

## **Testing the moderating role of victimization and microaggressions on the relationship between human-animal interaction and psychological adjustment among LGBTQ+ emerging adults**

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Human-animal interaction (HAI) is associated with positive psychological adjustment. Although these benefits are hypothesized to be most pronounced for individuals who experience adversity and compromised social relationships, such as LGBTQ+ (lesbian, gay, bisexual, transgender, queer, and other sexual/gender minority identities) individuals, this hypothesis has not been tested. The current, cross-sectional study examined whether the strength of the relationship between emotional comfort from companion animals and self-esteem and personal hardiness varies as a function of exposure to LGBTQ+ interpersonal stressors (i.e., victimization, microaggressions). Our sample included 155 LGBTQ+ emerging adults who lived with a dog and/or cat in the past year ( $M_{\text{age}} = 19.34$  years,  $SD = 1.12$  years). To test the hypothesis, we conducted simple and multiple moderation analyses. We found evidence that the magnitude of the association between comfort from companion animals and personal hardiness was greater for those who experienced high levels of interpersonal microaggressions. Similarly, victimization moderated the relation between comfort from companion animals and self-esteem. Including victimization and interpersonal microaggressions in the same model resulted in only one significant interaction effect: the relation between comfort from companion animals and self-esteem was positive at high levels of victimization and negative at low levels of victimization. Our results suggest that among LGBTQ+ emerging adults, the benefits of HAI on self-esteem were only present when high levels of victimization were reported. Future research should continue to examine factors that may influence the benefits and risks associated with HAI to identify for whom and under what circumstances HAI is beneficial.

*Keywords:* LGBTQ, companion animals, human-animal interaction, psychological adjustment, minority stress, victimization, microaggressions

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It is estimated that more than 60% of U.S. households own a companion animal, such as dogs and cats (Applebaum, Peek, & Zsembik, 2020). Empirical evidence suggests that living with a pet, day-to-day human-animal interaction (HAI), and the human-animal bond are associated with psychological adjustment across the lifespan (McConnell et al., 2011; Peluso et al., 2018; Schmitz et al., 2021; Schulz et al., 2020; Wright et al., 2019; see Piper & Uttley, 2019 and Purewal et al., 2017, for reviews). Specifically, HAI has been linked to internal traits and resources that are critical components of positive adjustment and resilience, such as self-esteem and personal hardiness (Bonanno, 2004; Kidd & Shahar, 2008; Maddi, 2013; McDonald, Murphy, et al., 2021; Smith & Gray, 2009; Zeigler-Hill & Wallace, 2012). It is hypothesized that the benefits of HAI, in relation to psychological adjustment, may be most pronounced in the context of adverse social experiences (e.g., social isolation, victimization; Carter & Porges, 2016); however, few studies have tested this hypothesis. This study examines the association between comfort derived from pets, forms of adversity, and two key aspects of psychological adjustment--self-esteem and personal hardiness--in a U.S. sample of LGBTQ+ (lesbian, gay, bisexual, transgender, queer, and other sexual/gender minority identities) emerging adults. Specifically, we test whether the strength of the association between comfort derived from pets and positive psychological adjustment varies as a function of exposure to adverse social experiences.

### **HAI, Self-Esteem, and Personal Hardiness**

Human-animal interaction (HAI) has been linked with multiple aspects of positive development, including higher self-esteem, self-confidence, and positive self-image (McConnell et al., 2011; Peluso et al., 2018; Schulz et al., 2020; see Piper & Uttley, 2019 and Purewal et al., 2017, for reviews). Among children, there is some evidence that HAI is associated with greater levels of self-esteem. For example, Van Houtte and Jarvis (1995) found that pet owning children between the ages of 10-13 reported higher self-esteem and self-concept in comparison to children of the same age who did not own pets. Further, there is evidence that youth who report greater attachment to a pet also report higher levels of self-esteem and self-confidence (Paul & Serpell, 1996; Triebenbacher, 1998). Qualitative research with children and adolescents provides additional support for how pets may promote psychosocial development (e.g., Covert et al., 1985; McNicholas & Collis, 2001). For example, youth described their pets as providing support, which allowed them to feel better about themselves, thus promoting self-esteem and self-confidence (McNicholas & Collis, 2001).

Similar psychosocial benefits of living with pets have been found in adult samples (e.g., Peluso et al., 2018). In a study by McConnell et al. (2011), pet owners reported greater self-esteem scores than individuals who did not own pets in a community sample. Schulz et al. (2020) found similar results; however, the benefits differed by sex and the type of pet owned. Specifically, females who owned cats reported significantly lower self-esteem than individuals who did not own pets; in contrast, male dog owners reported significantly higher levels of self-esteem than those who reported no pets. Relations between pet companionship and self-esteem are also supported by several qualitative studies. Specifically, pet owners often associate pet caretaking responsibilities and routines with feelings of value, purpose, stability, and self-efficacy, which promote self-esteem (Barcelos et al., 2020; Gan et al., 2020; Graham et al., 2019; McDonald, Matijczak, et al., 2021).

Personal hardiness is an important aspect of positive psychological adjustment; however, this construct has been unexplored in research on human-animal interaction. Personal hardiness is often used to measure individual-level qualities that assist in persevering despite difficult, adverse stressors (Kobasa, 1979; Smith & Gray, 2009). Although the evidence is limited, prior studies suggest that companion animals may promote personal hardiness. For example, in a study that explored college students' reasons for living with pets, Staats et al. (2008) found that one of the primary reasons for living with a pet was to have support during difficult times. In a study of transgender adults, Fuller and Riggs (2019) found that those who lived with a companion animal reported having a positive outlook and hopefulness of meeting a future intimate partner than those who did not live with a pet. These studies suggest that companion animals may provide benefits related to continuing to persevere and remain hopeful of the future despite difficulty. Additionally, a recent study by McDonald, Murphy, et al. (2021) found that HAI was directly associated with higher levels of personal hardiness in a community sample of emerging adults aged 18 to 21 years. Given that personal hardiness is an important factor in promoting positive development, associations between HAI and this construct warrant increased attention.

### **Inconsistencies and Gaps in the HAI Literature**

Although the studies reviewed above suggest that companion animals provide psychosocial benefits to their human companions, there is also evidence that HAI or pet ownership is unrelated to psychosocial outcomes (e.g. depression and anxiety, self-esteem; Hill et al., 2020; Hughes et al., 2020; Johnson & Rule, 1991; Kidd & Kidd, 1994; Mathers et al., 2010). In addition, some HAI

studies show associations between pet ownership or other aspects of HAI and worse psychological functioning, such as increased mental health symptoms and decreased levels of self-esteem (e.g., Barker et al., 2020; Matijczak et al., 2021; McDonald, O'Connor, et al., 2021; Schulz et al., 2020). The lack of research on moderation effects may explain the mixed pattern of findings on the impact of pets on psychosocial outcomes (Brooks et al., 2018; Hughes et al., 2020). Testing moderation effects also answers the call for a more nuanced and critically reflective approach to considering how pets impact humans (Herzog, 2011).

### **HAI, LGBTQ+ Emerging Adults, and Adverse Social Experiences**

It is generally hypothesized that the benefits of HAI in relation to psychological adjustment are enhanced when human relationships are compromised or absent, in the face of extreme adversity (e.g., potentially traumatic events such as exposure to violence, victimization), and during times of developmental vulnerability (Carter & Porges, 2016; Hawkins et al., 2019; Tomlinson et al., 2021). LGBTQ+ individuals are one population at increased risk for external stress and disrupted social support, especially during the transition to adulthood. For LGBTQ+ emerging adults, this developmental period is associated with increased risk for exposure to LGBTQ-related minority stressors, such as employment discrimination, housing insecurity, and family and peer rejection, due to oppressive, cisheteronormative<sup>1</sup> societal structures and attitudes (Bruce et al., 2014; Felner et al., 2020; Tan et al., 2017; Toomey et al., 2013; Wagaman et al., 2014).

Minority stressors experienced by LGBTQ+ individuals often are interpersonal in nature, including overt (e.g., victimization) and covert (e.g., microaggressions) actions (Fulginiti et al., 2020; Hall, 2018; Kosciw et al., 2020; Meyer, 2003; Toomey et al., 2010). Experiences of interpersonal stressors during emerging adulthood, such as victimization and exposure to microaggressions, place LGBTQ+ youth at increased risk of living alone and lacking human connections (Dakin et al., 2020; MacNamara, 2019; Muraco et al., 2018); this can have a negative impact on the development of healthy coping strategies, self-esteem, and overall resilience (Goldbach & Gibbs, 2017; Kosciw et al., 2013; Russell & Fish, 2020; Seelman, Colón-Díaz, et al., 2017). For example, among college students, Seelman, Woodford, and Nicolazzo (2017) found that experiences of microaggressions and victimization were associated with lower self-esteem; these findings are consistent with other research examining self-esteem among LGBTQ+ individuals (Johns et al., 2013; Parra et al., 2018; Wright & Wegner, 2012).

To counter social isolation stemming from interpersonal stressors and conflict with biological family and/or peers, research suggests that LGBTQ+ individuals often form “chosen families”<sup>2</sup> (Hailey et al., 2020; Wagaman et al., 2016; Wozolek, 2021). A qualitative study with LGBTQ+ individuals found that pets were included as a part of LGBTQ+ individuals’ chosen families (Hull & Ortyl, 2019), and a recent study by Riggs et al. (2018) examining relations between familial abuse, HAI, and social support found that experiencing familial abuse was associated with liking animals more and lower levels of perceived human social support. Therefore, individuals experiencing greater interpersonal conflict (e.g., with family, peers) may

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<sup>1</sup> Cisheteronormative refers to the “systemic normalization and material privileging of bodies, identities, and subjectivities that most closely align with white cisgender and heterosexual cultural expectancies” (LeMaster et al., 2019, p. 367).

<sup>2</sup> “Chosen family” is a term commonly used within LGBTQ+ communities to describe close relationships that are established and maintained by choice and not defined by biological or legal connections (Levin et al., 2020; Weston, 1991).

prefer interactions with companion animals over sources of human support (Applebaum & Zsembik, 2020; McNicholas & Collis, 2001; REDACTED; Rosenberg et al., 2020) which may provide additional opportunities for HAI to confer greater benefits to psychological adjustment. These intersecting adversities make HAI a particularly important social relationship to consider when examining risk and resilience in this population (McDonald, Matijczak, et al., 2021). However, no research study has specifically tested whether the impact of HAI on indicators of positive adjustment are moderated by life experiences, such as forms of adversity or external stressors.

### **Current Study**

The current study tested the hypothesis that the association between HAI and key aspects of positive psychological adjustment (self-esteem, personal hardiness) in LGBTQ+ emerging adults is moderated by experiences of adversity. Specifically, we tested whether and the degree to which the associations between comfort from companion animals and positive psychological adjustment is moderated by victimization and interpersonal microaggressions in a sample of LGBTQ+ emerging adults. Based on prior assertions that the benefits of HAI may be most pronounced among those who have compromised human relationships and experience adversity, we hypothesized that: (a) comfort from companion animals would be positively associated with self-esteem and personal hardiness and (b) the magnitude of the association between comfort from companion animals and self-esteem and personal hardiness would be greater among those who report more experiences of victimization and interpersonal microaggressions.

## **Methods**

### **Participants**

Participants were recruited as part of an ongoing, longitudinal study of LGBTQ+ stress and supports. Inclusion criteria for the overarching study were: being between the ages of 15 and 21 years, understanding spoken English, and self-identifying as LGBTQ+. In this paper, we report on cross-sectional data from the first wave of data collection. Due to the limited number of adolescents in our sample ( $n = 5$ ), we restricted our sample for the current study to 155 LGBTQ+ emerging adults between the ages of 18 and 21 ( $M_{\text{age}} = 19.34$  years,  $SD = 1.12$ ; 61.9% racial/ethnic minority) who lived with a pet dog and/or cat in the past 12 months. Approximately 47% of participants endorsed a gender minority identity (e.g., transgender, non-binary) and nearly all identified as a sexual minority (98.7%; e.g., asexual, gay, lesbian). Additionally, 46.5% of our sample indicated they were the primary caretaker of the cat(s) and/or dog(s) with whom they lived. More detailed demographic information is provided in Table 1.

### **Procedures**

All procedures were approved by the first author's university institutional review board (HM20014415). Recruitment and data collection took place from April 2019 to December 2020 in an urban, southeastern city of the U.S. Participants were recruited by posting flyers at five local community partner agencies that provide youth with LGBTQ+ inclusive services, online through social media, and through LGBTQ+ organizations' listservs. Participants were also recruited at LGBTQ+ community events (e.g., PRIDE celebration events). Those interested in participating contacted the study's project coordinators by phone or email and completed a screening interview via phone call. Participants who met inclusion criteria then scheduled an interview at a partner agency or at a private office at a local university. To begin the interview, a research assistant

described the study to the participants and completed the informed consent process. Participants had the option of completing an online survey by either self-administration using a laptop provided by the study staff member or by having the research team member verbally administer the survey. All participants chose to self-administer the survey. All interviews were conducted online via Zoom (version 5) beginning March 17, 2020, following the onset of the COVID-19 pandemic to adhere to public health recommendations. Nearly 23% of the interviews were conducted following this protocol. Although there were crisis protocols established for in-person and virtual interviews to provide guidance if participants indicated threat of harm to themselves or others, suicidal ideation, or extreme mental distress, no participants demonstrated distress that required the use of these crisis protocols. Additionally, a list of mental health and animal welfare resources was shared with all participants following the completion of the interview.

**Table 1**  
*Demographic Information (N = 155)*

Variable name	Variable categories	Frequency	%
Racial/ethnic identity	Arab/Arab American	1	.6
	Asian/Asian American	2	1.3
	Black/African American	23	14.8
	Latina/Latino/Latinx	9	5.8
	Multiracial/Mixed Race	23	14.8
	South Asian/Pacific Islander	1	.6
	White	95	61.3
	Prefer to self-describe	1	.6
Gender identity	Agender	4	2.6
	Cisgender Man	13	8.4
	Cisgender Woman	66	42.6
	Genderfluid	3	1.9
	Genderqueer	5	3.2
	Nonbinary	12	7.7
	Transgender man	19	12.3
	Transgender woman	3	1.9
	Multiple identifications	23	14.8
	Prefer to self-describe/not sure/questioning	7	4.5
Sexual orientation	Asexual	2	1.3
	Bisexual	36	23.2
	Demisexual	1	.6
	Gay	13	8.4
	Lesbian	20	12.9
	Pansexual	14	9.0
	Queer	19	12.3
	Straight/heterosexual	2	1.3
	Multiple identifications	48	31.0
Current school enrollment	No	12	7.7
	Yes	143	92.3

Level of education	12 <sup>th</sup> grade	1	.6
	High school graduate	53	34.2
	General equivalency diploma	2	1.3
	Some college, no degree	90	58.1
	Associate degree	5	3.2
	Bachelor's degree	4	2.6
<b>Pet type</b>	<b>Lived with</b>	<b>Primary Caretaker<sup>1</sup></b>	<b>Pet as Family<sup>1</sup></b>
Cat	48 (31.0%)	38 (79.2%)	44 (95.8%)
Dog	66 (42.6%)	30 (45.5%)	66 (100%)
Both	41 (26.5%)	4 (9.8%)	40 (97.6%) <sup>2</sup>

<sup>1</sup> Percentages are based on total number of participants that lived with the specific pet type.

<sup>2</sup> One individual who lived with both dog(s) and cat(s) reported only viewing their dog as a family member and two individuals reported only viewing their cats as a family member.

## Measures

### *Self-esteem*

Self-esteem was measured using the 10-item Rosenberg Self-Esteem Scale (RSES; Rosenberg et al., 1995). Participants responded to statements (e.g., “I take a positive attitude toward myself,” “I feel that I’m a person of worth, at least on an equal plane with others”) on a 4-point Likert scale from strongly disagree (1) to strongly agree (4). Total scores were created by summing each participant’s responses ( $\alpha = .88$ ).

### *Personal Hardiness*

Personal hardiness was assessed using the Courage to Challenge Scale (Smith & Gray, 2009). The Courage to Challenge Scale was developed for use with sexual and/or gender minority populations to examine resilience, coping, and self-efficacy. Respondents answered 18 items (e.g., “Getting through tough times prepares me for future challenges,” “Dealing with difficult situations has helped me grow in positive ways”) on a 7-point Likert scale ranging from strongly disagree (1) to strongly agree (7). Responses to each item were averaged to create a total score ( $\alpha = .85$ ).

### *Comfort from Companion Animals*

Emotional comfort from companion animals was assessed using the Comfort from Companion Animals Scale (CCAS; Zasloff, 1996). Respondents rated their agreement with 11 statements (e.g., “My pet is a source of constancy in my life,” “My pet makes me feel needed”) on a 4-point Likert scale from strongly agree (1) to strongly disagree (4). A total score was computed by summing the items ( $\alpha = .92$ ).

### *Victimization*

Victimization related to one’s gender identity and/or expression was measured using the victimization subscale of the Gender Minority Stress and Resilience Scale (GMSR; Testa et al., 2015). This subscale consisted of 6 items, in which participants endorsed experiencing (1) or not experiencing (0) forms of victimization attributed to their gender identity and/or expression (e.g., “I have been threatened with being outed or blackmailed because of my gender identity or

expression,” “I have been pushed, shoved, hit, or had something thrown at me because of my gender identity or expression”). Participants’ responses to the six subscale items were summed to create a total score ( $\alpha = .73$ ).

### ***Interpersonal Microaggressions***

Exposure to microaggressions was measured using the LGBQ Microaggressions on Campus Scale (Woodford et al., 2015). The current study assessed microaggressions using the interpersonal microaggressions subscale. Participants responded to how frequently they had directly experienced each form of microaggression on a 6-point Likert scale ranging from 0 (never) to 5 (very frequently). The interpersonal microaggressions subscale consists of 15 questions (e.g., “I was told I should act ‘less lesbian, gay, bisexual, or queer’”). The subscale score was computed by averaging individual item scores ( $\alpha = .91$ ).

### ***Covariates***

We included the following covariates in this study: age, race/ethnicity, gender modality<sup>3</sup>, the extent to which basic needs were currently met, being the primary caretaker of a dog and/or cat in the past 12 months, and social support. Gender modality was included as a covariate given evidence that transgender and nonbinary individuals experience greater levels of interpersonal stressors (i.e., victimization, microaggressions) than cisgender<sup>4</sup> individuals (e.g., Seelman, Colón-Díaz, et al., 2017). We also developed a dichotomous variable for whether participation took place before (= 0) or after (= 1) March 16, 2020, as a means of adjusting for the effects of additional COVID-related stress that may have influenced participant responses. The extent to which current needs are met was used as a proxy measure for household income, with participants responding on a 5-point Likert scale from 0 (never) to 4 (all of the time). Social support was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1998), with higher scores indicating higher levels of social support ( $\alpha = .80$ ).

### ***Analysis Plan***

All analyses for the study were conducted using IBM SPSS Statistics (Version 26) and PROCESS (Hayes, 2017). We conducted four simple moderation analyses (see Figure 1A) to examine whether, and to what extent, the association between comfort from companion animals and each psychological adjustment variable (personal hardiness, self-esteem) varied as a function of LGBTQ-related interpersonal stressors (i.e., victimization and interpersonal microaggressions). Additionally, we conducted additive multiple moderation models that included *both* victimization *and* interpersonal microaggressions as moderators of the relation between comfort from companion animals and each dependent variable (see Figure 1B). Covariates were included in each model: age (continuous), race/ethnicity (White/non-Latinx = 1, minority race/ethnicity or multiple racial/ethnic identities = 0), gender modality (gender minority = 1, cisgender = 0), extent to which current needs are met (continuous), whether the participant reported being the primary caretaker of a dog and/or cat in the past 12 months (=1) or not (=0), social support (continuous), and whether participation occurred prior to (=0) or after (=1) interviews began being conducted online due to

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<sup>3</sup> Gender modality refers to the degree to which an individual’s gender identity relates to their gender assigned at birth (Ashley, 2019). We use this term when referring to our dichotomization of gender identity into cisgender and gender minority, whereas we use the term gender identity when referring to multiple specific gender identities.

<sup>4</sup> Cisgender refers to a gender modality in which gender identity corresponds with the gender assigned at birth (Ashley, 2019).

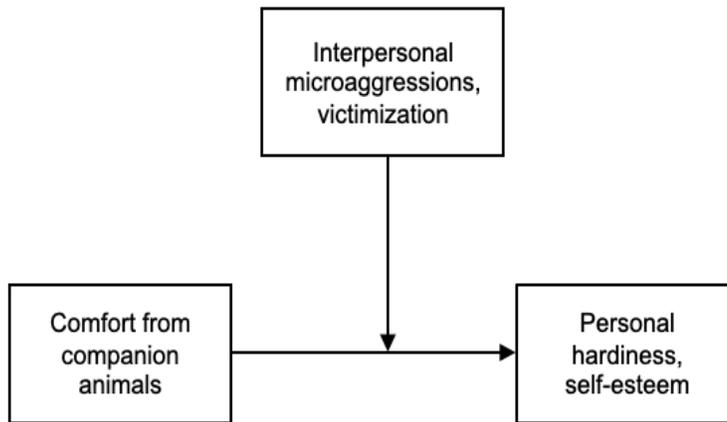
COVID-19. Both race/ethnicity and gender identity were dichotomized due to insufficient power to analyze the differences between each identity category.

We tested for the multivariate assumptions of normality, linearity, multicollinearity, singularity, and homoscedasticity, which were all met. Mahallanobis distance scores were computed and indicated that there were no outliers. We also standardized all continuous variables included in the analyses (Baron & Kenny, 1986). We conducted a post-hoc power analysis using G\*Power software (Faul et al., 2009); the results indicated that our sample size ( $n = 155$ ) was sufficient ( $> .80$ ) to detect a hypothesized incremental medium ( $f^2 = .15$ ) or large ( $f^2 = .35$ ) effect size (Cohen, 1977) at an alpha level of .05 and a critical  $F$  value of 3.91. However, we had less than adequate power to detect a small effect size ( $f^2 = .02$ ).

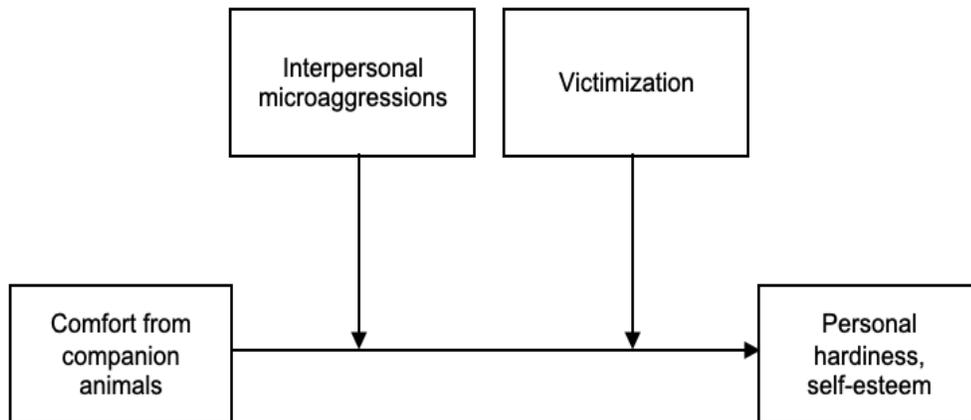
**Figure 1**

*Theoretical Models of the Moderating Effects of Interpersonal Stressors on the Relation Between Comfort from Companion Animals and Personal Hardiness or Self-Esteem*

**A.**



**B.**



## Results

Means, standard deviations, and correlations among constructs are reported in Table 2. The correlation between personal hardiness and self-esteem was statistically significant ( $r = .56, p < .001$ ). Personal hardiness was positively and significantly associated with comfort from companion animals ( $r = .29, p < .001$ ), while self-esteem was not significantly associated with comfort from companion animals. Comfort from companion animals was not significantly associated with victimization but was positively and significantly associated with interpersonal microaggressions ( $r = .33, p < .001$ ). However, this effect was not strong enough to violate the assumption of multicollinearity, as VIF and Tolerance were all acceptable (Hair et al., 2010). The only covariates significantly associated ( $p < .05$ ) with our dependent variables in our moderation models were gender modality (i.e., identifying as a gender minority) and social support. Identifying as a gender minority was negatively associated with personal hardiness and self-esteem in all moderation models; social support scores were positively associated with personal hardiness and self-esteem across all models. All covariates examined were included in the final models, despite non-significance, as they did not affect power.

### Simple Moderation Analyses

In our simple moderation model that examined victimization as a moderator of the relation between comfort from companion animals and personal hardiness, comfort from companion animals was significantly and positively associated with personal hardiness ( $\beta = 0.24, t[144] = 2.77, p = .006$ ), but victimization was not significantly associated with personal hardiness ( $\beta = -0.01, t[144] = -0.14, p = .890$ ). Victimization was not a significant moderator of the relation between comfort from companion animals and personal hardiness ( $\Delta R^2 = .02, F[1,144] = 2.80, \beta = 0.15, t[144] = 1.67, p = .096$ ); however, the overall model did predict a significant amount of the variance in self-esteem ( $R^2 = .17, F[10,144] = 2.87, p = .003$ ). Similarly, in the model that examined interpersonal microaggressions as a moderator, comfort from companion animals was significantly and positively related to personal hardiness ( $\beta = 0.27, t[144] = 2.95, p = .004$ ), whereas interpersonal microaggressions were not significantly associated with personal hardiness ( $\beta = 0.05, t[144] = 0.60, p = .551$ ). We found evidence that the relation between comfort from companion animals and personal hardiness was moderated by interpersonal microaggressions ( $\Delta R^2 = .03, F[1,144] = 4.45, \beta = 0.16, t[144] = 2.11, p = .037$ ). As shown in Figure 2A, the relation between comfort from companion animals and personal hardiness was statistically significant and positive at moderate ( $\beta = 0.29, t[106] = 3.08, p = .003$ ) and high levels of interpersonal microaggressions ( $\beta = 0.43, t[25] = 3.23, p = .002$ ), but was not significant at low levels of interpersonal microaggressions ( $\beta = 0.09, t[24] = 0.88, p = .381$ ). Further, the overall model explained 18% of the variance in personal hardiness ( $F[10,144] = 3.09, p = .001$ ).

**Table 2**

*Intercorrelations and Unstandardized Means and Standard Deviations (SD) for Constructs of Interest (N = 155)*

Variable	M / #	SD / %	1	2	3	4	5	6	7	8	9	10	11	12
1. COVID <sup>a</sup>	35	22.6	-											
2. Age	19.34	1.12	0.10	-										
3. Caretaker <sup>b</sup>	72	46.5	-0.04	0.02	-									
4. Race/ ethnicity <sup>c</sup>	96	61.9	-0.09	0.03	0.04	-								
5. Gender minority status <sup>d</sup>	73	47.1	-0.08	0.11	0.05	0.02	-							
6. Current needs met	3.78	0.43	0.24**	0.02	-0.31***	-0.09	-0.09	-						
7. Social support	5.31	0.95	-0.01	-0.04	-0.19*	-0.05	-0.04	0.19*	-					
8. CCAS	40.14	4.36	-0.16	0.08	.35***	-0.01	-0.15	-0.04	0.01	-				
9. Victimization	1.07	1.35	-0.01	0.07	0.14	0.10	0.28**	-0.17*	-0.08	-0.02	-			
10. Interpersonal microaggressions	2.53	1.02	-0.03	-0.001	0.31***	0.03	-0.02	-0.20*	-0.25**	0.33***	0.36***	-		
11. Self-Esteem	26.09	5.32	0.02	-0.16*	-0.07	-0.02	-0.22**	0.19*	0.31***	0.001	-0.12	-0.19*	-	
12. Personal Hardiness	5.46	0.71	-0.06	-0.04	0.13	0.05	-0.21**	0.04	0.15	0.29***	-0.04	0.10	0.56***	-

<sup>a</sup> 0 = participated before and 1 = participated after COVID-19 restrictions were established; frequency and percentage reflect those who participated after COVID-19. <sup>b</sup> 0 = not the primary caretaker of a dog/cat in the past year and 1 = primary caretaker; frequency and percentage reflect those who were the primary caretaker. <sup>c</sup> 0 = racial/ethnic minority and 1 = White, non-Latinx; frequency and percentage reflect those who identified as racial/ethnic minority. <sup>d</sup> 0 = cisgender and 1 = gender minority; frequency and percentage reflect those who identified as a gender minority.

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

In a model with self-esteem as the dependent variable, neither comfort from companion animals ( $\beta = -0.03$ ,  $t[144] = -0.42$ ,  $p = .677$ ), nor victimization ( $\beta = -0.07$ ,  $t[144] = -0.84$ ,  $p = .404$ ), were significantly associated with self-esteem. However, we found evidence of a moderated effect of comfort from companion animals by victimization on self-esteem ( $\Delta R^2 = .03$ ,  $F[1,144] = 4.64$ ,  $\beta = 0.19$ ,  $t[144] = 2.15$ ,  $p = .033$ ). Upon probing the interaction effect (see Figure 2B), the low, moderate, and high values of the moderator were not significant; further probing using the Johnson-Neyman technique also resulted in no regions of significance. This means that at no value of victimization within the range of our data is the effect of comfort from companion animals on self-esteem statistically significant. The significant interaction effect suggests that victimization had *some* effect on the relation between comfort from companion animals and self-esteem; however, our data do not provide sufficient information to specify more precise descriptions of the interaction effects. A significant amount of the variance in self-esteem was also accounted for by the overall model ( $R^2 = .20$ ,  $F[10, 144] = 3.61$ ,  $p < .001$ ). Finally, in our model that examined interpersonal microaggressions as a moderator, neither comfort from companion animals ( $\beta = 0.01$ ,  $t[144] = 0.10$ ,  $p = .923$ ), nor interpersonal microaggressions ( $\beta = -0.12$ ,  $t[144] = -1.45$ ,  $p = .149$ ), were significantly associated with self-esteem. There was also no evidence of a significant interaction between comfort from companion animals and interpersonal microaggressions on self-esteem ( $\Delta R^2 = .002$ ,  $F[1,144] = 0.27$ ,  $\beta = 0.04$ ,  $t[144] = 0.52$ ,  $p = .603$ ). Nevertheless, the overall model explained 19% of the variance in self-esteem ( $F[10,144] = 3.33$ ,  $p = .001$ ).

## Multiple Moderation Analyses

### *Personal Hardiness*

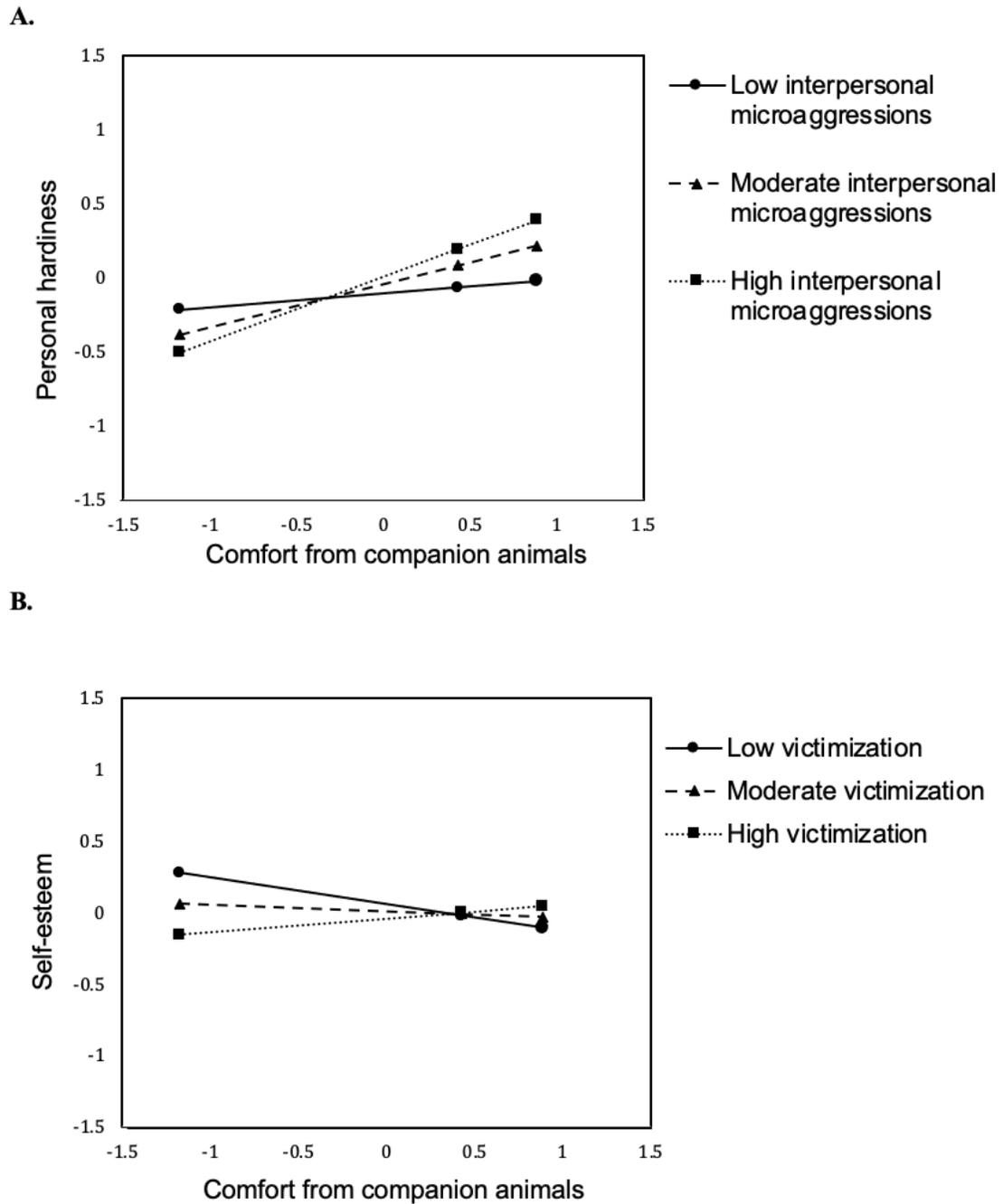
Although the overall model explained 18% of the variance in personal hardiness ( $F[12,142] = 2.62$ ,  $p = .004$ ) and comfort from companion animals was positively and significantly related to personal hardiness ( $\beta = 0.26$ ,  $t[142] = 2.81$ ,  $p = .006$ ), results indicated that neither victimization ( $\Delta R^2 = .004$ ,  $F[1,142] = .76$ ,  $\beta = 0.09$ ,  $t[142] = .87$ ,  $p = .386$ ) nor interpersonal microaggressions ( $\Delta R^2 = .01$ ,  $F[1,142] = 2.27$ ,  $\beta = 0.13$ ,  $t[142] = 1.51$ ,  $p = .135$ ) significantly moderated the relation between comfort from companion animals and personal hardiness.

### *Self Esteem*

In our model with victimization and interpersonal microaggressions as moderators, comfort from companion animals was not significantly associated with self-esteem, adjusting for the effects of victimization and interpersonal microaggressions ( $\beta = -0.01$ ,  $t[142] = -0.12$ ,  $p = .908$ ). Although the interaction between comfort from companion animals and interpersonal microaggressions was not statistically significant ( $\Delta R^2 = .001$ ,  $F[1,142] = 0.18$ ,  $\beta = -0.04$ ,  $t[142] = -0.43$ ,  $p = .671$ ), victimization significantly moderated the relation between comfort from companion animals and self-esteem while holding interpersonal microaggressions constant ( $F[1,142] = 4.21$ ,  $\beta = 0.20$ ,  $t[142] = 2.05$ ,  $p = .042$ ). This interaction effect uniquely accounted for 2.3% of the variance in self-esteem. Although there were no significant conditional effects at the low, medium, and high values of victimization PROCESS probed, the plot of the interaction effect reflects that the relation between comfort from companion animals and self-esteem change at different levels of victimization (see Figure 3). Specifically, there was a negative relation between comfort from companion animals and self-esteem at low levels of victimization, and a positive

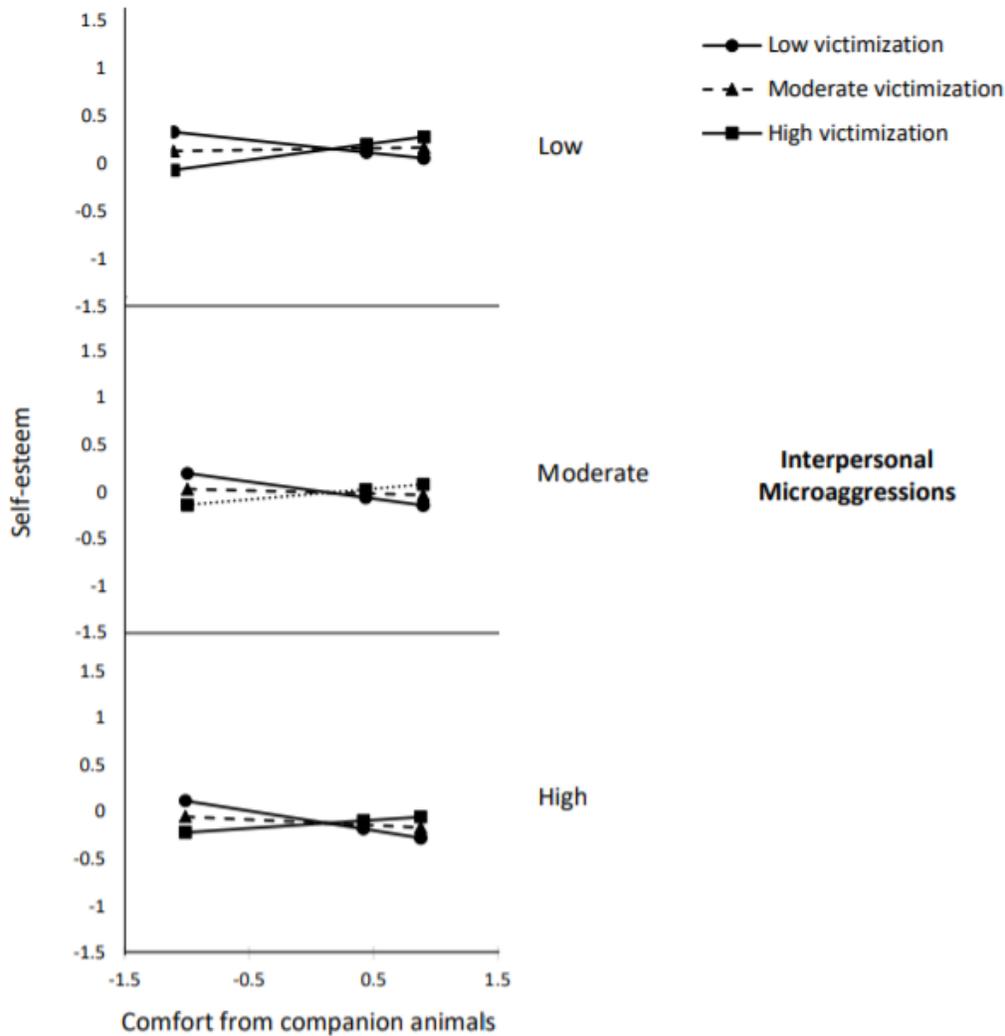
relation between comfort from companion animals and self-esteem at high levels of victimization. This effect was the same across all levels of interpersonal microaggressions.

**Figure 2** *Conditional Effects of Comfort from Companion Animals on Self-Esteem and Personal Hardiness as Functions of Victimization and Interpersonal Microaggressions (N = 155)*



**Figure 3**

*Conditional Effects of Comfort from Companion Animals on Self-esteem as a Function of Both Victimization and Interpersonal Microaggressions (N=155)*



## Discussion

This study aimed to empirically test the hypothesis that the benefits of HAI are most pronounced in the context of adversity and compromised social contexts. Specifically, we tested whether, and to what extent, exposure to forms of interpersonal stress (i.e., microaggressions and victimization) moderates the relation between comfort derived from companion animals and psychological adjustment in a sample of LGBTQ+ emerging adults. Given previous literature on the benefits of HAI in relation to human resilience (Piper & Uttley, 2018; Purewal et al., 2017), we hypothesized that comfort from companion animals would be positively related to self-esteem

and personal hardiness. Further, we hypothesized that the positive association between comfort from companion animals and these indicators of psychological adjustment would be strongest for those who report greater exposure to microaggressions and victimization.

Our first hypothesis was partially supported. We found a significant association between comfort from companion animals and personal hardiness across the simple and multiple moderation models, in which higher levels of comfort from companion animals were related to greater personal hardiness. These results coincide with existing literature that finds HAI is associated with personal hardiness (McDonald, Murphy, et al., 2021) and other aspects of resilience (Purewal et al., 2017). However, we did not find a significant association between comfort from companion animals and self-esteem. Although one other study has found statistically non-significant relations between comfort from companion animals and self-esteem (McDonald, O'Connor, et al., 2021), our results contradict evidence from multiple empirical studies that have found positive associations between HAI and self-esteem (Peluso et al., 2018; Schulz et al., 2020; see Purewal et al., 2017, for a review). One explanation for the non-significant findings could be that previous studies have investigated other domains of HAI (e.g., pet ownership, pet attachment, animal assisted interventions), and that comfort derived from pets may not be a domain of HAI that is related to self-esteem. For example, the qualitative study by Barcelos et al. (2020) found that themes related to pet companionship and aspects of pet attachment (e.g., love) were frequently linked to the promotion of self-esteem. In contrast, activities associated with emotional comfort (e.g., tactile interactions) were more likely to be discussed in relation to arousal regulation (i.e., emotion regulation, stress reduction), which may help to explain the differences in significant associations between comfort from companion animals and self-esteem and personal hardiness. Our study highlights the importance of investigating different characteristics of HAI in relation to multiple aspects of human health and wellbeing, in order to adequately delineate the mechanism through which HAI may confer benefits and risks to those who live with pets.

In support of our second hypothesis, we found that exposure to interpersonal microaggressions was a significant moderator of the relation between comfort from companion animals and personal hardiness. The results of the conditional effects suggest that the magnitude of the effect of comfort from companion animals on personal hardiness may be strongest for those who report moderate and high levels of interpersonal microaggressions. However, at low levels of interpersonal microaggressions, the relationship between CCAS and personal hardiness was no longer significant. Our results support the hypothesis that individuals who experience adverse social contexts characterized by high levels of interpersonal microaggressions may receive more benefits from HAI. This may be due to the link between LGBTQ-related interpersonal stressors and inadequate community-level support and/or lower levels of perceived social support from friends, family, and significant others (Dakin et al., 2020; Ehlke et al., 2020). In the absence of human support, LGBTQ+ individuals exposed to interpersonal microaggressions may rely on their pets more as a source of emotional comfort, which may strengthen the positive relationship between comfort from companion animals and individual-level coping skills and resilience. Indeed, our results also indicated that comfort from companion animals was positively correlated with interpersonal microaggressions. This could also explain why there was not a significant relation between comfort from companion animals and personal hardiness for participants who reported low levels of interpersonal microaggressions. Participants exposed to lower levels of interpersonal microaggressions may derive support from human relationships and, therefore, rely less on comfort from their companion animals (Matijczak et al., 2021).

When including victimization in the multiple moderation model, however, the moderating effect of interpersonal microaggressions on the relation between comfort from companion animals and personal hardiness was no longer significant. This highlights the importance of accounting for experiences of LGBTQ-related stressors that frequently co-occur (e.g., victimization, microaggressions) and co-vary. In our analysis, interpersonal microaggressions and victimization were moderately correlated; victimization was also correlated, although weakly and not significantly, with comfort from companion animals and personal hardiness. As a result, not including victimization in the analysis may have resulted in biased estimates in the simple moderation analysis (Kline, 2016). However, the weak correlations among victimization, comfort from companion animals, and personal hardiness, may mask the actual associations between variables once all variables are adjusted for in the model (Kline, 2016). This is supported by the negligible changes in the coefficients of comfort from companion animals and interpersonal microaggressions between the simple and additive multiple moderation models, respectively.

Although we did not find that interpersonal microaggressions moderated the relation between comfort from companion animals and self-esteem, victimization significantly moderated this relation in the simple moderation analysis *and* in the additive multiple moderation analysis, in which levels of interpersonal microaggressions were held constant. However, after probing for interaction effects, we did not find any significant conditional effects at the low, medium, and high values selected, and the Johnson-Neyman output suggested that the point of significance was outside of the range of the moderator. Thus, we are limited to making interpretations based on the moderation plots. The simple moderation plots indicated that at low levels of victimization, the relation between comfort from companion animals and self-esteem is negative, but at high levels of victimization, this relation is positive. This pattern remained consistent in the multiple moderation plots across all levels of interpersonal microaggressions. This suggests that the benefits of HAI in relation to self-esteem are only present when individuals reported exposure to high levels of victimization-related adversity. This aligns with the hypothesis that the benefits of companion animals are most pronounced for those experiencing adversity, although there is limited empirical evidence that supports *why* victimization may interact with HAI in relation to self-esteem in this way. Results from qualitative studies suggest that caring for a pet may lead to enhanced feelings of worth and responsibility in LGBTQ+ youth (Bryant, 1990; Maharaj & Haney, 2015; McDonald, Matijczak, et al., 2021). It is possible that caring for one's pet (and concurrently receiving comfort from one's pet) may be an important facilitator of self-esteem for participants exposed to greater levels of victimization, as it is evidence of their abilities to care for another being. However, these results should be interpreted with caution, and replication with a larger sample size adequate to detect small effects is needed.

### **Limitations**

There are a few notable limitations of the current study. As a result of our community-engaged research approach, our data were collected using convenience sampling methods. Additionally, our results are based on cross-sectional data. Although our sample size provided adequate power to detect moderate and large effect sizes, we lacked sufficient power to detect small effect sizes. Due to these power limitations, we relied on dichotomized race/ethnicity and gender modality variables that likely did not capture the full extent of participants' diverse experiences. Similarly, due to the limitations of our sample size, we were unable to test whether there were differences in the relation between HAI and our outcomes based on species type (dogs vs. cats). A limitation related to our measurement approach is that the GMSR assesses lifetime

victimization experiences due to gender identity and expression and not sexual orientation, whereas the LGBQ Microaggressions on Campus Scale asks respondents about experiences of interpersonal microaggressions related to their sexual orientation. Although experiences of sexual orientation and gender-based discrimination frequently co-occur across LGBTQ+ identities, there may be differences in how participants responded to items based on whether the participant identified as a sexual and/or gender minority. Another limitation is our use of measures that assessed experiences based on different timeframes (i.e., past year, lifetime). For example, we assessed lifetime experiences of victimization; in contrast, interpersonal microaggressions were measured by assessing experiences over the past year. Further, we did not collect data on the source of microaggressions or victimization (e.g., friend, family, peer). Due to the hypothesis that HAI may be especially beneficial for those who lack human social support, capturing whether adverse interpersonal experiences are caused by family, peers, and/or close others versus strangers is important to further delineate under what conditions and for whom HAI may provide the most benefits.

### **Implications**

Given our findings suggesting that the magnitude of the effect of comfort from companion animals on positive psychological adjustment (i.e., self-esteem, personal hardiness) is greatest for those who experience high levels of LGBTQ-related interpersonal stressors, we continue here with implications for policy and practice. Considering that LGBTQ+ individuals, and individuals with other marginalized identities, are disproportionately at risk for issues related to economic vulnerabilities, such as (lack of) access to pet-friendly rental housing and veterinary care, we emphasize a need for communities to encourage partnerships between social service providers and animal welfare organizations. These community partnerships should focus on supporting people and pets through collaborative measures that reduce barriers to health and wellbeing for LGBTQ+ emerging adults and their pets. For example, providing free or reduced-cost basic veterinary care or pet supplies in the same location where individuals receive mental health services could reduce some of the burden of issues with access to transportation or the need to take time away from paid work for multiple appointments. Additionally, social service and mental health providers should be cognizant of the animal services that may be available in their communities in order to assist individuals with pet-related needs. These types of efforts within communities, and more generally framed within public policy, could make great strides in supporting the health and wellbeing of individuals who take comfort in their pets while simultaneously supporting the welfare of their pets.

### **Future Directions**

Our findings emphasize the benefits of companion animals for LGBTQ+ communities and the importance of considering the nature and severity of stressors and how adversity exposure may impact HAI. Future research should replicate and expand on our cross-sectional study. For example, the hypothesis that the benefits of HAI will be most pronounced among those who experience adversity and lack social support should be explored with additional types of LGBTQ+ minority stress, such as discrimination and rejection. Future research should also capture multiple forms of minority stress (e.g., racism, ableism) that can intersect and co-occur with LGBTQ+ minority stress and complicate experiences of adversity and related social and health outcomes. Consistent with prior research (e.g., Johns et al., 2013; Parra et al., 2018; Seelman, Woodford, & Nicolazzo, 2017; Wright & Wegner, 2012), we found that individuals who did not identify as

cisgender reported significantly lower levels of self-esteem and personal hardiness. We adjusted for this effect in our models, however, future research would benefit from exploring relations between gender modality and interpersonal stressors to determine how experiences of microaggressions, victimization, and other forms of LGBTQ-related stress affect psychosocial outcomes across gender modalities. This approach allows for differences in interpersonal stressors based on gender modalities to be examined, in contrast to adjusting for the effects of gender modalities.

Future research would also benefit from exploring other domains of HAI given that comfort from companion animals is only one conceptualization of the human-animal bond. Other forms of HAI, such as attachment to pets, have been associated with psychological adjustment (e.g., McConnell et al., 2011; Peluso et al., 2018; Schulz et al., 2020; Triebenacher, 1998) and may provide different benefits in relation to adversity and the development of psychological resilience. Future research would also do well to consider and assess stress associated with pet ownership to examine how pet-related stressors may influence links between HAI and psychological adjustment (e.g., Applebaum, Tomlinson, et al., 2020; McDonald, Matijczak, et al., 2021). Further, our data was limited to the emerging adulthood period; however, the hypothesis regarding the benefits of pets should also be tested among children and older adults. Finally, longitudinal data is needed to explore the potential reciprocal relations between HAI, psychological adjustment, and adversity exposure, and the biobehavioral mechanisms through which HAI influences human health and development over time. Given prior assertions that HAI is a social determinant of health (Mueller et al., 2018), it is critical that future studies continue to examine for whom, and under what circumstances, HAI may promote psychosocial benefits.

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