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To cite this article: Kathryn A. Kerns, Amanda J. Koehn, Manfred H. M. van Dulmen, Kaela L. Stuart-Parrigon & Karin G. Coifman (2017) Preadolescents' relationships with pet dogs: Relationship continuity and associations with adjustment, *Applied Developmental Science*, 21:1, 67-80, DOI: [10.1080/10888691.2016.1160781](https://doi.org/10.1080/10888691.2016.1160781)

To link to this article: <https://doi.org/10.1080/10888691.2016.1160781>



Published online: 31 Mar 2016.



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Preadolescents' relationships with pet dogs: Relationship continuity and associations with adjustment

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Kent State University

ABSTRACT

Research on human–animal interaction in children has been studied in isolation rather than integrated with core theories of children's relationships. This study is one of the first to examine how children's relationships with pet dogs are related to their human relationships (parent–child attachments, friendships) and to child adjustment, and to include observational assessment of children's interactions with their pet dog. Children (9 to 11 years old, $n = 99$) completed questionnaires regarding relationships with pet dogs, parents, and friends. Half the children were observed interacting with their pet dog. Children and teachers reported children's adjustment. Children who felt closer to their dogs were more securely attached to mothers and fathers and reported more positive qualities and less conflict with friends. Children with more secure attachments to mothers, and greater companionship with dogs, interacted more with their dogs. Parental attachment and friendship quality, but not the pet dog relationship, were related to child adjustment.

Despite high levels of pet ownership in the United States (Melson, 2003; Walsh, 2009), research regarding the impact of human–animal interaction on mental health is still in the early stages, especially in the area of pets and child development (Griffin, McCune, Maholmes, & Hurley, 2011). There has been some progress in this area; for example, we know that most children view pets as friends, and say they rely on them for support (Melson, 2011). Yet, even though pets are now seen as potentially important social partners for children, there are limitations to our understanding of the importance of childhood pets. Specifically, this work is not well integrated with core theories of child development, including embedding our understanding of pets within the study of children's other close relationships (Melson, 2011). For example, while there is continuity in quality across the different human relationships children have, it is unclear whether the quality of relationships children form with pets is related to or independent of the quality of relationships they form with human partners. Furthermore, although children view pets as sources of support, there is a surprisingly minimal amount of evidence that children's relationships with pets can influence children's long term adjustment.

The goal of the present study was to address these limitations by examining the quality of children's relationships with their pets, parents, and friends. We

examined how children's relationships with pets were related to their human relationships, specifically their attachments to parents and the quality of a best friendship. In addition, we explored how both types of relationships (with pets and humans) were individually related to children's social and emotional adjustment. To our knowledge, this study is also the first to examine children's interactions with their pet dogs, and how those interactions are related to human relationships and child adjustment.

Studies investigating support from pets have often included children with any type of pet, even though there may be important differences in the types of social interactions children can have with different animals. For example, dogs may be especially important relationship partners given that they seek social interaction, are loyal and nonjudgmental, and respond to human's emotions (Walsh, 2009). The tendency to study pets as a group, rather than studying a type of pet, may contribute to some of the inconsistencies in the literature (e.g., whether caring for a pet promotes empathy; Melson, 2003). Given our interest in the quality of the interactions children have with their pets, this study focuses on pet dogs. Furthermore, we examined the role of pet dog relationships for preadolescents, as pets are central in children's lives at this age (Davis & Juhasz, 1995).

Children's close relationships in preadolescence: The role of pet dogs

The later middle childhood years (ages 9 to 12) can be time of social challenge for children. Although children are becoming more independent and better able to regulate their emotions, they are still in need of attachment figures, including parents (Seibert & Kerns, 2009). Children also benefit from a close friend or "chum" who can provide support, validation, and companionship (Sullivan, 1953; Vitaro, Boivin, & Bukowski, 2009). Thus, a key developmental task for preadolescents is acquiring sufficient support from relationships when facing normative challenges to buffer against the development of anxiety or difficulties regulating emotions and social behaviors. The literature on social support in children has focused almost exclusively on support obtained within human relationships (e.g., Levitt, Guacci-Franco, & Levitt, 1993; Seibert & Kerns, 2009), even though relationships with pets provides another avenue for support, validation, and companionship. An exception is a social network study by McNicholas & Collis (2000) in which they examined when children turn to human partners or pets for support. Although parents and friends were the primary providers of support, children did report turning to pet dogs in some situations (when ill, scared, or when confiding a secret).

There are several reasons to examine further the role of children's relationships with pets. First, a substantial number of children have pets (approximately 65–75%; Melson, 2003; Walsh, 2009), which means that pets are a widely available source of support. The incidence of ownership of pets appears to peak for families with preadolescent children (Davis & Juhasz, 1995), underscoring the importance of examining the role of pets during this developmental period. In addition, Davis and Juhasz (1985) identify pets as developmental resources for children in preadolescence. Pets are described by children in ways that suggest they can provide many of the benefits of friendship such as companionship, affection, social interaction, emotional support, and esteem enhancement (e.g., McNicholas & Collis, 2000; Morrow, 1998; Triebenbacher, 1998). Pets are also credited with reducing children's stress (Covert, Whiren, Keith, & Nelson, 1985; Guerney, 1991) and enhancing children's emotion regulation (Bryant & Donnellan, 2007; Mueller, 2014). Finally, children often report that they receive unconditional love from their pets, especially dogs (Morrow, 1998). Thus, a child who might be rejected by peers because s/he has social difficulties may nevertheless be able to derive a sense of validation and caring from their pet dog.

Although it is clear that pets are important to children, and can be a source of support, there are some gaps in our understanding of how and when pets may function as support figures for children. Most studies contrast children who do or do not own a pet rather than focusing on individual differences among children who own pets and considering the *quality* of the relationship with the pet, as is done in work on children's relationships with peers and parents (e.g., Berlin, Cassidy, & Appleyard, 2008; Booth-LaForce & Kerns, 2009). A few studies have noted that relationship dimensions typically associated with children's friendships—for example, companionship, enhancement of worth, and emotional support—can also be applied to describe individual differences in children's relationships with pets (e.g., Bryant & Donnellan, 2007; Davis & Juhasz, 1995; Melson, 1990). As reviewed in the following sections, only a small number of studies have examined whether the quality of relationships with pets predicts child adjustment. In addition, studies typically examine children's relationships with pets in isolation, and do not consider whether they predict preadolescent social and emotional development beyond the effects of human relationships. Consequently, we have little information regarding the relative importance of children's relationships with pets, and whether experiences with pets might facilitate children's relationships with human beings, as suggested by Vidović and colleagues (Vidović, Štetić, & Bratko, 1999).

Our study addresses these gaps. First, we examined whether the quality of children's relationships with pet dogs is related to the quality of their close relationships with humans, specifically, children's perceptions of their best friendship and their attachments to parents. We focused on parent–child attachment and friendship as parents and friends are key relationship partners in preadolescence (Levitt et al, 1993; Seibert & Kerns, 2009), and closeness in these relationships has been shown to be related to children's social and emotional adjustment (Vitaro et al, 2009; Kerns, 2008). There tends to be continuity in the quality of relationships children form with different human partners (Berlin et al., 2008), for example, children who are securely attached to their mothers form higher quality friendships (Booth-LaForce & Kerns, 2009; Schneider, Atkinson, & Tardif, 2001), suggesting that children may experience similar types of interactions with different social partners. We were interested in whether continuity would also be found between human and pet relationships, suggesting that experiences in one type of relationship may be carried over to the other.

Two recent studies with adults found that pet and human relationship quality were related; one study

(McConnell, Brown, Shoda, Stayton, & Martin, 2011) found that adults who reported feeling more support from a pet also reported greater support from parents, friends, and siblings, while a second study (Zilcha-Mano, Mikulincer, & Shaver, 2011) found that insecure attachments to pets were associated with an insecure romantic attachment style. We could only find two studies that examined the question of continuity in relationships with parents and pets in children (we found no studies examining how the quality of children's relationships with pets is related to the quality of their friendships). In one study with 10 to 14 year-olds, the quality of children's relationships with their pets and their parents was unrelated (Covert et al., 1985). In a second study with 9 to 14 year-olds, greater closeness to a pet was associated with a more positive family climate (Vidović et al., 1999). We sought to replicate and extend prior studies by examining how the quality of children's relationships with their pet dog is related to relationships with both parents and friends, using more recent and well established measures of attachment and friendship. Specifically, we examined whether children who reported higher quality relationships with their pet dog also reported more secure attachments to their mothers and fathers and higher friendship quality with their best friend.

We also extended prior research by examining whether children's reports of their relationships with pet dogs, parents, and friends predicted their actual interactions with their dog. The common approach to studying children's relationships with pets is with self-report measures from children in which they report their perceptions of their interactions with their pets. To our knowledge, prior studies have not coded children's behaviors with their pets, and thus this is the first study to examine how children's reported relationship experiences predict their behavior with their pet dog, which provides an opportunity to evaluate the validity of children's self-reports of the pet dog relationship.

Second, we were interested in whether individual differences in children's relationships with a pet dog would be related to their social and emotional adjustment. It has been speculated that children can receive emotional benefits from having pets, which could enhance their social and emotional adjustment and social skills such as empathy (McNicholas et al., 2005; Melson, 2011; Mueller, 2014; Walsh, 2009). Prior studies of the quality of children's relationships with pets and child adjustment have, however, produced mixed results. For example, studies examining whether a close relationship with pets is associated with greater empathy have found the two positively related (Daly & Morton, 2006; Poresky & Hendrix, 1990), not related (Daly & Morton,

2003), or showing mixed results (Melson, Peet, & Sparks, 1991). Similarly, a close relationship with pets has been linked to a positive self-concept in one study (Paul & Serpell, 1996) but not another (Van Houtte & Jarvis, 1995). In a study of children in military families (Mueller & Callina, 2014), greater closeness to pets was associated with greater thriving, but was related to more adaptive coping only for those children whose parents were currently deployed. As pets are thought to provide many of the benefits associated with friendship, we focused on aspects of adjustment that are associated with friendship, specifically anxiety and social and emotional competence (Vitaro et al., 2009). We thus tested whether children who form higher quality relationships with their pet dogs experienced less anxiety and showed better social and emotional competence at school. Further, because we simultaneously assessed both dog and human relationships, we were able to examine whether the two showed similar or unique associations with child adjustment. In addition, many studies examining the potential benefits of pets have included only child reports of well-being. Thus, it is not clear whether some of the findings are due to unique associations between quality features of pet relationships and well-being, or whether they are partially an artifact of self-report measures. Thus, an important advance in this study is that we included teacher reports of adjustment at school as supplements to child reports. We examined whether children's reports of the quality of their relationship with their pet dog were related to child and teacher reports of internalizing symptoms, and to teacher reports of social and emotional competence at school. We further examined how these associations compared to associations for friendship and parent-attachment with child adjustment.

Study goals

In summary, the present study integrates an analysis of children's relationships with dogs with more traditional perspectives on children's close relationships (parent-child attachment and friendship), thus linking these two research areas. The specific questions to be addressed are:

1. Do children who report more companionship, esteem enhancement, and emotional support in their relationships with pet dogs also experience more positive friendships and more secure attachments to their mothers and fathers?
2. Do children's reported relationships experiences with pet dogs, parents, and friends predict interactions with the pet dog?
3. Do children who have relationships with their dogs that are characterized by greater companionship, nurturance, admiration, and affection also experience less anxiety

and show greater social and emotional competence? If so, are these associations still significant, after controlling for friendship and parent–child attachment quality?

Methods

Participants

We recruited families ($n = 99$; 48 boys, 51 girls) with a child in grade 4 or 5 (mean age = 10.63 years) who owned at least one pet dog. Families were recruited through letters distributed through schools, announcements in newspapers, and flyers distributed in the community (e.g., libraries). Although we made efforts to recruit in diverse communities, the sample was primarily Caucasian (91%). This distribution reflects both minority representation in the local area and the fact that Caucasian families are the racial group most likely to own pets (Siegel, 1995; Rhoades, Winetrobe, & Rice, 2014; Westgarth et al., 2013). The mean education level for mothers and fathers were, respectively, 15.74 and 15.00 years, and 10% of the children in the sample qualified for free or reduced school lunches. Families were compensated for their participation with \$50 cash and a \$25 gift card for a local pet store.

Procedure

We visited families one time in their homes to collect the data. Parent consent and child assent were obtained at the start of the session. Children completed a packet of questionnaires about their relationships with parents and friends as well as their pet dog; only an experimenter was present when children completed the questionnaires. Next, children were randomly assigned to participate in a 5 minute resting period, followed by a social stress task that is not part of this report, either with or without their pet dog present. For those children completing the task with their dog, we coded child behavior during the resting period. Parents provided demographic information about the family. Data on children's adjustment were obtained from children and teachers. We contacted a child's primary teacher, and we were able to obtain teacher data for 79 children (80% of the sample).

Measures

Relationship with pet dog

We asked children rather than parents to complete measures of the child's relationship with the pet dog because we expected that they would have more direct access to their thoughts and feelings regarding pets (parents may be less aware of children's interactions with pets at this age given that children spend less time in close proximity

to parents and may spend time with pets when parents are away from the home, e.g., at work). In addition, we expected that children's own perceptions of the relationship (e.g., whether they feel they derive comfort from the pet) would have the greatest impact on their adjustment.

Relationships with pets can provide specific social provisions, such as companionship and validation (McNicholas et al., 2005; Walsh, 2009). Children completed Bryant and Donnellan (2007) Pet Provision of Support measure to assess 4 social provisions (3 items each): self-enhancing admiration (e.g., "How much does your dog make you feel good about yourself?"), affection (e.g., "How much does this pet love or like you?"), nurturance (e.g., "How much do you take care of your pet dog?"), and companionship (e.g., "How much free time do you spend with your dog?"). We dropped the nurturance scale due to poor reliability in this sample ($\alpha = .49$), and retained the remaining scales, all of which showed high internal consistency in this study: companionship ($\alpha = .80$), affection ($\alpha = .83$), and admiration ($\alpha = .86$). The three scales were all correlated with one another (see Table 1), and we created a pet relationship latent construct with admiration, affection, and companionship as the indicators (as shown in Figure 1, loadings on the latent factor ranged from .66 to .86).¹

Mother–child and father–child attachments

Children completed the Security Scale (Kerns, Aspelmeier, Gentzler, & Grabill, 2001), a 15-item measure based on attachment theory that includes items assessing children's expectations, behaviors, and feelings regarding a specific attachment figure (e.g., whether the child goes to parent when upset, shares thought and feelings with parent, feels loved by parent). Items are scored to assess a continuous security dimension. Children separately rated each parent in the household. Alphas for mother and father ratings were .83 and .89 respectively in this sample. Previous research has shown that the Security Scale is related to narrative measures of attachment, parenting, and social adjustment (e.g., Granot & Maysel, 2001; Kerns, Brumariu, & Seibert, 2011; Kerns et al., 2001).

Friendship quality

Berndt and McCandless (2009) suggest that, for elementary school age children, the best way to identify friends is child nominations. We asked children to nominate a

¹The sample size was small for testing models with individual scale items as indicators of the latent variables and potentially higher order factors. Nevertheless, we conducted an exploratory CFA analysis in which we tested a model in which each of the individual items loaded on the relevant 3 scales (affection, admiration, and companionship), and the scales loaded onto a single factor. The CFI for this model was .94, with a statistically significant Chi Square test $\chi^2(24) = 53.39, p < .001$.

Table 1. Correlations between children's relationship to pet dogs and their relationships to parents and peers.

Pet dog relationship	Admiration	Affection	Companionship	Observed physical contact ^a	Observed talking to dog ^a
Admiration-Dog	–	.48***	.59***	.21	.21
Affection-Dog			.56***	.14	.15
Companionship-Dog				.35*	.24
Attachment to Mom	.24*	.33**	.42***	.47**	.25
Attachment to Dad	.30**	.20*	.29**	.14	.19
Positive Friendship Qualities	.28**	.37***	.50***	.16	.08
Conflict in Friendship	.04	–.28**	–.22*	.05	.06

^a $n = 51$. $N = 99$ for all other analyses.

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

same-sex best friend, and rate the quality of that friendship using the Friendship Quality Questionnaire (Parker & Asher, 1993), which has scales assessing companionship (e.g., sit together at lunch), intimacy (e.g., tell each other our problems), validation and caring (e.g., would stick up for me), help and guidance (e.g., ask friend for help and advice), conflict resolution (e.g., make up easily when we have a fight), and conflict (e.g., get mad at each other a lot). This measure has excellent psychometric properties (Parker & Asher, 1993). For this study, we created separate indices of positive friendship quality (the average of scores on companionship, intimacy, validation and caring, help and guidance, and conflict resolution; $\alpha = .87$ this sample) and conflict ($\alpha = .71$ this sample). The correlation between the two scales was $-.34$.

Child behavior with dog

As part of a larger study, children were randomly assigned to complete a stress task either with or without their pet dog in the room. Prior to the introduction of the stress task, children first completed a 5-minute

baseline resting period while seated in a chair, and we coded interactions between the child and pet dog for those children who completed the task in the presence of their pet dog ($n = 51$). We only coded child–dog interaction during the baseline period because once the stress task was introduced children focused on the task (preparing and giving a speech) and had minimal contact with their pets.

We developed a coding system to capture the frequency of child interactions with the dog. We began by reviewing the list of appeasing/linking behaviors identified by Fillatre, Millot, Montagner, Eckerlin, & Gagnon (1998; e.g., patting dog, talking to dog), then viewed a few tapes to see what could be readily coded from our sessions. Based on this piloting, we condensed the list of categories of child behaviors to three: physical contact with the dog (e.g., petting, hugging), looking at the dog, and talking to the dog. For coding, the 5-minute resting period was divided into 10 30-second blocks, and for each time block we coded the behaviors that occurred (0 = did not occur, 1 = behavior occurred at least once during the time block). We then summed across the 10 time blocks, the number of time blocks

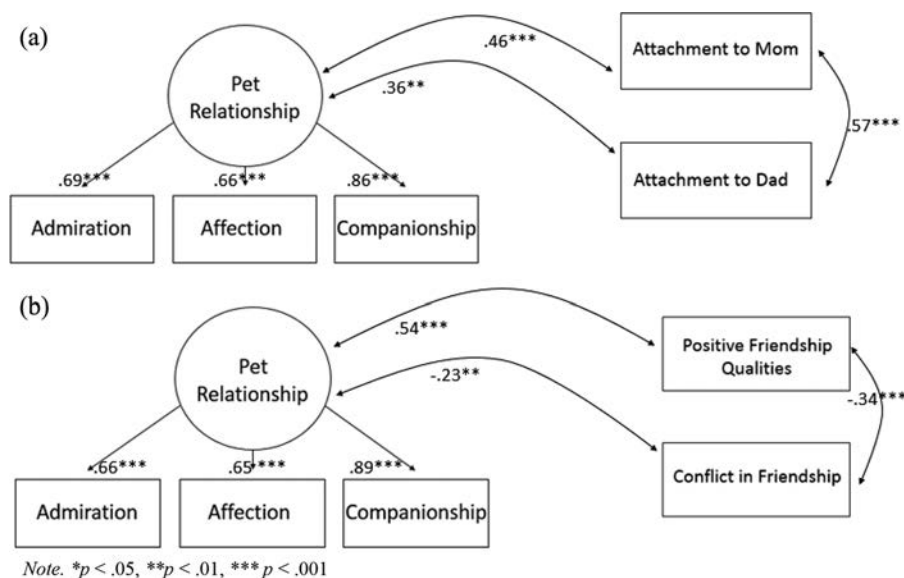


Figure 1. Relationships with pets: Associations with relationships with parents and friends.

during which children had physical contact with the dog, (mean), looked at the dog (mean), and talked to the dog (mean). The primary coder then coded all sessions, and the secondary coder coded 15 sessions (29%) to check agreement. Agreement, calculated as percentage of intervals in which coders agreed on the presence or absence of the target behavior, was high for all categories: physical contact, 99%; looking at dog, 93%; talking to dog, 91%.

The codes for physical contact and looking at the dog were highly correlated $r = .90$, and, therefore, we dropping the looking category and retained only the physical contact code. Children who spent more time physically in contact with the dog were also more likely to talk to the dog ($r = .37$, $p < .01$).

Child anxiety

We obtained two measures. Children completed the 38-item Screen for Child Anxiety Related Emotional Disorders (Birmaher et al., 1997; $\alpha = .91$ in the present study) which assessed a broad range of anxiety symptoms (e.g., feeling scared, worrying about things, sweating). This instrument can discriminate children with anxiety disorders from children with other types of disorders (Silverman & Ollendick, 2005). In addition, teachers completed the shy/anxious subscale from the Teacher-Child Rating Scale (TCRS; Primary Mental Health Project, Inc., 1995; e.g., child is anxious, withdrawn), which showed good reliability in this study ($\alpha = .83$). As is typically found for child and teacher reports of anxiety (Silverman & Ollendick, 2005), the two measures were only modestly related, $r = .23$, $p < .05$, and were analyzed separately rather than aggregated in subsequent analyses.

Social-emotional competence

Teachers also rated children's assertive social skills (e.g., comfortable as a leader), peer social skills (e.g., makes friends easily), and their ability to tolerate frustration (e.g., accepts things not going his/her way), using the TCRS (Primary Mental Health Project, Inc., 1995). The scales were conceptualized as an indicator of children's general social-emotional competence, or ability to manage social and emotional interactions and situations at school in a competent manner. All scales were internally consistent in our study: assertive social skills ($\alpha = .86$), peer social skills ($\alpha = .93$), and frustration tolerance ($\alpha = .89$). The three were substantially correlated, and were used as indicators for a latent Social and Emotional Competence latent variable (latent variable loadings ranged from .66 to .94).

Results

Preliminary analyses

Before running the main analyses, we confirmed that our data met statistical assumptions of each analysis (e.g., normality). The demographic variables were analyzed to determine whether regression analyses should control for any of these characteristics. We did not examine ethnicity due to limited variability in the sample. Pearson's correlations showed that the child's age (in months) was not significantly related to any of the outcome variables. Independent samples t-tests revealed that boys reported significantly higher attachment to fathers than girls, $t(97) = 2.46$, $p = .02$, means = 3.46 and 3.23. Girls reported significantly more affection than boys toward their pet dogs $t(97) = -2.22$, $p = .03$, means = 4.50 and 4.20, more positive friendship qualities $t(97) = -2.56$, $p = .01$, means = 3.02 and 2.62, and more anxiety symptoms $t(97) = -2.29$, $p = .02$, means = .61 and .47.

We then calculated Pearson correlations and tested several structural equation models to test our main research questions. Correlation coefficients are in tables, and 95% Confidence Intervals (CIs) are provided in the text. We employed structural equation modeling as it allowed us to control for measurement error and to examine unique effects of the various predictors. Overall model fit was evaluated using several different model fit indices: the Comparative Fit Index (CFI), Root Mean Squared Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR). CFI values closer to 1 indicate better model fit: CFI values between .95 and 1.0 are considered excellent fit, and CFI values less than .90 indicate poor model fit (Hu & Bentler, 1999). RMSEA values less than .08 suggest reasonable fit whereas values below .06 suggest good fit, and SRMR values of .08 or less indicate good model fit (Hu & Bentler, 1999). Model results are presented in Figures, and 95% Confidence Intervals for significant paths are in the text. We ran all structural equation models in two ways, one in which gender was controlled, and one in which it was not. There were no differences in the significance of any paths between the two groups of models, so for ease of interpretation we report the results of the models in which gender was not controlled. Also, because power was modest, we re-tested associations among our main variables using multiple regression. The findings were similar, so here we report the modeling results as they (a) account for measurement error between respectively the pet relationship and teacher competence scales, and (b) it allows us to test a comprehensive picture

rather than running separate analyses for each pet relationship and teacher competence scale.

Primary analyses

Associations of pet dog relationship quality with parent-child attachment and friendship quality

Zero-order correlations were conducted to test the first hypothesis that children who have positive relationships with pets, consisting of more companionship, esteem enhancement, and emotional support, also experience more positive friendships and more secure attachments to their mothers and fathers. As shown in Table 1, attachment to mothers and fathers and positive qualities of friendship are all significantly related to feelings of admiration of the pet (CI: mothers .04, .42; fathers .11, .47; positive friendship .09, .45), affection toward the pet (CI: mothers .14, .49; fathers .00, .38; positive friendship .19, .53), and companionship (CI: mothers .24, .57; fathers .10, .46; positive friendship .34, .63). Affection (CI: $-.45$, $-.09$) and companionship (CI: $-.40$, $-.02$), but not admiration of the pet, were also significantly negatively related to conflict betrayal in a friendship.

To further test our first hypothesis, we explored two structural equation models in which the three pet relationship variables were part of the same latent construct, which then predicted either parental attachment or friendship (Figure 1). For the relationship between the pet and parental attachment variables, the model fit the data well, $\chi^2(4) = 5.55$, $p = .23$, RMSEA = 0.06, 90% CI: 0.00–0.17, CFI = 0.99, SRMR = 0.02. Path estimates are reported in Figure 1, and show that the relationship with pet dog was significantly related to parental attachment (CI: .28, .64 for mothers; .16, .55 for fathers). For the relationship between the pet and friendship quality variables, the model fit the data adequately, $\chi^2(4) = 13.11$, $p = .01$, RMSEA 90% CI: 0.06–0.25, CFI = 0.93, SRMR = 0.06. Although the RMSEA value was high (RMSEA = 0.15), recent Monte

Carlo studies suggest the RMSEA falsely rejects good fitting models with small degrees of freedom (Kenny, Kaniskan, & McCoach, 2014), and therefore, we did not use the RMSEA to reject this model. Path estimates are reported in Figure 1, and show that the relationship with pet dog was significantly related to friendship quality (CI: .38, .70 for positive qualities; $-.43$, $-.02$ for conflict).

Relationships with pet dogs, parents, and friends: Predicting children's social interaction behavior with dog

As shown in Table 1, children's social contact with the dog showed some associations with children's reported quality of relationship with their dog. Specifically, children who reported higher levels of companionship with their dog spent more time physically touching their dog (CI: .16, .51). Mother-child attachment, but not father-child attachment, predicted interaction with the pet dog, in that children who were more securely attached to their mothers spent more time touching their dog (CI: .30, .61). Friendship quality did not predict interaction with the pet dog.

Relationships with pet dogs, parents, and friends: Associations with anxiety and social and emotional competence

To test our third hypothesis, that children who have positive relationships with their dogs, parents, and friends also experience less anxiety and have more social and emotional competence, we conducted zero-order correlations and structural equation models. As shown in Table 2, affection for the pet and companionship with the pet were not significantly related to anxiety and social-emotional competence, and admiration of the pet dog is significantly related only to teacher-reported assertive social skills (children reporting greater admiration from the pet were rated by teachers as showing more assertive social skills; CI: .03, .41). Children's

Table 2. Relationships with pets, parents, and peers correlated with anxiety and social-emotional competence.

	Child-reported anxiety	Teacher-reported anxiety	Frustration tolerance	Assertive social skills	Peer social skills
Pet Dog Relationship Pet Admiration	.01	-.03	-.01	.23*	-.08
Pet Affection	-.05	.18	-.02	-.04	-.17
Pet Companionship	-.11	.01	.07	.14	-.02
Observed Physical Contact with Dog ^a	.12	.11	.04	.04	-.05
Observed Talking with Dog ^a	.03	-.24	-.16	.25	-.11
Parent-Child Relationships					
Attachment to Mom	-.21*	-.11	.28*	.26*	.25*
Attachment to Dad	-.25*	-.06	.17	.08	.18
Friendship					
Positive Friendship Qualities	-.08	.07	.20	.03	.05
Conflict in Friendships	.45***	.26*	-.21	-.15	-.09

^a $n = 51$. $N = 99$ for all other analyses.

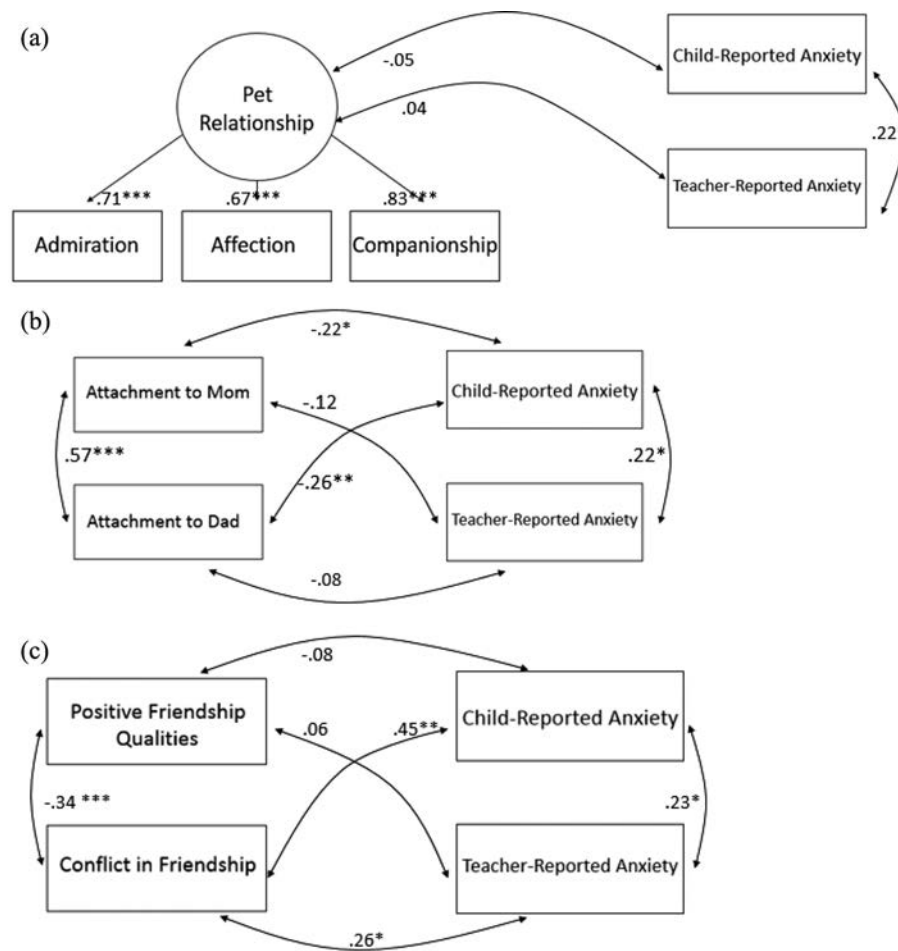
* $p < .05$. ** $p < .01$. *** $p < .001$.

observed time in physical contact with the dog or talking to the dog also did not predict children's social and emotional competence.

Maternal attachment was related to child-reported anxiety and to all three teacher reported emotional competence variables, such that more securely attached children reported less anxiety (CI: $-.39, -.01$) and were rated by teachers as showing a greater ability to tolerate frustration (CI: $.09, .45$), more assertive social skills (CI: $.07, .43$), and greater competence with peers (CI: $.06, .43$). Paternal attachment was related only to child-reported anxiety (children more securely attached to fathers were less anxious; CI: $-.43, -.06$), but not to teacher-reported anxiety or to any teacher ratings of social/emotional competence. Positive friendship quality was not significantly related to anxiety or social/emotional competence at school. Friendship conflict was significantly related to both child (CI: $.28, .59$) and teacher reported anxiety (CI: $.07, .43$), with children in more conflictual friendships rated more anxious, but was not related to teacher ratings of social/emotional competence.

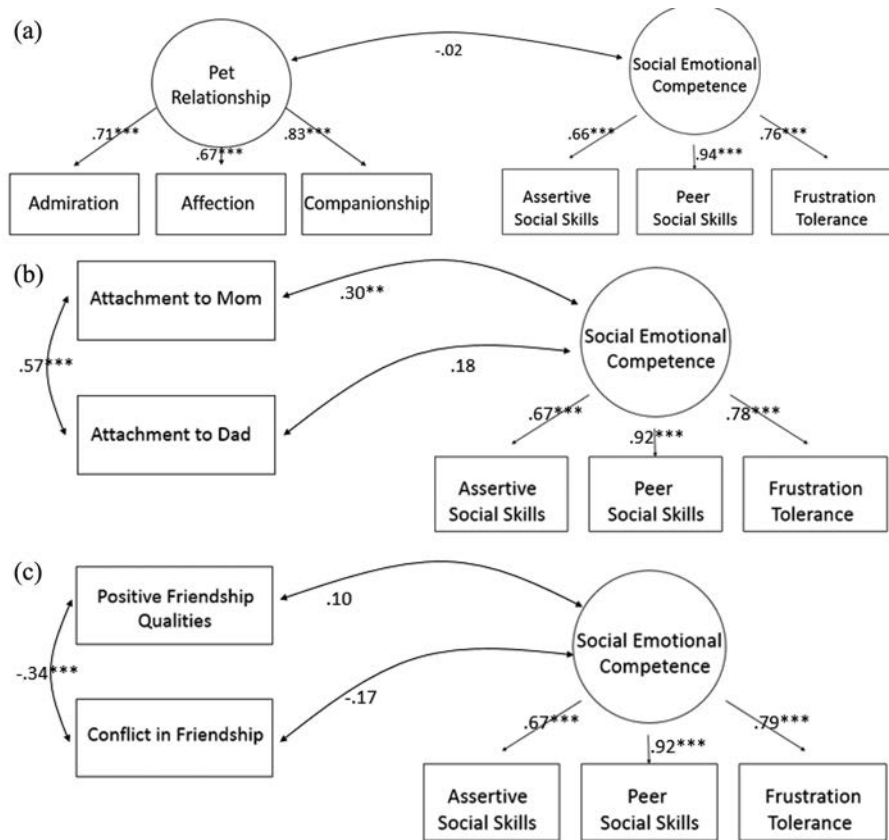
We also tested the relationship between pet relationships and anxiety (Figure 2) and social-emotional competence (Figure 3) using structural equation models. There were three indicators of the Pet Relationship latent variable (admiration, affection, companionship). This pet relationship construct was not significantly related to either child-reported or teacher-reported anxiety or to the social-emotional competence latent variable (frustration tolerance, assertive social skills, and peer social skills).

For comparison, we also tested the relationship between parent-child relationships and anxiety (Figure 2) and social-emotional competence (Figure 3) using structural equation models. We tested the relationship between the parental attachment variables and both child-reported and teacher-reported anxiety. The model fit could not be tested, as the model was fully identified, but path estimates (Figure 2) show that child-reported anxiety was significantly related to attachment to both parents (CI mothers $-.42, -.22$; fathers $-.46, -.26$). Teacher-reported anxiety was not related to attachment to either parent. We also tested



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

Figure 2. Associations between child anxiety and relationships with pets, parents, and friends.



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

Figure 3. Associations between child social-emotional competence and relationships with pets, parents, and friends.

the relationship between parental attachment and social-emotional competence. The model fit the data well, $\chi^2(4) = 3.21$, $p = .52$, RMSEA = 0.00, 90% CI: 0.00–0.14, CFI = 1.00, SRMR = 0.02. Path estimates are reported in Figure 3, and showed that social-emotional competence was significantly related to maternal attachment (CI: .08, .51), but not to paternal attachment.

We also tested the relationship between friendship and anxiety (Figure 2) or social-emotional competence (Figure 3) in structural equation models. For the model examining positive friendship qualities and friend conflict in relation to anxiety, we could not test model fit because the model was fully identified. Both child-reported anxiety and teacher-reported anxiety were related to conflict in friendships (CIs .29, .61 and .04, .47, respectively), but not related to positive friendship qualities. We also tested the relationship between friendship quality and the latent construct of social-emotional competence. The model fit the data well, $\chi^2(4) = 6.59$, $p = .16$, RMSEA = 0.08, 90% CI: 0.00–0.19, CFI = 0.98, SRMR = 0.04, but path estimates (reported in Figure 3) show that the latent factor of social-emotional competence was not significantly related to friendship quality.

Finally, given the lack of associations between the pet dog relationship and child adjustment, we subsequently explored whether there might be interaction effects, such that associations between pet relationship quality and child adjustment were stronger for children with low quality friendships or attachments (which would suggest pet relationships can have a compensatory effect in the case of low quality human relationships). Using structural equation analyses, we tested each of four possible moderators (attachment to mom, attachment to dad, positive friendship qualities, and conflict in friendships) as moderators of the relationship between the pet relationship latent variable and both anxiety and social-emotional competence, but none of these post hoc interaction tests were statistically significant.

Discussion

The goal of the present study was to extend our understanding of children's relationships with their pet dogs by studying these relationships *in the context* of children's close relationships with humans rather than studying them in isolation. Our study yielded three conclusions. First, there was continuity rather than independence between the quality of children's relationships with pet

dogs and the quality of their relationships with their mothers, fathers, and best friends, with effect sizes ranging from low to medium effect sizes to high effect sizes. Second, we found that the quality of children's relationships with their pet dogs and attachment to mothers, but not attachment to fathers or friendship quality, predicted an observational assessment of interaction children had with their pet dogs, with effect sizes in the medium to high range. Finally, attachments to parents and friendship quality were related to children's adjustment, with effect sizes in the low to medium range, but the quality of children's relationships with their pet dog (for the most part) and social interaction with the dog were not.

A well-known finding in the literature on children's close relationships is that children who form close, supportive relationships with one relationship partner (e.g., father) tend to form close relationships with other partners (e.g., a best friend; Berlin et al., 2008). Recent studies with adults (McConnell et al., 2011; Zilcha-Mano et al., 2011) found that the quality of an individual's relationship with pets was related to the quality of their relationships with close human partners. By contrast, two studies with children that examined associations between the quality of pet relationships and parent-child relationships produced conflicting results (Covert et al., 1985; Vidović et al., 1999), and no studies have examined whether there is continuity between the quality of children's relationships with pets and peers. The latter is surprising, given that pets are often described as providing the benefits of friendship for children (e.g., Triebenbacher, 1998; McNicholas & Collis, 2000; Morrow, 1998). Our study suggests that there is continuity in the quality of relationships children form with their pet dogs and the quality of their close human relationships, and is the first to document continuity in quality to relationships with both parents and friends. Specifically, children who reported more positive relationships with their pet dogs reported more secure attachments to mothers and fathers, and more positive qualities and less conflict with a best friend. The positive findings in our study might be due to our use of more elaborate and well validated measures of children's human relationships than those used in prior studies that examined continuity from human to human-animal relationships. Another factor might be our focus specifically on dogs, who may be more able than some other pets to provide certain types of social support (e.g., esteem enhancement, affection, companionship; Walsh, 2009).

We extended prior research by examining whether the quality of children's relationships with pet dogs, parents, and friends predicted children's social interactions

with the dog. To our knowledge, this study is the first to examine whether children's reports of their relationships with pet dogs predict their observed behavior with their pets. We found that children who reported greater companionship in their relationship with the pet dog spent more time interacting with the dog. This finding provides some evidence for the validity of the companionship scale as a measure of time spent together. Interestingly, reported mother-child attachment, but not father-child attachment or friendship quality, was related to amount of interaction with the dog. Children who were more securely attached to their mothers were more likely to touch their dogs, suggesting that being able to use one's mother as a safe haven and secure base may promote closeness to pets.

Our study cannot address the mechanisms accounting for the observed continuity. It is possible that children's close relationships with humans, especially those that predate their experience with pets, may serve as a model for how to approach the relationship they form with their pet. For example, children who have received loving care from parents or validation from a friend may approach their pet dog with the expectation that their dog will be similarly warm and validating and behave in nurturing ways that lead to these qualities in their relationships with their pet dogs. This interpretation is consistent with our finding that perceptions of attachments to mothers predicted how much children interacted with their pet dog. It is also possible that certain child characteristics, such as a sociable, extraverted temperament, may lead the child to induce friendly, cooperative behavior from both humans and dogs. A third possibility is that there may be reciprocal influences across all of these relationships over time, such that positive experiences with any social partner on one occasion tends to create more positive mood and more cooperative interactions with the next partner. Over time the accrual of positive interactions and moods with social partners results in the child developing a socially oriented relational style which is manifested across relationships. Longitudinal studies, especially those that follow children as families first adopt pets, are needed to examine these possibilities.

The study also investigated how the pet dog relationship is related to indices of children's adjustment. We were interested in testing the proposal that pets can provide emotional support and therefore may also enhance children's well-being and social skills (McNicholas et al., 2005; Melson, 2011; Mueller, 2014; Walsh, 2009). The few studies testing whether the quality of children's relationships with pets is related to children's social and emotional adjustment have yielded mixed results (Daly

& Morton, 2003, 2006; Melson et al., 1991; Mueller & Callina, 2014; Paul & Serpell, 1996; Poresky & Hendrix, 1990; Van Houtte & Jarvis, 1995). Although children reporting greater admiration from their pet dogs were rated more socially assertive by their teachers, for the most part the quality of children's relationships with pet dogs was not associated with anxiety or measures of social and emotional competence. In addition, observed interaction with the pet also did not predict children's social and emotional competence. While it can be difficult to interpret negative findings, the results for the pet dog relationship contrast with the present findings showing that the quality of human relationships was related to children's social adjustment. Specifically, we found that children who reported more secure attachments to their mothers or fathers reported less anxiety, and children who reported more secure attachments to their mothers were rated as more socially and emotionally competent by teachers. In addition, children who reported more conflictual friendships reported experiencing more anxiety and were rated by teachers as showing more anxious behaviors at school. Thus, human relationships rather than relationships with pet dogs were related to children's social and emotional adjustment.

The pattern of findings underscores the importance of examining relationships with pets in the context of children's human relationships. Doing so allows for understanding the relative significance of children's relationships with pet dogs for a particular domain of social adjustment. Although this study did not find that pet dog relationship quality was related to child anxiety or to an index of children's social and emotional adjustment at school, it is possible that pet dog relationships may be related to other measures of social adjustment. Alternatively, it may be that relationships with pet dogs have a relatively small impact on children's general social and emotional adjustment, at least in community samples. Human animal interaction might have more salutary effects in contexts where children are experiencing high level stressors in combination with diminished opportunities to receive support from human partners (e.g., children undergoing adoption or placement in foster care, coping with family or community violence), or when children are confronted with a salient immediate stressor, for example, when undergoing a medical procedure (Nagengast, Baun, Megel, & Leibowitz, 1997). Mueller and Callina (2014) finding that relationships with pets predicted coping only for those military children whose parents were currently deployed is consistent with the idea that pet relationships may be especially important to children during times of stress.

A strength of the study, and an advance on prior research, was the inclusion of multiple measures of the pet dog relationship and the use of modeling techniques to derive a latent factor of the quality of the pet dog relationship. This approach was more powerful than the use of a single measure in that we were able to account for error variance across different indicators of the pet dog relationship. Nevertheless, there were some limitations in our approach to assessing the pet relationship. Our study could be extended by observing children's interactions with pets in other contexts. For example, observing human-animal interaction when children are exposed to stressors may provide a valuable way of evaluating how much pet support buffers the experience of stress. In addition, although we focused on a single, global dimension of the pet relationship, it may be useful in some studies to examine specific relationship qualities (e.g., to test the hypothesis that the opportunity to take care of pets fosters empathy). A difficulty in the current literature is that a number of different questionnaires have been used to assess pet relationship quality, but none has been validated very extensively. Most studies have obtained child reports of pet relationship quality, and related them to other questionnaires completed by the child. To our knowledge, none of the questionnaires have been validated against parent reports of pet relationship quality or diary data of daily interactions and only this study has validated measures against observed interactions with the pet. In addition, each measure has been used in only a handful of studies. Another concern is that current measures are biased toward the assessment of positive relationship qualities, and do not capture potentially negative qualities and interactions with a pet (e.g., child perceives pet as annoying or a burden). Although there are benefits to owning pets, there are also potential costs (stresses) such as worrying about the pet, the effort needed to provide care, additional expenses, and coping with the death of a pet (Bryant, 1990; Fifield & Forsyth, 1999). The development and validation of a broad measure of pet relationship quality, assessing both positive and negative relationship qualities, would advance the field by providing a comprehensive measure that could be used consistently across studies. The availability of such a measure would also facilitate the inclusion of the study of pet relationships into ongoing longitudinal studies that have another primary focus, and thereby provide an efficient way to expand the current limited literature on children's relationships with pets while also allowing the study of pet relationships to be done within the context of other influences on children's development.

Although the families in this study were drawn from a diverse set of communities (i.e., medium sized city, suburbs, small towns), and there was some range on family education and income in the sample, there were relatively few families with very low incomes (e.g., only 10% of the sample qualified for free or reduced price school lunches). In addition, the sample was also primarily White (non-Hispanic). These findings are not surprising, given the fact that both race and income are related to pet ownership, with higher ownership rates for families with higher income and families and White (vs. non-White) families (Owen et al., 2010; Rhoades et al., 2014; Siegel, 1995; Westgarth et al., 2013). Nevertheless, the present findings may not generalize to other ethnic groups or to low income samples.

In conclusion, the present study advances research on human animal interaction by examining children's relationships with pet dogs *in the context* of their relationships with parents and friends. In particular, we found continuity between the quality of children's relationships with pet dogs and parents or friends, and some associations between children's reported relationships and their interactions with pet dogs, although only human relationships showed consistent associations with children's social and emotional adjustment. The present study could be extended by considering other aspects of pet relationships (e.g., negative interactions with pets) as well as examining whether relationships with pet dogs play a role in mitigating real time emotional and behavioral responses within specific stressful situations.

Acknowledgments

We thank the families who participated in this project.

Funding

This project was funded by a grant from the National Institute of Nursing Research (NR013872) and the Waltham Center for Pet Nutrition.

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