is important that future studies consider including control

variables that may influence pet attachment. Neglecting to adjust for the effects of demographic covariates may lead to conclusions about the scale's validity that are inaccurate and over-simplified.

We also examined the construct validity of the PALS by correlating its factors with types of human social support. Love and Personal Growth were significantly and positively correlated with social support received from friends, which suggests that aspects of attachment to pets are related to aspects of human social support. This partially supports the results reported by Cromer and Barlow (2013), who found that scores on the Love factor were positively and significantly correlated with social support from friends, family, and significant others. In contrast to Cromer and Barlow (2013), the lack of a significant correlation between Love and social support provided by significant others and family within our sample may be explained by incongruencies in how relations with pets and humans are viewed. For example, pets are often viewed as sources of unconditional love and support (Brooks et al., 2016; McDonald, Matijczak et al., 2021); however, social support provided by a significant other is argued to be a temporary, short-term relationship (Adamczyk, 2016; Tabaac et al., 2016). Thus, the non-significant correlation between Love and social support from significant others may be explained by differences in how relationships with pets and significant others are perceived. Additionally, our sample of SGM individuals is likely at higher risk for experiencing family rejection and/or conflict due to oppressive attitudes toward SGM identities (Katz-Wise et al., 2016; Scheer et al., 2021), thus potentially making unconditional support received from a pet and social support received from family incongruent and unrelated in this population.

Our results also suggest that the Personal Growth factor was correlated with social support from friends. Prior research has found that social support from friends aids in positive developmental outcomes during the emerging adulthood period and is associated with increases in self-esteem (Szkody & McKinney, 2019) and a sense of purpose (Sukhawathanakul et al., 2020). Similarly, the PALS Personal Growth factor items relate to how pets contribute to the development of positive traits, such as "I am more affectionate because of my pet," and "My pet teaches me responsibility." Prior HAI research supports this connection between the benefits associated with human friend social support and pet attachment. For example, a qualitative study exploring the risks and benefits associated with pet ownership found that caring for a pet provided SGM emerging adults with a sense of purpose, belongingness, self-esteem, and increased responsibility (McDonald, Matijczak, et al., 2021). Taken together, our results suggest that the benefits of attachment to pets among SGM emerging adults may be related to their ability to provide social support.

Limitations

Our findings should be interpreted with several methodological limitations in mind. First, our sample of SGM emerging adults was recruited via convenience methods from an urban community in the mid-Atlantic region of the United States. We also offered compensation for our study, which may have influenced who responded to our study advertisements. Our results may not be generalizable to samples from different regions and/or those recruited without compensation. Second, our sample size required us to dichotomize the variables utilized in invariance testing and the covariates in the SEM. This limited our ability to test whether the PALS is invariant across all gender modalities, racial/ethnic groups, and pet types, and to adjust for the effects of multiple covariate groups (e.g., multiple racial/ethnic groups) when examining relations between the PALS factors and the CCAS. Additionally, we were not able to test measurement

invariance in the CFA across sexual orientation. The participants in this study also all reported on their attachment to either a dog or cat, which limited our ability to assess differences across other species of companion animals (e.g., birds, small mammals, rodents). We were also unable to conduct multiple group modeling in the SEM because a larger sample size is required in models with more parameters (i.e., minimum of 100 participants per group; Kline, 2005).

Future Directions

Attachment to pets is an important construct that is hypothesized to provide benefits to human health and well-being (e.g., Pendry & Vandagriff, 2020; Tomlinson, Matijczak, et al., 2021). Future studies should continue to test the psychometric properties of the PALS across diverse samples. Specifically, researchers should consider participants' use of the response scale and test modifications to the response scale and/or to the items to ensure that the full range of attachment to pets is assessed. Given our study was unable to test invariance across sexual orientation or expanded categories of gender identity and race/ethnicity, future research should utilize larger samples of individuals with a wide range of identities to continue to test whether the PALS is reliably and validly assessing attachment to pets across all identity groups. Future research would also do well to explore whether the PALS consistently measures attachment to pets across a wide range of developmental stages and pet types. Lastly, our study specifically tested construct validity between the PALS and the CCAS and MSPSS. Researchers should examine and compare the PALS with other HAI measures that assess attachment to pets and to measures of human attachment to continue to improve our knowledge of the measurement validity of this important HAI construct. For example, studies should examine whether attachment to pets is related to human attachment bonds (Crawford, 2006), and assess relations between attachment to pets and human health and well-being over time.

References

Adamczyk, K. (2016). An investigation of loneliness and perceived social support among single and partnered young adults. *Current Psychology, 35*, 674-689. https://doi.org/10.1007/s12144-015-9337-7

Ainsworth, M. S. (1973). The development of infant-mother attachment. In B. M. Caldwell & H. N. Ricciuti (Eds.), *Review of child development research: Child development and social policy* (pp. 1-94). The University of Chicago Press.

Ainsworth, M. S. (1989). Attachments beyond infancy. *American Psychologist, 44*(4), 709–716. https://doi.org/10.1037/0003-066X.44.4.709

Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. N. (2015). *Patterns of attachment: A psychological study of the strange situation.* Psychology Press. https://doi.org/10.4324/9780203758045

Albert, A., & Bulcroft, K. (1988). Pets, families, and the life course. *Journal of Marriage and the Family, 50*(2), 543-552. https://doi.org/10.2307/352019

American Psychological Association. (2015). Guidelines for psychological practice with transgender and gender nonconforming people. *American Psychologist, 70*(9), 832-864. https://doi.org/10.1037/a0039906

Antonacopoulos, N. M., D., & Pychyl, T. A., (2010). An examination of the potential role of pet ownership, human social support and pet attachment in the psychological health of individuals living alone. *Anthrozoös, 23*(1), 37-54. https://doi.org/10.2752/175303710X12627079939143

Applebaum, J. W., MacLean, E. L., & McDonald, S. E. (2021). Love, fear, and the human-animal bond: On adversity and multispecies relationships. *Comprehensive Psychoneuroendocrinology, 7*, Article 100071. https://doi.org/10.1016/j.cpnec.2021.100071

Applebaum, J. W., Tomlinson, C. A., Matijczak, A., McDonald, S. E., & Zsembik, B. A. (2020). The concerns, difficulties, and stressors of caring for pets during COVID-19: Results from a large survey of U.S. pet owners. *Animals, 10*(10), Article 1882. https://doi.org/10.3390/ani10101882

Arnett, J. J., Žukauskienė, R., Sugimura, K. (2014). The new life stage of emerging adulthood at ages 18–29 years: Implications for mental health. *The Lancet Psychiatry, 1*(7), 569–576. https://doi.org/10.1016/S2215-0366(14)00080-7

Asparouhov, T., & Muthén, B. (2006, May 26). Robust chi square difference testing with mean and variance adjusted test statistics. *Mplus.* https://www.statmodel.com/download/webnotes/webnote10.pdf

Ashley, F. (2019*).* 'Trans' is my gender modality: A modest terminological proposal. *Florence Ashley*. https://www.florenceashley.com/uploads/1/2/4/4/124439164/florence_ashley_trans_is_my_gender_modality.pdf

Barlow, M. R., Hutchinson, C. A., Newton, K., Grover, T., & Ward, L. (2012). Childhood neglect, attachment to companion animals, and stuffed animals as attachment objects in women and men. *Anthrozoös, 25*(1), 111-119. https://doi.org/10.2752/175303712X13240472427159

Beauducel, A., & Herzberg, P. Y. (2006). On the performance of maximum likelihood versus means and variance adjusted weighted least squares estimation in CFA. *Structural Equation Modeling, 13*(2), 186–203. https://doi.org/10.1207/s15328007sem1302_2

Behler, A. M. C., Green, J. D., & Joy-Gaba, J. (2020). "We lost a member of the family": Predictors of the grief experience surrounding the loss of a pet. *Human-Animal Interaction Bulletin, 8*(3), 54-70.

Bibbo, J., Curl, A. L., & Johnson, R. A. (2019). Pets in the lives of older adults: A life course perspective. *Anthrozoös, 32*(4), 541-554. https://doi.org/10.1080/08927936.2019.1621541

Boateng, G. O., Neilands, T. B., Frongillo, E. A., Mlegar-Quinonez, H. R., & Young, S. L. (2018). Best practices for developing and validating scales for health, social, and behavioral research: A primer. *Frontiers in Public Health, 6*, Article 149. https://doi.org/10.3389/fpubh.2018.00149

Bowlby, J. (1973). *Attachment and loss: Separation* (Vol. 2). Hogarth Press.

Bowlby, J. (1980). *Attachment and loss: Loss* (Vol. 3). Hogarth Press.

Bowlby, J. (1982). *Attachment and loss: Attachment* (2nd ed., Vol. 1). Basic Books.

Brooks, H., Rushton, K., Walker, S., Lovell, K., & Rogers, A. (2016). Ontological security and connectivity provided by pets: A study in the self-management of the everyday lives of people diagnosed with a long-term mental health condition. *BMC Psychiatry, 16,* Article 409. https://doi.org/10.1186/s12888-016-1111-3

Brown, S. E. (2002). Ethnic variations in pet attachment among students at an American school of veterinary medicine. *Society & Animals, 10*(3), 249-266. https://doi.org/10.1163/156853002320770065

Brown, T. A. (2014). *Confirmatory factor analysis for applied research*. Guilford Publications.

Budge, R. C., Spicer, J., Jones, B., & St. George, R. (1998). Health correlates of compatibility and attachment in human-companion animal relationships. *Society & Animals, 6*(3)*,* 219-234. https://doi.org/10.1163/156853098X00168

Buller, K., & Ballantyne, K. C. (2020). Living with and loving a pet with behavioral problems: Pet owners' experiences. *Journal of Veterinary Behavior, 37*, 41-47. https://doi.org/10.1016/j.jveb.2020.04.003

Bures, R. M., Mueller, M. K., & Gee, N. R. (2019). Measuring human-animal attachment in a large U.S. survey: Two brief measures for children and their primary caregivers. *Frontiers in Public Health, 7,* Article 107. https://doi.org/10.3389/fpubh.2019.00107

Byrne, B. M., & van de Vijver, F. J. R. (2010). Testing for measurement and structural equivalence in large-scale cross-cultural studies: Addressing the issue of nonequivalence. *International Journal of Testing, 10*(2), 107-132. https://doi.org/10.1080/15305051003637306

Cassels, M. T., White, N., Gee, N., & Hughes, C. (2017). One of the family? Measuring young adolescents' relationships with pets and siblings. *Journal of Applied Developmental Psychology, 49*, 12-20. https://doi.org/10.1016/j.appdev.2017.01.003

Chae, Y., Goodman, M., Goodman, G. S., Troxel, N., McWilliams, K., Thompson, R. A., Shaver, P. R., & Widaman, K. F. (2018). How children remember the Strange Situation: The role of attachment. *Journal of Experimental Child Psychology, 166,* 360-379. https://doi.org/10.1016/j.jecp.2017.09.001

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9*(2), 233-255. https://doi.org/10.1207/S15328007SEM0902_5

Community Marketing & Insights. (2019, July). *13th Annual LGBTQ community survey: USA summary report.* https://www.communitymarketinginc.com/documents/temp/CMI-13th_LGBTQ_Community_Survey_US_Profile.pdf

Conron, K. J. (2020, September). *LGBT youth population in the United States.* The Williams Institute. https://williamsinstitute.law.ucla.edu/publications/lgbt-youth-pop-us/

Crawford, E. K., Worsham, N. L., & Swinehart, E. R. (2006). Benefits derived from companion animals, and the use of the term "attachment". *Anthrozoös, 19*(2), 98-112. https://doi.org/10.2752/089279306785593757

Cromer, L. D., & Barlow, M. R. (2013). Factors and convergent validity of the Pet Attachment and Life Impact Scale (PALS). *Human-Animal Interaction Bulletin, 1*(2), 34-56.

Curran, P. J., McGinley, J. S., Bauer, D. J., Hussong, A. M., Burns, A., Chassin, L., Sher, K., & Zucker, R. (2014). A moderated nonlinear factor model for the development of commensurate measures in integrative data analysis. *Multivariate Behavioral Research, 49*(3), 214-231. https://doi.org/10.1080/00273171.2014.889594

Enders-Slegers, M-J., & Hediger, K. (2019). Pet ownership and human-animal interaction in an aging population: Rewards and challenges. *Anthrozoös, 32*(2), 255-265. https://doi.org/10.1080/08927936.2019.1569907

Esposito, L., McCune, S., Griffin, J. A., & Maholmes, V. (2011). Directions in human-animal interaction research: Child development, health, and therapeutic interventions. *Child Development Perspectives, 5*(3), 205-211. https://doi.org/10.1111/j.1750-8606.2011.00175.x

Fraley, R. C., Waller, N. G., & Brennan, K. A. (2000). An item-response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology, 78*, 350-365. https://doi.org/10.1037/0022-3514.78.2.350

Frost, D. M., & Meyer, I. H. (2012). Measuring community connectedness among diverse sexual minority populations. *The Journal of Sex Research, 49*(1), 36-49. https://doi.org/10.1080/00224499.2011.565427

Gadomski, A. M., Scribani, M. B., Krupa, N., & Jenkins, P. (2017). Pet dogs and child physical activity: The role of child-dog attachment. *Pediatric Obesity, 12*(5), e37-e40. https://doi.org/10.1111/ijpo.12156

Graham, T. M., Milaney, K. J., Adams, C. L., & Rock, M. J. (2019). Are millennials really picking pets over people? Taking a closer look at dog ownership in emerging adulthood. *Canadian Journal of Family and Youth, 11*(1), 202-227. https://doi.org/10.29173/cjfy29454

Graham, T. M., & Glover, T. D. (2014). On the fence: Dog parks in the (un)leashing of community and social capital. *Leisure Sciences, 36*(3), 217-234. https://doi.org/10.1080/01490400.2014.888020

Hall, W. J. (2018). Psychosocial risk and protective factors for depression among lesbian, gay, bisexual, and queer youth: A systematic review. *Journal of Homosexuality, 65*(3), 263-316. https://doi.org/10.1080/00918369.2017.1317467

Harris Interactive. (2010). *The lesbian, gay, bisexual and transgender (LGBT) population at-a-glance*. https://www.witeck.com/wp-content/uploads/2013/03/HI_LGBT_SHEET_WCC_AtAGlance.pdf

Hawkins, R. D., Williams, J. M., & Scottish Society for the Prevention of Cruelty to Animals. (2017). Childhood attachment to pets: Associations between pet attachment, attitudes to animals, compassion, and humane behavior. *International Journal of Environmental Research and Public Health, 14*(5), Article 490. https://doi.org/10.3390/ijerph14050490

Hayes, A. F., & Coutts, J. J. (2020). Use omega rather than Cronbach's alpha for estimating reliability. But…. *Communication Methods and Measures, 14*(1), 1-24. https://doi.org/10.1080/19312458.2020.1718629

Holcomb, R., Williams, R. C., & Richards, P. S. (1985). The elements of attachment: Relationship maintenance and intimacy. *Journal of the Delta Society, 2*(1), 28-34.

Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modeling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods, 6*(1), 53-60.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6,* 1-55. https://doi.org/10.1080/10705519909540118

Jacobson, K. C., & Chang, L. (2018). Associations between pet ownership and attitudes toward pets with youth socioemotional outcomes. *Frontiers in Psychology, 9,* Article 2304. https://doi.org/10.3389/fpsyg.2018.02304

Johnson, T. P., Garrity, T. F., & Stallones, L. (1992). Psychometric evaluation of the Lexington Attachment to Pets Scale (LAPS). *Anthrozoös, 5*(3), 160-175. https://doi.org/10.2752.089279392787011395

Katz-Wise, S. L., Rosario, M., & Tsappis, M. (2016). LGBT youth and family acceptance. *Pediatric Clinics of North America, 63*(6), 1011-1025. https://doi.org/10.1016/j.pcl.2016.07.005

Kline, R. B. (2005). *Methodology in the social sciences: Principles and practice of structural equation modeling* (2nd ed.). Guilford Press.

Kurdek, L. A. (2008). Pet dogs as attachment figures. *Journal of Social and Personal Relationships, 25*(2), 247-266. https://doi.org/10.1177/0265407507087958

Lee, J. W., Jones, P. S., Mineyama, Y., & Zhang, X. E. (2002). Cultural differences in responses to a Likert scale. *Research in Nursing Health, 25*(4), 295-306. https://doi.org/10.1002/nur.10041

Liu, M., Harbaugh, A. G., Harring, J. R., & Hancock, G. R. (2017). The effect of extreme response and non-extreme response styles on testing measurement invariance. *Frontiers in Psychology, 8,* Article 726. https://doi.org/10.3389/fpsyg.2017.00726

Marsa-Sambola, F., Williams, J., Muldoon, J., Lawrence, A., Connor, M., & Currie, C. (2017). Quality of life and adolescents' communication with their significant others (mother, father, and best friend): The mediating effect of attachment to pets. *Attachment & Human Development, 19*(3), 278-297. https://doi.org/10.1080/14616734.2017.1293702

Matijczak, A., McDonald, S. E., Tomlinson, C. A., Murphy, J. L., & O'Connor, K. (2021). The moderating effect of comfort from companion animals and social support on the relationship between microaggressions and mental health in LGBTQ+ emerging adults. *Behavioral Sciences, 11*, Article 1. https://doi.org/10.3390/bs11010001

McCune, S., Kruger, K. A., Griffin, J. A., Esposito, L., Freund, L. S., Hurley, K. J., & Bures, R. (2014). Evolution of research into the mutual benefits of human-animal interaction. *Animal Frontiers, 4*(3), 49-58. https://doi.org/10.2527/af.2014-0022

McDonald, S. E., Matijczak, A., Nicotera, N., Applebaum, J. W., Kremer, L., Natoli, G., O'Ryan, R., Booth, L. J., Murphy, J. L., Tomlinson, C. A., & Kattari, S. K. (2021). "He was like, my ride or die": Sexual and gender minority emerging adults' perspectives on living with pets during the transition to adulthood. *Emerging Adulthood,* Advance online publication. https://doi.org/10.1177/21676968211025340

McDonald, S. E., Murphy, J. L., Tomlinson, C. A., Matijczak, A., Applebaum, J. W., Wike, T. L., & Kattari, S. K. (2022). Relations between sexual and gender minority stress, personal hardiness, and psychological stress in emerging adulthood: Examining indirect effects via human-animal interaction. *Youth & Society, 54*(2), 240-261. https://doi.org/10.1177/0044118X21990044

McDonald, S. E., O'Connor, K., Matijczak, A., Murphy, J. L., Applebaum, J. W., Tomlinson, C. A., Wike, T., & Kattari, S. (2021). Victimization and psychological wellbeing among sexual and gender minority emerging adults: Testing the moderating role of emotional comfort from companion animals. *Journal of the Society for Social Work and Research*. Advance online publication. https://doi.org/10.1086/713889

Mellor, D., & Moore, K. A. (2014). The use of Likert scales with children. *Journal of Pediatric Psychology, 39*(3), 369-379. https://doi.org/10.1093/jpepsy/jst079

Mueller, M. K., King, E. K., Callina, K., Dowling-Guyer, S., & McCobb, E. (2021). Demographic and contextual factors as moderators of the relationship between pet ownership and health. *Health Psychology and Behavioral Medicine, 9*(1), 701-723. https://doi.org/10.1080/21642850.2021.1963254

Muldoon, J. C., Williams, J. M., & Currie, C. (2019). Differences in boys' and girls' attachment to pets in early-mid adolescence. *Journal of Applied Developmental Psychology, 62,* 50-58. https://doi.org/10.1016/j.appdev.2018.12.002

Pendry, P., & Vandagriff, J. L. (2020). Salivary studies of the social neuroscience of human-animal interaction. In D. A. Granger & M. K. Taylor (Eds.), *Salivary bioscience* (pp. 555-581). Springer.

Poresky, R. H., Hendrix, C., Mosier, J. E., & Samuelson, M. L. (1987). The Companion Animal Bonding Scale: Internal reliability and construct validity. *Psychological Reports, 60*(3), 743-746. https://doi.org/10.2466/pr0.1987.60.3.743

Putney, J. M. (2014). Older lesbian adults' psychological well-being: The significance of pets. *Journal of Gay & Lesbian Social Services, 26*(1), 1-17. https://doi.org/10.1080/10538720.2013.866064

Putnick, D. L., & Bornstein, M. H. (2016). Measurement invariance conventions and reporting: The state of the art and future directions for psychological research. *Developmental Review, 41,* 71-90. https://doi.org/10.1016/j.dr.2016.06.004

Ravitz, P., Maunder, R., Hunter, J., Sthankiya, B., & Lancee, W. (2010). Adult attachment measures: A 25-year review. *Journal of Psychosomatic Research, 69*(4), 419-432. https://doi.org/10.1016/j.jpsychores.2009.08.006

Rhemtulla, M., Brosseau-Liard, P. E., & Savalei, V. (2012). When can categorical variables be treated as continuous? A comparison of robust continuous and categorical SEM estimation methods under suboptimal conditions. *Psychological Methods, 17,* 354-373. https://doi.org/10.1037/a0029315

Riggs, D. W., Taylor, N., Signal, T., Fraser, H., & Donovan, C. (2018). People of diverse genders and/or sexualities and their animal companions: Experiences of family violence in a binational sample. *Journal of Family Issues, 39*(18), 4226-4247. https://doi.org/10.1177/0192513X18811164

Rodriguez, K. E., Guérin, N. A., Gabriels, R. L., Serpell, J. A., Schreiner, P. J., & O'Haire, M. E. (2018). The state of assessment in human-animal interaction research. *Human-Animal Interaction Bulletin, 6,* 63-81.

Rodriguez, K. E., Herzog, H., & Gee, N. R. (2021). Variability in human-animal interaction research. *Frontiers in Veterinary Science, 7,* Article 619600. https://doi.org/10.3389/fvets.2020.619600

Rosenberg, S., Riggs, D. W., Taylor, N., & Fraser, H. (2020). 'Being together really helped': Australian transgender and non-binary people and their animal companions living through violence and marginalisation. *Journal of Sociology, 56*(4), 571-590. https://doi.org/10.1177/1440783319896413

Rutkowski, L., Svetina, D., & Liaw, Y.-L. (2019). Collapsing categorical variables and measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal, 26*(5), 790-802. https://doi.org/10.1080/10705511.2018.1547640

Sable, P. (2013). The pet connection: An attachment perspective. *Clinical Social Work Journal, 41,* 93-99. https://doi.org/10.1007/s10615-012-0405-2

Scheer, J. R., Edwards, K. M., Helminen, E. C., & Watson, R. J. (2021). Victimization typologies among a large national sample of sexual and gender minority adolescents. *LGBT Health, 8*(8), 507-518. https://doi.org/10.1089/lgbt.2021.0024

Schmitz, R. M., Carlisle, Z. T., & Tabler, J. (2021). "Companion, friend, four-legged fluff ball": The power of pets in the lives of LGBTQ+ young people experiencing homelessness. *Sexualities.* Advance online publication. https://doi.org/10.1177/1363460720986908

Schmitz, R. M., Tabler, J., Carlisle, Z. T., & Almy, L. (2021). LGBTQ+ people's mental health and pets: Novel strategies of coping and resilience. *Archives of Sexual Behavior, 50*, 3065-3077. https://doi.org/10.1007/s10508-021-02105-6

Schrager, S. M., Steiner, R. J., Bouris, A. M., Macapagal, K., & Brown, C. H. (2019). Methodological considerations for advancing research on the health and wellbeing of

sexual and gender minority youth. *LGBT Health, 6*(4), 156-165. https://doi.org/10.1089/lgbt.2018.0141

Schwarzmüeller-Erber, G., Maier, M., & Kundi, M. (2020a). Pet attachment and wellbeing of older-aged recreational horseback riders. *International Journal of Environmental Research and Public Health, 17*(6), Article 1865. https://doi.org/10.3390/ijerph17061865

Schwarzmüeller-Erber, G., Stummer, H., Maier, M., & Kundi, M. (2020b). Nature relatedness of recreational horseback riders and its association with mood and wellbeing. *International Journal of Environmental Research and Public Health, 17*(11), Article 4136. https://doi.org/10.3390/ijerph17114136

Schwarzmüeller-Erber, G., Maier, M., Stummer, H., & Kundi, M. (2021). Recreational horseback riding and its association with physical, mental, and social wellbeing and perceived health. *Anthrozoös, 34*(5), 685-706. https://doi.org/10.1080/08927936.2021.1926709

Sukhawathanakul, P., Ames, M. E., & Leadbeater, B. J. (2020). The influence of emotional support from parents, peers, and romantic partners on changes in purpose in life and mastery in young adulthood. *Canadian Journal of Family and Youth, 12*(3), 1-22. https://doi.org/10.29173/cjfy29546

Szkody, E., & McKinney, C. (2019). Indirect effects of social support on psychological health through self-esteem in emerging adulthood. *Journal of Family Issues, 40*(17), 2439-2455. https://doi.org/10.1177/0192513X19859612

Tabaac, A. R., Perrin, P. B., Rabinovitch, A. E. (2016). The relationship between social support and suicide risk in a national sample of ethnically diverse sexual minority women. *Journal of Gay & Lesbian Mental Health, 20*(2), 116-126. https://doi.org/10.1080/19359705.2015.1135842

Teo, J. T., & Thomas, S. J. (2019). Psychological mechanisms predicting wellbeing in pet owners: Rogers' core conditions versus Bowlby's attachment. *Anthrozoös, 32*(3), 399-417. https://doi.org/10.1080/08927936.2019.1598660

Tomlinson, C. A., Matijczak, A., McDonald, S. E., & Gee, N. R. (2021). The role of human-animal interaction in child and adolescent health and development. In B. Halpern-Felsher (Ed.), *The encyclopedia of child and adolescent health.* Elsevier. https://doi.org/10.1016/B978-0-12-818872-9.00003-0

Tomlinson, C. A., Murphy, J. L., Williams, J. M., Hawkins, R. D., Matijczak, A., Applebaum, J. W., & McDonald, S. E. (in press). Testing the moderating role of victimization and microaggressions on the relationship between human-animal interaction and psychological adjustment among LGBTQ+ emerging adults. *Human Animal Interaction Bulletin.*

Tomlinson, C. A., Pittman, S. K., Murphy, J. L., Matijczak, A., & McDonald, S. E. (2022). Psychometric evaluation of the Comfort from Companion Animals Scale in a sexual and gender minority sample. *Anthrozoös, 35*(1), 143-163. https://doi.org/10.1080/08927936.2021.1963548

Volsche, S., & Gray, P. (2016). "Dog moms" use authoritative parenting styles. *Human-Animal Interaction Bulletin, 4*(2), 1-16.

The Williams Institute. (2019, January). *LGBT demographic data interactive. https://williamsinstitute.law.ucla.edu/visualization/lgbt-stats/?topic=LGBT#density*

Wilson, D. M., Underwood, L., Carr, E., Gross, D. P., Kane, M., Miciak, M., Wallace, J. E., & Brown, C. A. (2021). Older women's experiences of companion animal death: Impacts on well-being and aging in place. *BMC Geriatrics, 21,* Article 470. https://doi.org/10.1186/s12877-021-02410-8

Wolf, E. J., Harrington, K. M., Clark, S. L., & Miller, M. W. (2013). Sample size requirements for structural equation models: An evaluation of power, bias, and solution property. *Educational and Psychological Measurement, 73*(6), 913-934. https://doi.org/10.1177/0013164413495237

Wood, L., Martin, K., Christian, H., Nathan, A., Lauritsen, C., Houghton, S., Kawachi, I., & McCune, S. (2015). The pet factor - Companion animals as a conduit for getting to know people, friendship formation and social support. *PLoS ONE, 10*(4), Article e0122085. https://doi.org/10.1371/journal.pone.0122085

Wood, L., Martin, K., Christian, H., Houghton, S., Kawachi, I., Vallesi, S., & McCune, S. (2017). Social capital and pet ownership - A tale of four cities. *SSM - Population Health, 3,* 442-447. https://doi.org/10.1016/j.ssmph.2017.05.002

Wu, C. S. T., Wong, R. S. M., & Chu, W. H. (2018). The association of pet ownership and attachment with perceived stress among Chinese adults. *Anthrozoös, 31*(5), 577-586. https://doi.org/10.1080/08927936.2018.1505269

Zasloff, R. L. (1996). Measuring attachment to companion animals: A dog is not a cat is not a bird. *Applied Animal Behaviour Science, 47*(1-2)*,* 43-48. https://doi.org/10.1016/0168-1591(95)01009-2

Zilcha-Mano, S., Mikulincer, M., & Shaver, P. R. (2011). An attachment perspective on human-pet relationships: Conceptualization and assessment of pet attachment orientations. *Journal of Research in Personality, 45*, 345-357. https://doi.org/10.1016/j.jrp.2011.04.001

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment, 52*(1), 30-41. https://doi.org/10.1207/s15327752jpa5201_2