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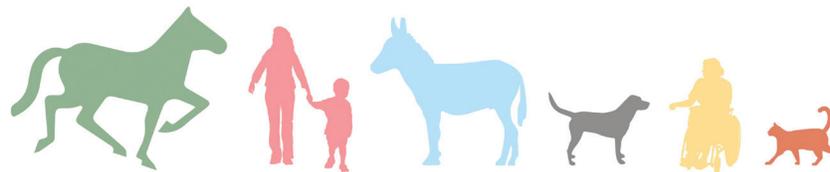
Interactions Between Sex and Pet Ownership on Attitudes Toward Children

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Interactions Between Sex and Pet Ownership on Attitudes Toward Children

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Abstract Background: Many people are attached to their pets. This attachment shares characteristics with the parental attachment to children. Previous studies have established a sex difference in attitudes about children; women compared to men report more positive attitudes about children. However, whether this sex difference is attenuated by owning and caring for pet(s) has not been investigated. **Methods:** In a sample of non-parents, we investigated the following: (1) whether the established main effect of sex on attitudes about children was moderated by pet ownership using a 2 (male, female) x 2 (pet owner, non-pet owner) design; and (2) whether the established main effect of sex on attitudes about children was moderated by lifetime experiences caring for pets using hierarchical multiple linear regression models. Data was collected via online survey of a community sample ($n = 173$). **Results:** We found that compared to females, males had more negative reactions to children and childcare (NRC). However, a significant sex by current pet ownership interaction revealed that current pet ownership eliminated the sex difference on NRC; males' NRC scores were similar to females' scores exclusively among people who currently owned a pet. Further, regression analyses revealed that the relationship between sex and NRC was moderated by the extent of lifetime experiences caring for pets. This effect was driven by males but not females; compared to males with low levels of lifetime experiences caring for pets, males with high levels of lifetime experiences caring for pets had less NRC. **Conclusion:** Taken together, these results provide the first reported evidence of the positive association between current pet ownership/lifetime experiences caring for pets and more favorable attitudes about children and childcare in non-parent males, but not in non-parent females.

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Many people become extremely attached to their pets. People care for their pets, get comfort from them, miss them when they are not around, and mourn for them when they die. The attachment and caregiving behaviors between owners and their companion animals share similarities to the relationship between human parents and their children. Young nulliparous couples often treat their pets as children (Owens & Grauerholz, 2019) and, colloquially, people refer to their pets as “fur babies” (Greenebaum, 2004). It has been observed that young couples often decide to get a pet prior to having their first child (Walsh, 2009). Further, it has been proposed that having a pet may be preparatory for parenthood (Borgi & Cirulli, 2016; Nast, 2006; Shell, 1986). However, to our knowledge, this proposal has not been empirically investigated. Given the similarities in parent–child and owner–pet attachment and the established sex difference in attitudes about infants, we investigated whether current ownership of a pet and lifetime experiences caring for a companion animal (pet) moderated the relationship between sex and attitudes about children and child-care in non-parents.

Sex Differences in Responsiveness to Infant Cues and Caregiving Experience

A clear sex difference has been demonstrated in responsiveness to infant cues when measured by subjective self-report. In general, compared to females, males consistently rate infants as less positive and less interesting (for a review see Berman, 1980; Kringelbach et al., 2016; also see Maestripieri & Pelka, 2002; Parsons et al., 2017). Maestripieri and Pelka (2002) investigated sex differences in interest and/or affection toward infants across the following age groups: children, adolescents, young adults, and older adults. They found that compared to males, females were significantly more interested in infants across all age groups (Maestripieri & Pelka, 2002). Empathy has also been shown to modulate responsiveness to infant cues (Hiraoka & Nomura, 2017; Lin & McFatter, 2012). A sex difference in empathy levels has also

been well established using self-report; females report greater levels of empathy compared to males (Christov-Moore et al., 2014). Overall, males report less positive attitudes about infants compared to females.

There is evidence to suggest that previous experiences caring for children positively influence responsiveness to and attitudes about children. The extent of previous caregiving experience is predictive of the quality of maternal behavior in new mothers such that previous experience with infants and children is associated with increased positive responsiveness, attitudes, and feelings toward infants and children (Fleming et al., 1993, 1997, 2002). Given the inherent differences in the extent of caregiving experience between parents and non-parents, it is not surprising that parents respond more positively to infant stimuli compared to non-parents (Lehmann et al., 2013; Parsons et al., 2017). Also, differences between mothers and fathers appear to be diminished when both are involved in caregiving behaviors (for review see Feldman, 2017). Overall, parents report more positive attitudes about infants and children than non-parents. Taken together, non-parent males are the least child-centric group.

Caregiving can take many forms; observational studies have identified different aspects of caregiving behavior including instrumental care and affectionate care. Instrumental care includes grooming behavior and is not involved in warm and affectionate care and touch (Chico et al., 2014; Giardino et al., 2008; Krpan et al., 2005; Teberg et al., 1983). Earlier studies from our group examined attitudes about these different aspects of caregiving. For example, a cross-sectional study by Ruble et al. (1990) found decreases in attitudes about instrumental aspects of caregiving (i.e., negative attitudes about childcare) across the transition to motherhood but no differences in warm and affectionate attitudes about children (i.e., feelings about children) across the transition to motherhood. However, to our knowledge, sex differences in these particular self-reported measures of attitudes about children and childcare have not been investigated and are an objective of the current study. Critically, to our knowledge, the moderating effects of lifetime experiences caring for

pets on sex differences in attitudes about children and childcare have not been investigated and constitute the primary objective of the current study.

Similarities between Parent-Infant and Owner-Pet Attachment

Attachment is of crucial importance to social animals, occurring within a variety of social relations beginning with mother–infant interactions (Rynearson, 1978). The human–animal relationship refers to a type of attachment developed reciprocally between pet owners and their companion animals (Fine & Beck, 2015; Hines, 2003; Serpell, 2016). Unlike animals raised for utilitarian purposes, pets have no financial or functional purposes other than for comfort and companionship (Cohen, 2002; Serpell, 2016; Serpell & Paul, 1994). The emotional attachment that people have for their pets involves strong psychological and emotional ties that can be similar to those observed in human–human bonds (Hines, 2003; Sable, 1995). For instance, some owners have refused to evacuate during natural disasters because they were not allowed to bring their pets to the rescue shelters (Rosenkoetter et al., 2007; Zottarelli, 2010). The concept of the human–animal bond was extrapolated from attachment theory as the human–animal bond shares characteristics with those observed in mother–infant interactions (Ainsworth, 1989; Barba, 1995; Beck & Katcher, 2003; Bowlby, 1969; Fine & Beck, 2015; Payne et al., 2015; Prato-Previde et al., 2003, 2006).

Human–pet interactions share similar biobehavioral synchrony to that observed in mother–infant attachments (Feldman, 2017; Fleming & Corter, 1988; Galbally et al., 2011). Similar to observations between the parent–child dyad, synchronous gaze behavior was observed between owners and their pets (Borgi & Cirulli, 2016; De Dreu et al., 2010; Nagasawa et al., 2009). Also similar to parental autonomic responsiveness during pleasurable and positive interaction with infants, pet owners’ heart rate significantly decreased (Handlin et al., 2011) and oxytocin levels increased (Handlin et al., 2011; Odendaal & Meintjes, 2003; Petersson et al., 2017) in response to interactions with

pets. Similarly, Stoeckel and colleagues (2014) demonstrated that the caregiving neural network—including brain regions involved in emotion, reward and affiliation—was engaged not only when mothers viewed pictures of their own baby but also when they viewed pictures of their own dog.

Studies report similar properties of pet-directed and infant-directed speech (Burnham et al., 2002; Hirsh-Pasek & Treiman, 1982; Mitchell, 2001). For example, pet-directed speech (doggerel) shares similar properties (well-formedness, short utterances, frequency, and high pitch) with infant-directed speech (motherese). A naturalistic observation of communication with pets and infants (Mitchell, 2001) found that the limited attention and reciprocity of pets and infants warrants the speaker to modulate their attention with exaggerated gestures and intonation to generally express friendliness and affection. Despite the many similarities between attachment to children and to pets, there are differences as well. For instance, adult affective speech (measured by intonation and rhythm) was shown to be greater when directed at infants in comparison to when it was directed at pets (Burnham et al., 2002). Also, unlike children, pets have a more “flexible” role in the family hierarchy across the developmental stages of the family life cycle; in the absence of a young child the family pet serves the role of a child, but not in the presence of a young child (Owens & Grauerholz, 2019; Turner, 2005).

Given the established effects of sex on attitudes about children and childcare, in this study, we investigated the following: (1a) whether the established main effect of sex on negative reactions to children and childcare (NRC) was moderated by current pet ownership; (1b) whether the established main effect of sex on positive feelings about children (PFC) was moderated by current pet ownership; (2a) whether the established main effect of sex on negative reactions to children and childcare (NRC) was moderated by lifetime experience caring for pets; and (2b) whether the established main effect of sex on positive feelings about children (PFC) was moderated by lifetime experience caring for pets. Based on previous studies showing that non-parent males are the least

child-centric group and given the more positive responsiveness to children by females compared to males, we hypothesize that the moderating effects of pet ownership and/or lifetime experience caring for pets on attitudes about children and childcare would be greatest among males in a sample of non-parents.

Methods

Participants

Data from 173 participants (74 non-pet owners, 99 pet owners) were analyzed in this study. English-speaking respondents from the United States completed an online survey advertised via a link posted on SurveyMonkey.com. A total of 432 respondents completed the survey. Respondents were included as participants in this study if they were non-parents, between the ages of 18 and 45, and completed questions regarding age, sex, parental status, and whether or not they are currently pet owners. Pet owners were excluded from data analysis if they had pets other than dog(s) and/or cat(s) that they consider a companion ($n = 19$). Also, respondents were excluded if they did not consider their pet a companion animal; that is, if participants answered “no” to currently owning a pet that they consider a companion, but “yes” to currently owning a dog and/or cat ($n = 21$). The study was approved by the Research Ethics Board of the University of Toronto, Toronto, ON, Canada.

Procedures and Questionnaires

Participants completed a survey on SurveyMonkey.com (duration: ~20 min). In addition to standard questions regarding demographic information, the survey includes questions about participants' history, attitudes, and feelings towards pets and children. Relevant questionnaires are described in Table 1.

Predictors

Sex. Self-reported sex with the following options: male or female.

Current pet ownership. Participants were labeled as a pet owner only if they currently have a pet (specifically dog[s] and/or cat[s]) that they consider to be a companion. Participants were labeled as non-pet owners if they do not currently have a pet (dog[s] and/or ca([s])). In this sample, non-pet owners could have owned a pet that they considered a companion in the past—as a child ($n = 12$), an adult ($n = 6$), or both ($n = 20$) (Table 3).

Lifetime experience caring for pets. Responses to items were used to compute a mean score. A higher score indicates greater lifetime experience caring for pets (Table 1).

Outcomes

Negative reactions to children and childcare (NRC). This factor corresponds to instrumental aspects of caregiving. Responses to items were used to compute mean NRC scores. A higher score indicates greater negative reactions to children and the instrumental aspects of childcare (Table 1).

Positive feelings about children (PFC). This factor corresponds to affectionate/warm aspects of caregiving. Responses to items were used to compute mean PFC scores. A higher score indicates more positive and affectionate feelings about children (Table 1).

Potential Confounds

To control for their potential confounding effects, we included empathy (Christov-Moore et al., 2014), experience caring for children (Fleming et al., 1993, 1997, 2002), and age as covariates in our models.

Empathy. This factor was created by computing the mean of items indicated in Table 1. A higher score indicates greater levels of empathy.

Lifetime experience caring for children. This factor was created by computing the mean of items indicated in Table 1. A higher score indicates greater experience caring for children.

Table 1. Description of the Questionnaires

Factor & Questionnaires	Questions	Score	α
<p><i>Positive feelings about children (PFC)</i> corresponding to affectionate aspects of caregiving (Chico et al., 2014; Giardino et al., 2008; Krpan et al., 2005; Teberg et al., 1983).</p> <p>From: Childbearing Attitudes Questionnaire (CAQ) (Fleming, Ruble, Flett, & Shaul, 1988; Ruble et al., 1990).</p>	<ol style="list-style-type: none"> 1. Just the sight of a small child makes me smile. 2. Whenever I see a baby, I feel like picking it up. 3. Just thinking of a baby makes me feel good. 	<p>Seven-point Likert scale: 1 = "strongly disagree" to 7 = "strongly agree" A higher score indicates more positive and affectionate feelings about children.</p>	.89
<p><i>Negative reactions to children and childcare (NRC)</i> corresponding to instrumental aspects of caregiving (Chico et al., 2014; Giardino et al., 2008; Krpan et al., 2005; Teberg et al., 1983).</p> <p>From: Childbearing Attitudes Questionnaire (CAQ) (Fleming, Ruble, Flett, & Shaul, 1988; Ruble et al., 1990).</p>	<ol style="list-style-type: none"> 1. I try to avoid places where I think there will be a lot of infants and small children. 2. Child care is repetitive and boring. 3. The messes that babies make bother me a lot. 	<p>Seven-point Likert scale: 1 = "strongly disagree" to 7 = "strongly agree" A higher score indicates greater negative reactions to children and instrumental aspects of childcare.</p>	.80
<p><i>Lifetime experience caring for pets</i></p> <p>From: Companion Animal Bonding Scale (CABS) (Poresky et al., 1987) and the Pet Attachment Scale (PAS) (Geller, 2005).</p>	<ol style="list-style-type: none"> 1. How often are you responsible for the pet's care? 2. How much experience with pets have you had? 3. How much time have you spent looking after, playing with, cleaning [up] after, or walking pets? 	<p>Five-point Likert scale: 1 = "none" to 5 = "a lot" A higher value represents more experience caring for pets.</p>	.82
<p><i>Empathy</i></p> <p>From: Interpersonal Reactivity Index (Davis, 1980, 1983).</p>	<ol style="list-style-type: none"> 1. When I see another person who is hurt or upset, I feel sorry for them. 2. When I see someone being bullied, I feel sorry for them. 3. I feel bad for other people who are sad or have problems. 4. Before criticizing somebody, I try to imagine how I would feel if I were in their place. 5. If I'm sure I'm right about something, I don't waste much time listening to other people's arguments. (reversed) 6. I sometimes try to understand my friends better by imagining how things look from their perspective. 7. I believe that there are two sides to every question and try to look at them both. 8. I sometimes find it difficult to see things from the other person's point of view. (reversed) 9. I try to look at everybody's side of a disagreement before I make a decision. 10. When I'm upset at someone, I usually try to "put myself in his/her shoes" for a while. 	<p>Five-point Likert scale: 1 = "does not describe me well" to 5 = "describes me very well" A higher score represents greater levels of empathy.</p>	.82

(continued)

Table 1. (Continued)

Factor & Questionnaires	Questions	Score	α
Lifetime experience caring for children From: Child Experience Inventory (Fleming et al., 1993, 1997, 2002).	1. How much experience with infants under one [year] have you had? 2. How much volunteer work with infants younger than one year have you had? 3. How much time have you spent looking after or playing with brothers, sisters, nieces, nephews, friends' babies under the age of one year?	Five-point Likert scale: 1 = None, 5 = A lot A higher value represents more experience caring for children.	.86

Note: α = Cronbach alpha. All participants were evaluated for lifetime experience caring for pets.

Age. Given that we found a significant sex difference in age in our sample (see section on participant characteristics in results section and Table 2), we controlled for the potential confounding effects of age.

Data Analysis Strategy

Missing data. Missing data were addressed using multiple imputations ($n = 50$) with the Markov chain Monte Carlo (MCMC) method (Kenward & Carpenter, 2007; Schafer, 1997). We used the bar procedure in the Statistical Package for the Social Sciences (SPSS, version 24.0) software to pool the multi-imputed data frames into a single data frame. The percentage of missing values for the data analyzed in this study ($n = 173$) ranged from 0.5% ($n = 1$) to 11.3% ($n = 22$) for PAS and CABS questionnaires, respectively, and 11.3% ($n = 22$) for CAQ. According to Little's Missing Completely at Random (MCAR) test, data was missing at random ($\chi^2 = 23.90$, $df = 20.51$, $p = .24$). Independent variables and demographic data were not imputed including socioeconomic status (SES) (missing values 1.2%; $n = 2$), cohabitating status (missing values 2.9%; $n = 5$) and quantity of pets (missing values 2.9%; $n = 5$). We ran the same models with unimputed data (including missing data); results using unimputed data were largely similar but less strong due to reduced power.

Statistical analysis. We used chi-square tests of homogeneity (χ^2) to compare the distribution of counts between females and males on all categorical demographic variables (e.g., age, socioeconomic

status [SES], and cohabitating status). We used t -tests to compare females and males on continuous variables (e.g., empathy, lifetime experiences caring for pets, and lifetime experience caring for children; see Table 2). To control for their potential confounding effects, we included empathy, lifetime experience caring for children, and age as covariates in all the models. All statistical analyses were performed using SPSS version 24.0 (IBM Corp., Armonk, NY).

Current pet ownership. To determine (a) whether the established main effect of sex on negative reactions to children and childcare (NRC) was moderated by current pet ownership, and (b) whether the established main effect of sex on positive feelings about children (PFC) was moderated by current pet ownership, we computed 2 (male, female) \times 2 (pet, no pet) between-participants ANCOVAs independently for NRC and PFC as the outcome variable. Standard post-hoc Tukey HSD tests were computed where relevant.

Lifetime experience caring for pets. To determine (a) whether the established main effect of sex on negative reactions to children and childcare (NRC) was moderated by lifetime experience caring for pets, and (b) whether the established main effect of sex on positive feelings about children (PFC) was moderated by lifetime experience caring for pets, we ran hierarchical multiple linear regression (HMLR) analyses with three blocks independently for NRC and PFC as the dependent variable. Block 1 included the covariates (age, empathy, and lifetime

experiences caring for children) to control for their potential confounding effects. Block 2 included sex as the main predictor and lifetime experience caring for pets as the moderator. Conceptually, the reason for choosing sex as a main predictor of NRC/PFC is two-fold: sex chronologically precedes lifetime experience of care for pets, and there is an established sex effect on interest and attitudes about children (for a review see Berman, 1980; Kringelbach et al., 2016; also see Maestripieri & Pelka, 2002; Parsons et al., 2017). Block 3 included the interaction term (sex x lifetime experience caring for pets). In that sense, results from this last block allows testing the hypothesis that lifetime experience caring for pets moderates or changes the direction and/or strength of the relation between sex and attitudes about children and childcare (NRC/PFC).

Prior to conducting a HMLR, the relevant assumptions were tested. A sample size of 173 participants was deemed adequate given five independent variables to be included in the analysis (Tabachnick & Fidell, 2001). The assumption of singularity was also met as the independent variables (lifetime experience caring for children, empathy, age, sex, and lifetime experience caring for pets) were not a combination of other independent variables. An examination of correlations (see Table 4) revealed that no independent variables were highly correlated ($r > 0.70$) (Hinkle et al., 2003; Mukaka, 2012). Finally, the predictor “lifetime experience caring for pets” was mean centered by computing standardized z -scores.

Note on interpreting effect size. For ANCOVAs, the effect size estimates for individual variables are partial eta squared (η^2) and for the whole model it is adjusted R^2 values. For regression models, the effect size estimates are standardized β coefficients for individual variables and adjusted R^2 values for the whole model. In HMLR, the ΔR^2 indicates the change in R^2 from the previous model to the current model indicating whether the current model significantly explains more variance in the outcome than the previous model, that is, if ΔR^2 is significant, then the current model explains more variance in the outcome than the previous model.

Results

Participant Characteristics by Sex

We found a significant sex difference in current non-pet owners, with more males than females indicating that they did not own a pet ($\chi^2 [1, N = 173] = 4.00, p = .045$). We also found sex differences in age ($\chi^2 [1, N = 173] = 16.00, p = .001$) with more females in the 18–25 years old age group compared to males, and more males in the 36–45 years old age group compared to females. Also compared to males, females had higher levels of empathy ($p = .001$), and more lifetime experience caring for children ($p = .001$) (Table 2). Therefore, we controlled for the potentially confounding effects of empathy, lifetime experience caring for children, and age in all models.

Pet-Related Characteristics

We found that compared to current non-pet owners ($M = 2.96, SD = 1.06$), current pet owners ($M = 4.54, SD = .53$) showed greater levels of lifetime experience caring for pets ($t[171] = 11.74, p = .001$). Further, Table 3 describes the characteristics of current pet ownership in our sample; the majority of current pet owners are dog owners, have more than one pet, and have always had pets (in childhood, adulthood, and now).

Significant Sex by Current Pet Ownership Interaction on Attitudes about Children and Childcare

Negative reactions to children and childcare (NRC). We found a main effect of sex on NRC ($F[1, 166] = 4.708, p = .031$, partial $\eta^2 = .028$); compared to females, males reported higher NRC scores (more negative reactions to children and childcare). There was a significant sex by current pet ownership interaction on NRC ($F[1, 166] = 4.634, p = .033$, partial $\eta^2 = .027$) such that current pet ownership eliminated the sex difference in NRC (Figure 1a). The adjusted R^2 for the model was equal to 0.127.

Post-hoc tests revealed that in comparison to female current non-pet owners, male current non-pet

Table 2. Participant Characteristics by Sex

Variables (<i>n</i> = 173)	Females (<i>n</i> = 83)	Males (<i>n</i> = 90)
Current pet ownership, <i>n</i> (%) [*]		
<i>Pet owners</i>	54 (54.5)	45 (45.5)
<i>Non-pet owners</i>	29 (39.2)	45 (60.8)
Age (years), <i>n</i> (%) [*]		
18–25	41 (67.2)	20 (32.8)
26–35	27 (43.5)	35 (56.5)
36–45	15 (30)	35 (70)
SES, <i>n</i> (%)		
<50 K	40 (44.0)	51 (56.0)
50–74 K	18 (62.1)	11 (37.9)
75–99 K	12 (63.2)	7 (36.8)
>100 K	8 (38.1)	13 (61.9)
<i>Prefer not to answer</i>	4 (36.4)	7 (63.6)
Cohabiting, <i>n</i> (%)		
<i>No</i>	47 (46.5)	54 (53.5)
<i>Yes</i>	35 (52.2)	32 (47.8)
Empathy, <i>Mean (SD)</i> [*]	4.07 (.58)	3.59 (.76)
Lifetime experience caring for children, <i>Mean (SD)</i> [*]	2.94 (1.25)	2.16 (1.01)
Lifetime experience caring for pets, <i>Mean (SD)</i> [*]	4.04 (1.09)	3.70 (1.13)

Note: SES = socioeconomic status; ^{*} significant differences between females and males, $p < .05$. Independent (sex, current pet ownership) and demographic variables (SES, cohabiting status) were not imputed (see Data Analysis Strategy under Methods). SES (missing 1 female; 1 male), cohabiting status (missing 1 female; 4 males).

owners reported higher NRC (hence more negative reactions); however, current pet owners reported similar levels of NRC regardless of their sex (Figure 1a).

Positive feelings about children (PFC). We did not find main effects nor interactions between sex and current pet ownership on PFC (Figure 1b). The adjusted R^2 for the model was equal to 0.349.

These analyses show that the interaction between sex and current pet ownership on attitudes about children and childcare is specific to NRC but not PFC (Figure 1).

Lifetime Experience Caring for Pets Moderated the Relationship between Sex and Attitudes about Children and Childcare

Negative reactions to children and childcare (NRC). The hierarchical multiple linear regression (HMLR) revealed that at block one, “Lifetime experience caring for children” and “Empathy” contributed significantly to the regression model ($p = .001$) and accounted for 11.6% of the variance in NRC. When introducing “Sex” and “Lifetime

Table 3. Description of Pet-Related Variables by Current Pet Ownership

Pet status variables (<i>n</i> = 173)	Current Pet Owner (<i>n</i> = 99)	Current Non-Pet Owner (<i>n</i> = 74)
Pet Type, <i>n</i> (%)		
<i>No Pets</i>	–	74 (42.8)
<i>Just Dog(s)</i>	53 (30.6)	–
<i>Just Cat(s)</i>	20 (11.6)	–
<i>Cat(s) and Dog(s)</i>	26 (15.0)	–
Quantity of Pets, <i>n</i> (%)		
<i>None</i>	–	71 (42.3)
<i>One</i>	41 (24.4)	–
<i>Two or more</i>	56 (33.3)	–
History of having a pet, <i>n</i> (%)		
<i>Never had</i>	–	31 (18.7)
<i>Childhood only</i>	–	12 (7.2)
<i>Adulthood, not now</i>	–	6 (3.6)
<i>Childhood and adulthood</i>	–	20 (1.2)
<i>Adulthood and currently</i>	10 (6)	–
<i>Always (childhood, adulthood, and now)</i>	87 (52.4)	–

experience caring for pets” at block two, ΔR^2 was not significant ($p = .136$). However, adding the interaction term “Sex by Lifetime experience caring for pets” at block three explained 16.4% of the variance in NRC and this ΔR^2 was significant ($p = .02$). Block three of the regression model showed that the strongest predictors of NRC were “Lifetime experience caring for children” and the interaction term “Sex by Lifetime experience caring for pets” (see Table 5).

To determine which sex was driving the statistically significant interaction between “Sex” and “Lifetime experience caring for pets” on NRC, we ran simple linear regression analyses independently for males and females. These analyses revealed that experience caring for pets predicted NRC for males ($\beta = -.271$; SE = .149; constant = 3.888; $p = .01$, adjusted $R^2 = 0.063$), but not for females ($\beta = .123$; SE =

.159; constant = 3.125, $p = .27$, adjusted $R^2 = 0.003$). For a visual representation of this sex difference on NRC moderated by lifetime experiences caring for pets see Figure 2a; the dashed line representing males has a negative slope, thus, males with more experience caring for pets show less NRC compared to males with lower experience caring for pets. The slope of the line for females does not show significant changes, such that for females, lifetime experience caring for pets was not associated with NRC.

Positive feelings about children (PFC). The HMLR revealed that only block one with “Lifetime experience caring for children” and “Empathy” contributed significantly to the regression model ($p = .001$) and accounted for 36.2% of the variance in PFC. The model was not significant when

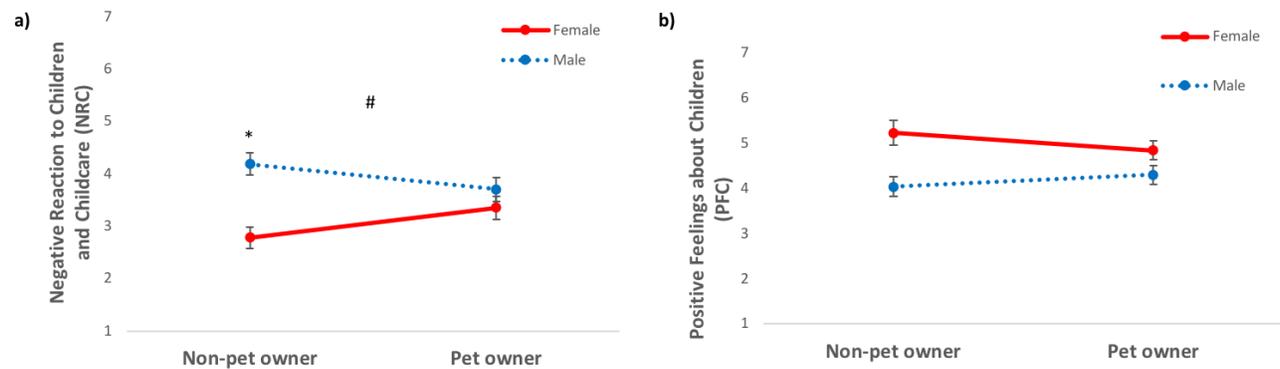


Figure 1. Interaction between sex and current pet ownership on attitudes about children and childcare. Means \pm SEMs of attitudes about children and childcare depicting the interaction between sex and current pet ownership on (a) negative reactions to children and childcare (NRC), and (b) positive feelings about children (PFC). Significant sex by current pet ownership interactions are represented by #, main effects of sex are represented by *. There are no sex differences within current pet owners; however, within current non-pet owners, males reported more negative attitudes about children and childcare (higher NRC) compared to females. #, * $p < .05$.

Table 4. Correlation Table

	1	2	3	4	5	6	7
1. PFC	1						
2. NRC	-.442**	1					
3. Sex ¹	-.268**	.268**	1				
4. Current pet ownership ²	0.029	-0.041	-.152*	1			
5. Lifetime experience caring for pets	0.054	-0.125	-.150*	.700**	1		
6. Lifetime experience caring for children	.476**	-.290**	-.326**	0.057	0.042	1	
7. Empathy	.475**	-.232**	-.337**	.196**	.269**	.254**	1

Note: Pearson correlation was used to evaluate the association between continuous variables and also for the association between continuous variables and dummy variables (Sex and Current pet ownership) (¹coding for sex: female = 0, male = 1; ²coding for current pet ownership: non-pet owner = 0, pet owner = 1). Spearman correlation was used to evaluate the association between the dichotomous categorical variables (Sex with Current Pet Ownership). * $p < .01$ (bilateral); ** $p < .001$ (bilateral).

introducing variables for blocks two and three ($p = .471$ and $p = .541$ respectively) (Figure 2b). This showed that the strongest predictors of PFC were “Lifetime experience caring for children” and “Empathy.” Also, none of the following variables significantly predicted PFC: “Age,” “Sex,” “Lifetime experience caring for pets,” nor the interaction term “Sex by Lifetime experience caring for pets” (see Table 6).

Discussion

This is the first study to explore the effects of current pet ownership and lifetime experiences caring for pet(s) on sex differences in attitudes about children and childcare. We found a sex effect in attitudes about children and childcare such that compared to males, females had less negative attitudes about children and childcare. This is consistent with previous

Table 5. Hierarchical Multiple Linear Regression for Variables Predicting Outcome Variable NRC

Block	Independent variables	Unstandardized coefficients		Standardized coefficients		R ²	Adjusted			
		B	SE	β (SE)	p-value		R ²	ΔR^2	F	p
1	Lifetime experience caring for children	-.301	.093	-.241 (.075)	.002	.116	.101	.116	7.421	.001
	Empathy	-.320	.157	-.155 (.076)	.04					
	Age	.142	.137	.077 (.074)	.30					
2	Lifetime experience caring for children	-.261	.096	-.209 (.077)	.007	.137	.111	.021	2.022	.136
	Empathy	-.214	.165	-.104 (.080)	.19					
	Age	.091	.141	.049 (.076)	.52					
	Sex ¹	.414	.242	.140 (.082)	.09					
	Lifetime experience caring for pets	-.100	.111	-.068 (.075)	.37					
3	Lifetime experience caring for children	-.222	.096	-.178 (.077)	.02	.164	.134	.026	5.257	.02
	Empathy	-.228	.163	-.111 (.079)	.17					
	Age	.108	.139	.058 (.075)	.44					
	Sex	.438	.239	.148 (.081)	.07					
	Lifetime experience caring for pets	.169	.161	.114 (.109)	.30					
	Sex by Lifetime experience caring for pets	-.498	.217	-.244 (.106)	.02					

Note: *B weight* = B coefficient (slope of the line, indicates the direction of the relationship between two variables); *SE* = standard error; β = beta weight (standardized B weights); ΔR^2 = change in R^2 . The predictor "Lifetime experience caring for pets" was centered (z-scores were used). ¹Sex was coded as follows: 0 female; 1 male; indicating that males are the reference group, thus the table represents changes pertaining to males when compared to females. Bold values indicate statistical significance at the $p < 0.05$ level.

studies showing an established sex effect on attitudes about children (Berman, 1980; Kringelbach et al., 2016; Maestripieri & Pelka, 2002; Parsons et al., 2017). However, we found that this was only true for participants who currently did not own a pet as well as for participants who had low levels of lifetime experiences caring for pets. For current pet owners and those with high levels of lifetime experiences caring for pets, both females and males had similar attitudes about children and childcare. Specifically, males with higher levels of experience caring for pets showed less negative reactions to children and childcare (NRC) compared to males with lower levels of lifetime experiences caring for pets. These results are consistent with our hypothesis stating that the moderating effects of pet ownership or lifetime

experience caring for pets on the established relationship between sex and attitudes about children and childcare would be greatest among males in our study sample of non-parents: the group that is the least child-centric.

Greater positive attitudes about children and childcare have been linked to higher quality of caregiving (Bader et al., 2019; Daggett et al., 2000). As described above, we found that males who had the most lifetime experiences caring for pets showed greater positive attitudes about children and childcare compared to males with less lifetime experiences caring for pets. Although not directly investigated, our results suggest that lifetime experiences caring for pets may function to prepare males, more than females, for parenthood; or, that experience caring for

Table 6. Hierarchical Multiple Linear Regression for Variables Predicting Outcome Variable PFC

Block	Independent variables	Unstandardized coefficients		Standardized coefficients		R ²	Adjusted			
		B	SE	β (SE)	p-value		R ²	ΔR^2	F	p
1						.362	.350	.362	31.93	.001
	Lifetime experience caring for children	.486	.081	.382 (.064)	.001					
	Empathy	.808	.136	.385 (.065)	.001					
	Age	.058	.119	.031 (.064)	.63					
2						.367	.349	.006	.756	.471
	Lifetime experience caring for children	.472	.084	.371 (.066)	.001					
	Empathy	.835	.145	.397 (.069)	.001					
	Age	.082	.123	.044 (.066)	.51					
	Sex ¹	-.114	.212	-.038 (.071)	.59					
	Lifetime experience caring for pets	-.112	.097	-.074 (.064)	.25					
3						.369	.346	.001	.376	.541
	Lifetime experience caring for children	.481	.085	.378 (.067)	.001					
	Empathy	.831	.145	.396 (.069)	.001					
	Age	.086	.123	.046 (.066)	.49					
	Sex	-.109	.212	-.036 (.070)	.61					
	Lifetime experience caring for pets	-.048	.143	-.032 (.095)	.74					
	Sex by Lifetime experience caring for pets	-.118	.192	-.057 (.093)	.54					

Note: *B weight* = B coefficient (slope of the line, indicates the direction of the relationship between two variables); *SE* = standard error; β = beta weight (standardized B weights); ΔR^2 = change in R^2 . The predictor "Lifetime experience caring for pets" was centered (z-scores were used). ¹Sex was coded as follows: 0 female; 1 male; indicating that males are the reference group, thus the table represents changes pertaining to males when compared to females. Bold values indicate statistical significance at the $p < 0.05$ level.

pets may prepare the couple as their attitudes about children converge. Whereas our results reflect the interaction between sex and current pet ownership on attitudes about children and childcare, a longitudinal study design would be best suited to address the question of causality. It is important to note that the small effect sizes reported in this study reflect the subtle nature of the effects of currently owning a pet and lifetime experiences caring for pets on attitudes about children and childcare.

Lifetime Experiences Caring for Pets

Owning a pet does not necessarily mean taking care of it. Pet care activities include instrumental

and affectionate aspects. Examples of instrumental care include providing daily fresh food and water, a clean shelter, exercise, enrichment, training, and grooming (August, 2011). Affectionate care includes petting, playing, and cuddling (August, 2011). In contrast to affectionate care, instrumental care may be overwhelming, especially to children who generally delegate those instrumental responsibilities to their parents (Muldoon et al., 2015). In this study, the factor "Lifetime experience caring for pets" measures the extent of caring for, playing with, cleaning or walking the pets. It is possible that caregiving interactions between humans and their pets also contribute to sensitive behavior and more positive attitudes toward children. For example, caretaking

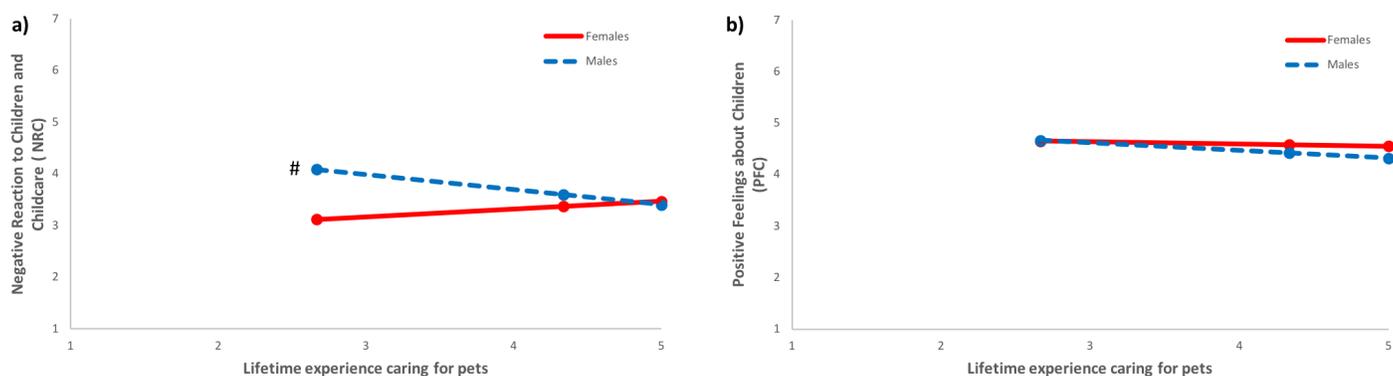


Figure 2. Visual representation of the interaction between sex and lifetime experience caring for pets on attitudes about children and childcare.

(a) Visual representation of block 3 of the hierarchical regression analysis showing the moderating effect of lifetime experience caring for pets on the relationship between sex (main predictor) and NRC. # indicates that lifetime experience caring for pets significantly predicted NRC for males using the post-hoc linear regression for males ($\beta = -.271$; SE = .149; constant = 3.888; $p = .01$, adjusted $R^2 = 0.063$). (b) Visual representation of block 3 of the hierarchical regression analysis showing no relationship between sex and PFC and no moderating effect of lifetime experience caring for pets on the relationship between sex and PFC. Values for moderator (not centered: Lifetime experience caring for pets) are at the 16th, 50th, and 84th percentiles. Although centered values of the moderator were used in the analyses, the graph shows noncentered values for better interpretability of the graphs. We chose to orient Figure 2 as we did (Lifetime experience caring for pets on the x-axis and Sex presented as two separate lines) given that “Sex” is a dichotomous variable so easily represented by two different lines, and to graph a continuous variable like “Lifetime experience caring for a pet” required artificial dichotomization. This presentation, while contravening traditional statistical style conventions, aids in interpretability of the figure.

interactions contribute to the dyadic bond between mothers and their babies (Barrett & Fleming, 2011; Cassidy, 2008) and more experienced mothers exhibit more sensitive mothering behavior toward their infants (Fleming et al., 1993, 1997, 2002).

Our study provides evidence showing that greater levels of lifetime experiences caring for pets is associated with decreased NRC (hence increased positive attitudes generally) about children and childcare in males—suggesting that the bond between the human-pet dyad could generalize beyond that dyad to include children. Similarly, the human-pet relationship is associated with attitudes about other humans, animals, and environmental issues (Amiot & Bastian, 2015; Muldoon et al., 2015). Among adults, pet ownership was found to be associated with less negative attitudes toward romantic partners (Bonas et al., 2000; Cloutier & Pectz, 2016; Guthrie et al., 2018; McConnell et al., 2019). Among children, pet ownership was associated with positive attitudes toward other animals (Bowd, 1984) and increased environmentally conscious attitudes and behaviours (Torkar

et al., 2020). Our results add to this literature by demonstrating that among male non-parents, current pet ownership and lifetime experiences caring for pets are associated with less negative attitudes about children and childcare.

Lifetime Experiences Caring for Pets Increase Males’ “Caregiving Portfolio”

Our results provide first insights into the moderating effects of lifetime experiences caring for pets on the relationship between sex and attitudes about children and childcare. Consistent with the literature showing that women spend more time with babies and children compared to men (Craig, 2006; Rossi, 1984), in a sample of non-parents, we found that females had higher levels of experience caring for children compared to males. In addition to being the main caregiver to an infant, observational studies show that mothers tend to be the main caregiver of the family pet (Fifield & Forsyth, 1999; Muldoon et al., 2015). These studies suggest that females tend

to have a greater “caregiving portfolio” compared to males. This begs the question: would males show equivalent attitudes about children and childcare if they had an equivalent “caregiving portfolio”? A study by van Polanen and colleagues (2017) on caregiving professionals with similar levels of experience with children found no gender differences in caregiving behaviors on dimensions of attention, sensitivity, and stimulation. This shows that experience caring for children is an important factor associated with increased positive attitudes about children. Similarly, our findings suggest that lifetime experiences caring for pets may increase males’ “caregiving portfolio” to a level that is similar to females, thus showing more positive attitudes about children. It is plausible that the extent of experience as a caregiver increases attitudes not only for the individual who is being cared for, but possibly increases positive attitudes toward other living beings.

Differences between NRC and PFC

We investigated whether sex in interaction with current pet ownership and/or lifetime experience caring for pets was associated with two components of attitudes about children and childcare: negative reactions to children and childcare (NRC) and positive feelings about children (PFC). We found that the interaction between sex and current pet ownership as well as an interaction between sex and lifetime experience caring for pets on attitudes about children was specific to NRC. PFC is a measure of warm affectionate emotional attitudes about children, while NRC is a measure of negative attitudes about the physical or instrumental aspects of childcare. In line with our results, and using similar factors for measures of NRC and PFC, Ruble and colleagues (1990) also found significant effects of NRC but not PFC while measuring change in these attitudes across the peripartum period; NRC decreased across the transition to motherhood (from pre-pregnant to postpartum), but PFC did not. A possible explanation for this may be due to the fact that the two components examine different aspects of caregiving. Caregiving behavior consists of multiple aspects (Cancian &

Oliker, 2000), which include instrumental (Barrett & Fleming, 2011; Lomanowska et al., 2017; Lonstein et al., 2015) and affective aspects of caregiving (Atkinson et al., 2000; Fleming et al., 2002; Lomanowska et al., 2017). Therefore, it makes sense that NRC (which addresses reactions about child *care*) would be more sensitive to the moderating effects of lifetime experiences of *care* for pets compared to PFC (which addresses *feelings* about children). While the two factors measure attitudes about the emotional and physical aspects of childcare, it is important to note that they are not measures of behavior per se.

Limitations and Future Directions

Our findings can be considered with the following limitations in mind. The results are limited by a relatively small sample size and the correlational nature of the study. Although current pet ownership eliminated the sex differences in negative attitudes about children and childcare—an effect driven by differences between males with and without pets—it is possible that males who are more inclined to own a pet are also more inclined to care and therefore report more positive attitudes about dependents (children or pets). Further, despite evidence pointing to the importance of the social environment on responsiveness to infant stimuli (Berman, 1980), it was not possible to control the social environment as participants completed the survey online. It is important to note that the small effect sizes reported in this study reflect the subtle nature of the effects of owning and caring for a pet on attitudes about children and childcare. Attitudes about children form a complex psychological phenotype, and this study’s objectives were limited by design to explore the interplay between sex and pet ownership/care on attitudes toward children. Future work should include a larger sample size with both parents and non-parents. Also, our group is investigating the effects of pet ownership on well-being including mental health during the COVID-19 pandemic. Further, to determine whether the association between sex and pet ownership on attitudes about children is causal, it would be paramount to investigate these effects through a

longitudinal and experimental design including behavioral and attitudinal end points.

Conclusion

In this sample of non-parents, males reported greater negative reactions to children and childcare (NRC) compared to females. However, this sex difference was eliminated within the current pet owners' group as well as among participants with the greatest lifetime experiences caring for pets. Males and females who were either currently pet owners or had more lifetime experience caring for pets had similar NRC levels. This was driven by changes in males' attitudes, such that males with the greatest lifetime experience caring for pets had less NRC compared to males with the least lifetime experience caring for pets. Taken together, these results suggest that owning and specifically caring for pets was associated with increased positive attitudes about children and childcare and may be preparatory for parenthood in male non-parents.

Summary for Practitioners

It is well established that compared to females, males report less positive (i.e., more negative) attitudes about children and childcare (ACC). Given the similarities between parent–infant and owner–pet attachment, we investigated whether these established sex differences in ACC were moderated by owning a pet and/or by lifetime experiences caring for pets—particularly dogs and/or cats—in non-parents. We found that compared to females, males reported more NRC if they were non–pet owners; however, among pet owners, there were no sex differences in NRC. Similarly, we found no sex differences among participants who had more lifetime experience caring for pets; however, at lower levels of lifetime experience caring for pets, males reported more NRC (more negative attitudes) compared to females. This effect was driven by the males, such that compared to males with low lifetime experiences of care for pets, males with higher levels of lifetime experiences

of care for pets reported less NRC (more positive attitudes). It is therefore plausible that benefits of the human–pet bond generalize beyond that dyad to include children. Based on this pattern of results, it is not surprising that young couples often acquire a shared pet before they have children. Adding more caregiving experience to their “caregiving portfolio” may afford young couples “practice” or preparation for impending parenthood.

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