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**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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46 **Abstract**

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

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

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

72 It is estimated that more than 60% of U.S. households own a companion animal, such as
73 dogs and cats (Applebaum, Peek, & Zsembik, 2020). Empirical evidence suggests that living
74 with a pet, day-to-day human-animal interaction (HAI), and the human-animal bond are
75 associated with psychological adjustment across the lifespan (McConnell et al., 2011; Peluso et
76 al., 2018; Schmitz et al., 2021; Schulz et al., 2020; Wright et al., 2019; see Piper & Uttley, 2019
77 and Purewal et al., 2017, for reviews). Specifically, HAI has been linked to internal traits and
78 resources that are critical components of positive adjustment and resilience, such as self-esteem
79 and personal hardiness (Bonanno, 2004; Kidd & Shahar, 2008; Maddi, 2013; McDonald,
80 Murphy, et al., 2021; Smith & Gray, 2009; Zeigler-Hill & Wallace, 2012). It is hypothesized that
81 the benefits of HAI, in relation to psychological adjustment, may be most pronounced in the
82 context of adverse social experiences (e.g., social isolation, victimization; Carter & Porges,
83 2016); however, few studies have tested this hypothesis. This study examines the association
84 between comfort derived from pets, forms of adversity, and two key aspects of psychological
85 adjustment--self-esteem and personal hardiness--in a U.S. sample of LGBTQ+ (lesbian, gay,
86 bisexual, transgender, queer, and other sexual/gender minority identities) emerging adults.
87 Specifically, we test whether the strength of the association between comfort derived from pets
88 and positive psychological adjustment varies as a function of exposure to adverse social
89 experiences.

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

91 Human-animal interaction (HAI) has been linked with multiple aspects of positive
92 development, including higher self-esteem, self-confidence, and positive self-image (McConnell
93 et al., 2011; Peluso et al., 2018; Schulz et al., 2020; see Piper & Uttley, 2019 and Purewal et al.,
94 2017, for reviews). Among children, there is some evidence that HAI is associated with greater
95 levels of self-esteem. For example, Van Houtte and Jarvis (1995) found that pet owning children
96 between the ages of 10-13 reported higher self-esteem and self-concept in comparison to
97 children of the same age who did not own pets. Further, there is evidence that youth who report
98 greater attachment to a pet also report higher levels of self-esteem and self-confidence (Paul &
99 Serpell, 1996; Triebenbacher, 1998). Qualitative research with children and adolescents provides
100 additional support for how pets may promote psychosocial development (e.g., Covert et al.,
101 1985; McNicholas & Collis, 2001). For example, youth described their pets as providing support,
102 which allowed them to feel better about themselves, thus promoting self-esteem and self-
103 confidence (McNicholas & Collis, 2001).

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

113 efficacy, which promote self-esteem (Barcelos et al., 2020; Gan et al., 2020; Graham et al., 2019;
114 REDACTED).

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

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

131 Although the studies reviewed above suggest that companion animals provide
132 psychosocial benefits to their human companions, there is also evidence that HAI or pet
133 ownership is unrelated to psychosocial outcomes (e.g. depression and anxiety, self-esteem; Hill
134 et al., 2020; Hughes et al., 2020; Johnson & Rule, 1991; Kidd & Kidd, 1994; Mathers et al.,
135 2010). In addition, some HAI studies show associations between pet ownership or other aspects

136 of HAI and worse psychological functioning, such as increased mental health symptoms and
137 decreased levels of self-esteem (e.g., Barker et al., 2020; Matijczak et al., 2021; McDonald,
138 O'Connor, et al., 2021; Schulz et al., 2020). The lack of research on moderation effects may
139 explain the mixed pattern of findings on the impact of pets on psychosocial outcomes (Brooks et
140 al., 2018; Hughes et al., 2020). Testing moderation effects also answers the call for a more
141 nuanced and critically reflective approach to considering how pets impact humans (Herzog,
142 2011).

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

144 It is generally hypothesized that the benefits of HAI in relation to psychological
145 adjustment are enhanced when human relationships are compromised or absent, in the face of
146 extreme adversity (e.g., potentially traumatic events such as exposure to violence, victimization),
147 and during times of developmental vulnerability (Carter & Porges, 2016; Hawkins et al., 2019;
148 Tomlinson et al., 2021). LGBTQ+ individuals are one population at increased risk for external
149 stress and disrupted social support, especially during the transition to adulthood. For LGBTQ+
150 emerging adults, this developmental period is associated with increased risk for exposure to
151 LGBTQ-related minority stressors, such as employment discrimination, housing insecurity, and
152 family and peer rejection, due to oppressive, cisheteronormative¹ societal structures and attitudes
153 (Bruce et al., 2014; Felner et al., 2020; Tan et al., 2017; Toomey et al., 2013; Wagaman et al.,
154 2014).

155 Minority stressors experienced by LGBTQ+ individuals often are interpersonal in nature,
156 including overt (e.g., victimization) and covert (e.g., microaggressions) actions (Fulginiti et al.,

¹ 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).

157 2020; Hall, 2018; Kosciw et al., 2020; Meyer, 2003; Toomey et al., 2010). Experiences of
158 interpersonal stressors during emerging adulthood, such as victimization and exposure to
159 microaggressions, place LGBTQ+ youth at increased risk of living alone and lacking human
160 connections (Dakin et al., 2020; MacNamara, 2019; Muraco et al., 2018); this can have a
161 negative impact on the development of healthy coping strategies, self-esteem, and overall
162 resilience (Goldbach & Gibbs, 2017; Kosciw et al., 2013; Russell & Fish, 2020; Seelman, Colón-
163 Diaz, et al., 2017). For example, among college students, Seelman, Woodford, and Nicolazzo
164 (2017) found that experiences of microaggressions and victimization were associated with lower
165 self-esteem; these findings are consistent with other research examining self-esteem among
166 LGBTQ+ individuals (Johns et al., 2013; Parra et al., 2018; Wright & Wegner, 2012).

167 To counter social isolation stemming from interpersonal stressors and conflict with
168 biological family and/or peers, research suggests that LGBTQ+ individuals often form “chosen
169 families”² (Hailey et al., 2020; Wagaman et al., 2016; Wozolek, 2021). A qualitative study with
170 LGBTQ+ individuals found that pets were included as a part of LGBTQ+ individuals’ chosen
171 families (Hull & Ortyl, 2019), and a recent study by Riggs et al. (2018) examining relations
172 between familial abuse, HAI, and social support found that experiencing familial abuse was
173 associated with liking animals more and lower levels of perceived human social support.
174 Therefore, individuals experiencing greater interpersonal conflict (e.g., with family, peers) may
175 prefer interactions with companion animals over sources of human support (Applebaum &
176 Zsembik, 2020; McNicholas & Collis, 2001; REDACTED; Rosenberg et al., 2020) which may
177 provide additional opportunities for HAI to confer greater benefits to psychological adjustment.

² “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).

178 These intersecting adversities make HAI a particularly important social relationship to consider
179 when examining risk and resilience in this population (REDACTED). However, no research
180 study has specifically tested whether the impact of HAI on indicators of positive adjustment are
181 moderated by life experiences, such as forms of adversity or external stressors.

182 **Current Study**

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

194 **Methods**

195 **Participants**

196 Participants were recruited as part of an ongoing, longitudinal study of LGBTQ+ stress
197 and supports. Inclusion criteria for the overarching study were: being between the ages of 15 and
198 21 years, understanding spoken English, and self-identifying as LGBTQ+. In this paper, we
199 report on cross-sectional data from the first wave of data collection. Due to the limited number of
200 adolescents in our sample ($n = 5$), we restricted our sample for the current study to 155 LGBTQ+

201 emerging adults between the ages of 18 and 21 ($M_{\text{age}} = 19.34$ years, $SD = 1.12$; 61.9%
202 racial/ethnic minority) who lived with a pet dog and/or cat in the past 12 months. Approximately
203 47% of participants endorsed a gender minority identity (e.g., transgender, non-binary) and
204 nearly all identified as a sexual minority (98.7%; e.g., asexual, gay, lesbian). Additionally, 46.5%
205 of our sample indicated they were the primary caretaker of the cat(s) and/or dog(s) with whom
206 they lived. More detailed demographic information is provided in Table 1.

207 **Procedures**

208 All procedures were approved by the first author's university institutional review board
209 (HM20014415). Recruitment and data collection took place from April 2019 to December 2020
210 in an urban, southeastern city of the U.S. Participants were recruited by posting flyers at five
211 local community partner agencies that provide youth with LGBTQ+ inclusive services, online
212 through social media, and through LGBTQ+ organizations' listservs. Participants were also
213 recruited at LGBTQ+ community events (e.g., PRIDE celebration events). Those interested in
214 participating contacted the study's project coordinators by phone or email and completed a
215 screening interview via phone call. Participants who met inclusion criteria then scheduled an
216 interview at a partner agency or at a private office at a local university. To begin the interview, a
217 research assistant described the study to the participants and completed the informed consent
218 process. Participants had the option of completing an online survey by either self-administration
219 using a laptop provided by the study staff member or by having the research team member
220 verbally administer the survey. All participants chose to self-administer the survey. All
221 interviews were conducted online via Zoom (version 5) beginning March 17, 2020, following the
222 onset of the COVID-19 pandemic to adhere to public health recommendations. Nearly 23% of
223 the interviews were conducted following this protocol. Although there were crisis protocols

224 established for in-person and virtual interviews to provide guidance if participants indicated
225 threat of harm to themselves or others, suicidal ideation, or extreme mental distress, no
226 participants demonstrated distress that required the use of these crisis protocols. Additionally, a
227 list of mental health and animal welfare resources was shared with all participants following the
228 completion of the interview.

229 **Measures**

230 *Self-esteem*

231 Self-esteem was measured using the 10-item Rosenberg Self-Esteem Scale (RSES;
232 Rosenberg et al., 1995). Participants responded to statements (e.g., “I take a positive attitude
233 toward myself,” “I feel that I’m a person of worth, at least on an equal plane with others”) on a
234 4-point Likert scale from strongly disagree (1) to strongly agree (4). Total scores were created by
235 summing each participant’s responses ($\omega = .88$).

236 *Personal Hardiness*

237 Personal hardiness was assessed using the Courage to Challenge Scale (Smith & Gray,
238 2009). The Courage to Challenge Scale was developed for use with sexual and/or gender
239 minority populations to examine resilience, coping, and self-efficacy. Respondents answered 18
240 items (e.g., “Getting through tough times prepares me for future challenges,” “Dealing with
241 difficult situations has helped me grow in positive ways”) on a 7-point Likert scale ranging from
242 strongly disagree (1) to strongly agree (7). Responses to each item were averaged to create a total
243 score ($\omega = .85$).

244 *Comfort from Companion Animals*

245 Emotional comfort from companion animals was assessed using the Comfort from
246 Companion Animals Scale (CCAS; Zasloff, 1996). Respondents rated their agreement with 11

247 statements (e.g., “My pet is a source of constancy in my life,” “My pet makes me feel needed”)
248 on a 4-point Likert scale from strongly agree (1) to strongly disagree (4). A total score was
249 computed by summing the items ($\omega = .92$).

250 *Victimization*

251 Victimization related to one’s gender identity and/or expression was measured using the
252 victimization subscale of the Gender Minority Stress and Resilience Scale (GMSR; Testa et al.,
253 2015). This subscale consisted of 6 items, in which participants endorsed experiencing (1) or not
254 experiencing (0) forms of victimization attributed to their gender identity and/or expression (e.g.,
255 “I have been threatened with being outed or blackmailed because of my gender identity or
256 expression,” “I have been pushed, shoved, hit, or had something thrown at me because of my
257 gender identity or expression”). Participants’ responses to the six subscale items were summed to
258 create a total score ($\omega = .73$).

259 *Interpersonal Microaggressions*

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

267 *Covariates*

268 We included the following covariates in this study: age, race/ethnicity, gender modality³,
269 the extent to which basic needs were currently met, being the primary caretaker of a dog and/or
270 cat in the past 12 months, and social support. Gender modality was included as a covariate given
271 evidence that transgender and nonbinary individuals experience greater levels of interpersonal
272 stressors (i.e., victimization, microaggressions) than cisgender⁴ individuals (e.g., Seelman,
273 Colón-Díaz, et al., 2017). We also developed a dichotomous variable for whether participation
274 took place before (= 0) or after (= 1) March 16, 2020, as a means of adjusting for the effects of
275 additional COVID-related stress that may have influenced participant responses. The extent to
276 which current needs are met was used as a proxy measure for household income, with
277 participants responding on a 5-point Likert scale from 0 (never) to 4 (all of the time). Social
278 support was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS;
279 Zimet et al., 1998), with higher scores indicating higher levels of social support ($\omega = .80$).

280 **Analysis Plan**

281 All analyses for the study were conducted using IBM SPSS Statistics (Version 26) and
282 PROCESS (Hayes, 2017). We conducted four simple moderation analyses (see Figure 1A) to
283 examine whether, and to what extent, the association between comfort from companion animals
284 and each psychological adjustment variable (personal hardiness, self-esteem) varied as a function
285 of LGBTQ-related interpersonal stressors (i.e., victimization and interpersonal
286 microaggressions). Additionally, we conducted additive multiple moderation models that
287 included *both* victimization *and* interpersonal microaggressions as moderators of the relation

³ 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.

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

288 between comfort from companion animals and each dependent variable (see Figure 1B).
289 Covariates were included in each model: age (continuous), race/ethnicity (White/non-Latinx = 1,
290 minority race/ethnicity or multiple racial/ethnic identities = 0), gender modality (gender minority
291 = 1, cisgender = 0), extent to which current needs are met (continuous), whether the participant
292 reported being the primary caretaker of a dog and/or cat in the past 12 months (=1) or not (=0),
293 social support (continuous), and whether participation occurred prior to (=0) or after (=1)
294 interviews began being conducted online due to COVID-19. Both race/ethnicity and gender
295 identity were dichotomized due to insufficient power to analyze the differences between each
296 identity category.

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

305 **Results**

306 Means, standard deviations, and correlations among constructs are reported in Table 2.
307 The correlation between personal hardiness and self-esteem was statistically significant ($r = .56$,
308 $p < .001$). Personal hardiness was positively and significantly associated with comfort from
309 companion animals ($r = .29$, $p < .001$), while self-esteem was not significantly associated with
310 comfort from companion animals. Comfort from companion animals was not significantly

311 associated with victimization but was positively and significantly associated with interpersonal
312 microaggressions ($r = .33, p < .001$). However, this effect was not strong enough to violate the
313 assumption of multicollinearity, as VIF and Tolerance were all acceptable (Hair et al., 2010).
314 The only covariates significantly associated ($p < .05$) with our dependent variables in our
315 moderation models were gender modality (i.e., identifying as a gender minority) and social
316 support. Identifying as a gender minority was negatively associated with personal hardiness and
317 self-esteem in all moderation models; social support scores were positively associated with
318 personal hardiness and self-esteem across all models. All covariates examined were included in
319 the final models, despite non-significance, as they did not affect power.

320 **Simple Moderation Analyses**

321 In our simple moderation model that examined victimization as a moderator of the
322 relation between comfort from companion animals and personal hardiness, comfort from
323 companion animals was significantly and positively associated with personal hardiness ($\beta = 0.24,$
324 $t[144] = 2.77, p = .006$), but victimization was not significantly associated with personal
325 hardiness ($\beta = -0.01, t[144] = -0.14, p = .890$). Victimization was not a significant moderator of
326 the relation between comfort from companion animals and personal hardiness ($\Delta R^2 = .02,$
327 $F[1,144] = 2.80, \beta = 0.15, t[144] = 1.67, p = .096$); however, the overall model did predict a
328 significant amount of the variance in self-esteem ($R^2 = .17, F[10,144] = 2.87, p = .003$).
329 Similarly, in the model that examined interpersonal microaggressions as a moderator, comfort
330 from companion animals was significantly and positively related to personal hardiness ($\beta = 0.27,$
331 $t[144] = 2.95, p = .004$), whereas interpersonal microaggressions were not significantly
332 associated with personal hardiness ($\beta = 0.05, t[144] = 0.60, p = .551$). We found evidence that
333 the relation between comfort from companion animals and personal hardiness was moderated by

334 interpersonal microaggressions ($\Delta R^2 = .03$, $F[1,144] = 4.45$, $\beta = 0.16$, $t[144] = 2.11$, $p = .037$).
335 As shown in Figure 2A, the relation between comfort from companion animals and personal
336 hardiness was statistically significant and positive at moderate ($\beta = 0.29$, $t[106] = 3.08$, $p = .003$)
337 and high levels of interpersonal microaggressions ($\beta = 0.43$, $t[25] = 3.23$, $p = .002$), but was not
338 significant at low levels of interpersonal microaggressions ($\beta = 0.09$, $t[24] = 0.88$, $p = .381$).
339 Further, the overall model explained 18% of the variance in personal hardiness ($F[10,144] =$
340 3.09 , $p = .001$).

341 In a model with self-esteem as the dependent variable, neither comfort from companion
342 animals ($\beta = -0.03$, $t[144] = -0.42$, $p = .677$), nor victimization ($\beta = -0.07$, $t[144] = -0.84$, $p =$
343 $.404$), were significantly associated with self-esteem. However, we found evidence of a
344 moderated effect of comfort from companion animals by victimization on self-esteem ($\Delta R^2 =$
345 $.03$, $F[1,144] = 4.64$, $\beta = 0.19$, $t[144] = 2.15$, $p = .033$). Upon probing the interaction effect (see
346 Figure 2B), the low, moderate, and high values of the moderator were not significant; further
347 probing using the Johnson-Neyman technique also resulted in no regions of significance. This
348 means that at no value of victimization within the range of our data is the effect of comfort from
349 companion animals on self-esteem statistically significant. The significant interaction effect
350 suggests that victimization had *some* effect on the relation between comfort from companion
351 animals and self-esteem; however, our data do not provide sufficient information to specify more
352 precise descriptions of the interaction effects. A significant amount of the variance in self-esteem
353 was also accounted for by the overall model ($R^2 = .20$, $F[10, 144] = 3.61$, $p < .001$). Finally, in
354 our model that examined interpersonal microaggressions as a moderator, neither comfort from
355 companion animals ($\beta = 0.01$, $t[144] = 0.10$, $p = .923$), nor interpersonal microaggressions ($\beta = -$
356 0.12 , $t[144] = -1.45$, $p = .149$), were significantly associated with self-esteem. There was also no

357 evidence of a significant interaction between comfort from companion animals and interpersonal
358 microaggressions on self-esteem ($\Delta R^2 = .002$, $F[1,144] = 0.27$, $\beta = 0.04$, $t[144] = 0.52$, $p = .603$).
359 Nevertheless, the overall model explained 19% of the variance in self-esteem ($F[10,144] = 3.33$,
360 $p = .001$).

361 **Multiple Moderation Analyses**

362 *Personal Hardiness*

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

370 *Self Esteem*

371 In our model with victimization and interpersonal microaggressions as moderators,
372 comfort from companion animals was not significantly associated with self-esteem, adjusting for
373 the effects of victimization and interpersonal microaggressions ($\beta = -0.01$, $t[142] = -0.12$, $p =$
374 $.908$). Although the interaction between comfort from companion animals and interpersonal
375 microaggressions was not statistically significant ($\Delta R^2 = .001$, $F[1,142] = 0.18$, $\beta = -0.04$, $t[142]$
376 $= -0.43$, $p = .671$), victimization significantly moderated the relation between comfort from
377 companion animals and self-esteem while holding interpersonal microaggressions constant
378 ($F[1,142] = 4.21$, $\beta = 0.20$, $t[142] = 2.05$, $p = .042$). This interaction effect uniquely accounted
379 for 2.3% of the variance in self-esteem. Although there were no significant conditional effects at

380 the low, medium, and high values of victimization PROCESS probed, the plot of the interaction
381 effect reflects that the relation between comfort from companion animals and self-esteem change
382 at different levels of victimization (see Figure 3). Specifically, there was a negative relation
383 between comfort from companion animals and self-esteem at low levels of victimization, and a
384 positive relation between comfort from companion animals and self-esteem at high levels of
385 victimization. This effect was the same across all levels of interpersonal microaggressions.

386 **Discussion**

387 This study aimed to empirically test the hypothesis that the benefits of HAI are most
388 pronounced in the context of adversity and compromised social contexts. Specifically, we tested
389 whether, and to what extent, exposure to forms of interpersonal stress (i.e., microaggressions and
390 victimization) moderates the relation between comfort derived from companion animals and
391 psychological adjustment in a sample of LGBTQ+ emerging adults. Given previous literature on
392 the benefits of HAI in relation to human resilience (Piper & Uttley, 2018; Purewal et al., 2017),
393 we hypothesized that comfort from companion animals would be positively related to self-
394 esteem and personal hardiness. Further, we hypothesized that the positive association between
395 comfort from companion animals and these indicators of psychological adjustment would be
396 strongest for those who report greater exposure to microaggressions and victimization.

397 Our first hypothesis was partially supported. We found a significant association between
398 comfort from companion animals and personal hardiness across the simple and multiple
399 moderation models, in which higher levels of comfort from companion animals were related to
400 greater personal hardiness. These results coincide with existing literature that finds HAI is
401 associated with personal hardiness (McDonald, Murphy, et al., 2021) and other aspects of
402 resilience (Purewal et al., 2017). However, we did not find a significant association between

403 comfort from companion animals and self-esteem. Although one other study has found
404 statistically non-significant relations between comfort from companion animals and self-esteem
405 (McDonald, O'Connor, et al., 2021), our results contradict evidence from multiple empirical
406 studies that have found positive associations between HAI and self-esteem (Peluso et al., 2018;
407 Schulz et al., 2020; see Purewal et al., 2017, for a review). One explanation for the non-
408 significant findings could be that previous studies have investigated other domains of HAI (e.g.,
409 pet ownership, pet attachment, animal assisted interventions), and that comfort derived from pets
410 may not be a domain of HAI that is related to self-esteem. For example, the qualitative study by
411 Barcelos et al. (2020) found that themes related to pet companionship and aspects of pet
412 attachment (e.g., love) were frequently linked to the promotion of self-esteem. In contrast,
413 activities associated with emotional comfort (e.g., tactile interactions) were more likely to be
414 discussed in relation to arousal regulation (i.e., emotion regulation, stress reduction), which may
415 help to explain the differences in significant associations between comfort from companion
416 animals and self-esteem and personal hardiness. Our study highlights the importance of
417 investigating different characteristics of HAI in relation to multiple aspects of human health and
418 wellbeing, in order to adequately delineate the mechanism through which HAI may confer
419 benefits and risks to those who live with pets.

420 In support of our second hypothesis, we found that exposure to interpersonal
421 microaggressions was a significant moderator of the relation between comfort from companion
422 animals and personal hardiness. The results of the conditional effects suggest that the magnitude
423 of the effect of comfort from companion animals on personal hardiness may be strongest for
424 those who report moderate and high levels of interpersonal microaggressions. However, at low
425 levels of interpersonal microaggressions, the relationship between CCAS and personal hardiness

426 was no longer significant. Our results support the hypothesis that individuals who experience
427 adverse social contexts characterized by high levels of interpersonal microaggressions may
428 receive more benefits from HAI. This may be due to the link between LGBTQ-related
429 interpersonal stressors and inadequate community-level support and/or lower levels of perceived
430 social support from friends, family, and significant others (Dakin et al., 2020; Ehlke et al., 2020).
431 In the absence of human support, LGBTQ+ individuals exposed to interpersonal
432 microaggressions may rely on their pets more as a source of emotional comfort, which may
433 strengthen the positive relationship between comfort from companion animals and individual-
434 level coping skills and resilience. Indeed, our results also indicated that comfort from companion
435 animals was positively correlated with interpersonal microaggressions. This could also explain
436 why there was not a significant relation between comfort from companion animals and personal
437 hardiness for participants who reported low levels of interpersonal microaggressions.
438 Participants exposed to lower levels of interpersonal microaggressions may derive support from
439 human relationships and, therefore, rely less on comfort from their companion animals
440 (Matijczak et al., 2021).

441 When including victimization in the multiple moderation model, however, the
442 moderating effect of interpersonal microaggressions on the relation between comfort from
443 companion animals and personal hardiness was no longer significant. This highlights the
444 importance of accounting for experiences of LGBTQ-related stressors that frequently co-occur
445 (e.g., victimization, microaggressions) and co-vary. In our analysis, interpersonal
446 microaggressions and victimization were moderately correlated; victimization was also
447 correlated, although weakly and not significantly, with comfort from companion animals and
448 personal hardiness. As a result, not including victimization in the analysis may have resulted in

449 biased estimates in the simple moderation analysis (Kline, 2016). However, the weak
450 correlations among victimization, comfort from companion animals, and personal hardiness, may
451 mask the actual associations between variables once all variables are adjusted for in the model
452 (Kline, 2016). This is supported by the negligible changes in the coefficients of comfort from
453 companion animals and interpersonal microaggressions between the simple and additive multiple
454 moderation models, respectively.

455 Although we did not find that interpersonal microaggressions moderated the relation
456 between comfort from companion animals and self-esteem, victimization significantly moderated
457 this relation in the simple moderation analysis *and* in the additive multiple moderation analysis,
458 in which levels of interpersonal microaggressions were held constant. However, after probing for
459 interaction effects, we did not find any significant conditional effects at the low, medium, and
460 high values selected, and the Johnson-Neyman output suggested that the point of significance
461 was outside of the range of the moderator. Thus, we are limited to making interpretations based
462 on the moderation plots. The simple moderation plots indicated that at low levels of
463 victimization, the relation between comfort from companion animals and self-esteem is negative,
464 but at high levels of victimization, this relation is positive. This pattern remained consistent in
465 the multiple moderation plots across all levels of interpersonal microaggressions. This suggests
466 that the benefits of HAI in relation to self-esteem are only present when individuals reported
467 exposure to high levels of victimization-related adversity. This aligns with the hypothesis that the
468 benefits of companion animals are most pronounced for those experiencing adversity, although
469 there is limited empirical evidence that supports *why* victimization may interact with HAI in
470 relation to self-esteem in this way. Results from qualitative studies suggest that caring for a pet
471 may lead to enhanced feelings of worth and responsibility in LGBTQ+ youth (Bryant, 1990;

472 Maharaj & Haney, 2015; REDACTED). It is possible that caring for one's pet (and concurrently
473 receiving comfort from one's pet) may be an important facilitator of self-esteem for participants
474 exposed to greater levels of victimization, as it is evidence of their abilities to care for another
475 being. However, these results should be interpreted with caution, and replication with a larger
476 sample size adequate to detect small effects is needed.

477 **Limitations**

478 There are a few notable limitations of the current study. As a result of our community-
479 engaged research approach, our data were collected using convenience sampling methods.
480 Additionally, our results are based on cross-sectional data. Although our sample size provided
481 adequate power to detect moderate and large effect sizes, we lacked sufficient power to detect
482 small effect sizes. Due to these power limitations, we relied on dichotomized race/ethnicity and
483 gender modality variables that likely did not capture the full extent of participants' diverse
484 experiences. Similarly, due to the limitations of our sample size, we were unable to test whether
485 there were differences in the relation between HAI and our outcomes based on species type
486 (dogs vs. cats). A limitation related to our measurement approach is that the GMSR assesses
487 lifetime victimization experiences due to gender identity and expression and not sexual
488 orientation, whereas the LGBQ Microaggressions on Campus Scale asks respondents about
489 experiences of interpersonal microaggressions related to their sexual orientation. Although
490 experiences of sexual orientation and gender-based discrimination frequently co-occur across
491 LGBTQ+ identities, there may be differences in how participants responded to items based on
492 whether the participant identified as a sexual and/or gender minority. Another limitation is our
493 use of measures that assessed experiences based on different timeframes (i.e., past year,
494 lifetime). For example, we assessed lifetime experiences of victimization; in contrast,

495 interpersonal microaggressions were measured by assessing experiences over the past year.
496 Further, we did not collect data on the source of microaggressions or victimization (e.g., friend,
497 family, peer). Due to the hypothesis that HAI may be especially beneficial for those who lack
498 human social support, capturing whether adverse interpersonal experiences are caused by family,
499 peers, and/or close others versus strangers is important to further delineate under what conditions
500 and for whom HAI may provide the most benefits.

501 **Implications**

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

518 supporting the health and wellbeing of individuals who take comfort in their pets while
519 simultaneously supporting the welfare of their pets.

520 **Future Directions**

521 Our findings emphasize the benefits of companion animals for LGBTQ+ communities
522 and the importance of considering the nature and severity of stressors and how adversity
523 exposure may impact HAI. Future research should replicate and expand on our cross-sectional
524 study. For example, the hypothesis that the benefits of HAI will be most pronounced among
525 those who experience adversity and lack social support should be explored with additional types
526 of LGBTQ+ minority stress, such as discrimination and rejection. Future research should also
527 capture multiple forms of minority stress (e.g., racism, ableism) that can intersect and co-occur
528 with LGBTQ+ minority stress and complicate experiences of adversity and related social and
529 health outcomes. Consistent with prior research (e.g., Johns et al., 2013; Parra et al., 2018;
530 Seelman, Woodford, & Nicolazzo, 2017; Wright & Wegner, 2012), we found that individuals
531 who did not identify as cisgender reported significantly lower levels of self-esteem and personal
532 hardiness. We adjusted for this effect in our models, however, future research would benefit
533 from exploring relations between gender modality and interpersonal stressors to determine how
534 experiences of microaggressions, victimization, and other forms of LGBTQ-related stress affect
535 psychosocial outcomes across gender modalities. This approach allows for differences in
536 interpersonal stressors based on gender modalities to be examined, in contrast to adjusting for the
537 effects of gender modalities.

538 Future research would also benefit from exploring other domains of HAI given that
539 comfort from companion animals is only one conceptualization of the human-animal bond. Other
540 forms of HAI, such as attachment to pets, have been associated with psychological adjustment

541 (e.g., McConnell et al., 2011; Peluso et al., 2018; Schulz et al., 2020; Triebenacher, 1998) and
542 may provide different benefits in relation to adversity and the development of psychological
543 resilience. Future research would also do well to consider and assess stress associated with pet
544 ownership to examine how pet-related stressors may influence links between HAI and
545 psychological adjustment (e.g., Applebaum, Tomlinson, et al., 2020; REDACTED). Further, our
546 data was limited to the emerging adulthood period; however, the hypothesis regarding the
547 benefits of pets should also be tested among children and older adults. Finally, longitudinal data
548 is needed to explore the potential reciprocal relations between HAI, psychological adjustment,
549 and adversity exposure, and the biobehavioral mechanisms through which HAI influences human
550 health and development over time. Given prior assertions that HAI is a social determinant of
551 health (Mueller et al., 2018), it is critical that future studies continue to examine for whom, and
552 under what circumstances, HAI may promote psychosocial benefits.

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857 **Table 1**858 *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 th 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
Pet type	Lived with	Primary Caretaker¹	Pet as Family¹
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%) ²

859 ¹ Percentages are based on total number of participants that lived with the specific pet type.860 ² One individual who lived with both dog(s) and cat(s) reported only viewing their dog as a

861 family member and two individuals reported only viewing their cats as a family member.

862 **Table 2**863 *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 ^a	35	22.6	-											
2. Age	19.34	1.12	0.10	-										
3. Caretaker ^b	72	46.5	-0.04	0.02	-									
4. Race/ ethnicity ^c	96	61.9	-0.09	0.03	0.04	-								
5. Gender minority status ^d	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***	-

864 ^a0 = participated before and 1 = participated after COVID-19 restrictions were established; frequency and percentage reflect those who865 participated after COVID-19. ^b0 = not the primary caretaker of a dog/cat in the past year and 1 = primary caretaker; frequency and percentage866 reflect those who were the primary caretaker. ^c0 = racial/ethnic minority and 1 = White, non-Latinx; frequency and percentage reflect those who867 identified as racial/ethnic minority. ^d0 = cisgender and 1 = gender minority; frequency and percentage reflect those who identified as a gender

868 minority.

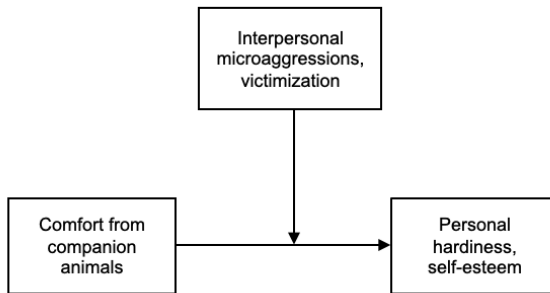
869 * $p < .05$. ** $p < .01$. *** $p < .001$.

870 **Figure 1**

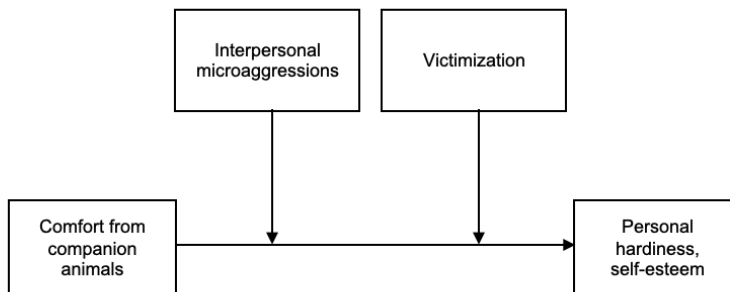
871 *Theoretical Models of the Moderating Effects of Interpersonal Stressors on the Relation Between*

872 *Comfort from Companion Animals and Personal Hardiness or Self-Esteem*

A.



B.



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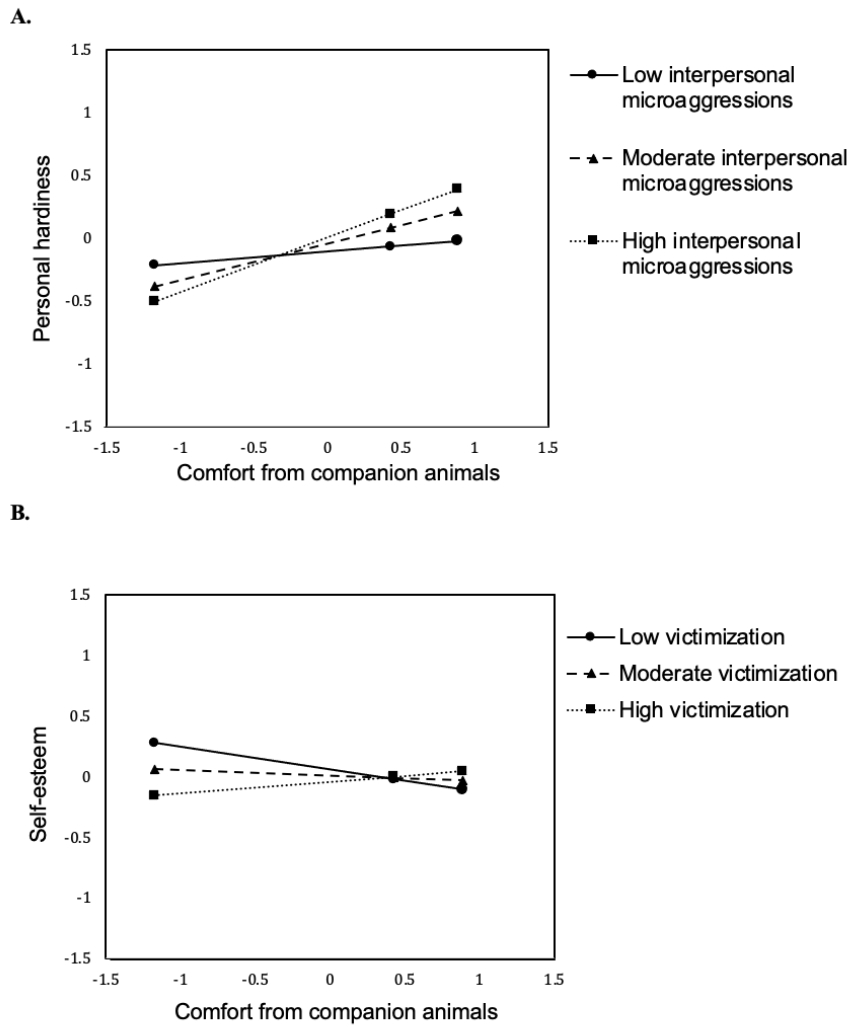
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879 **Figure 2**

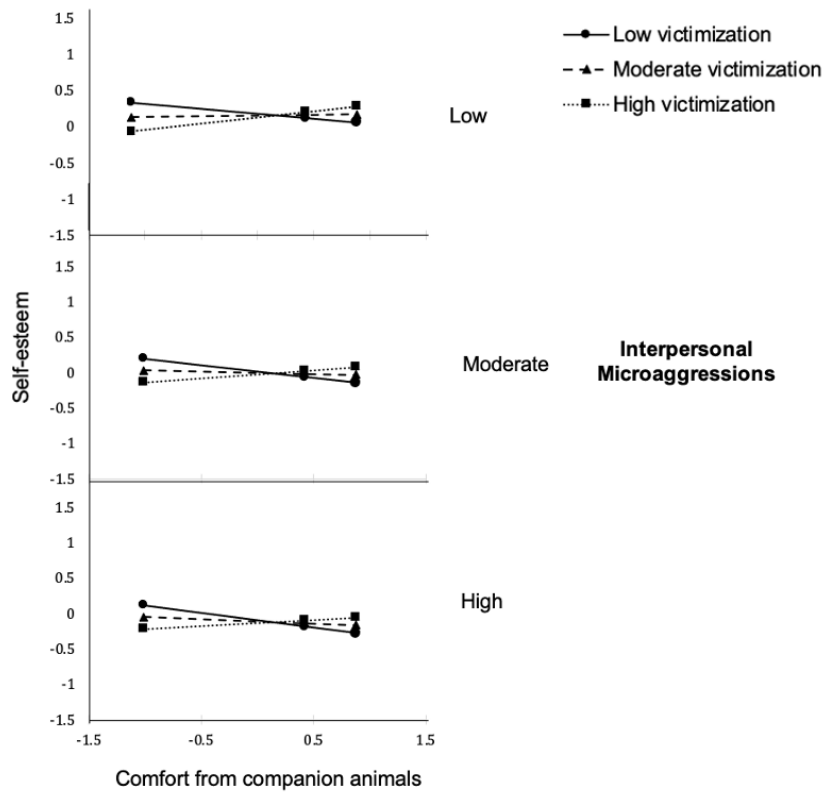
880 *Conditional Effects of Comfort from Companion Animals on Self-Esteem and Personal*

881 *Hardiness as Functions of Victimization and Interpersonal Microaggressions (N = 155)*



882

883 **Figure 3**
884 *Conditional Effects of Comfort from Companion Animals on Self-Esteem as a Function of Both*
885 *Victimization and Interpersonal Microaggressions (N = 155)*



886