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Companion Animals and Adolescent Stress and Adaptive Coping During the COVID-19 Pandemic

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Abstract

The COVID-19 pandemic has resulted in significant social disruptions for youth caused by lockdowns, school closures, and a lack of in-person social interactions. Companion animals are prevalent in US households and may provide a source of emotional support and motivation for youth to engage in adaptive coping behaviors during social challenges. The goals of this study were to assess if dog owners, non-dog pet owners, and non-pet owners differed in stress levels, positive affect, and use of adaptive coping strategies such as increased time outdoors, regular walking, and healthy behaviors. This study used data collected during the COVID-19 pandemic from the Adolescent Brain Cognitive DevelopmentSM (ABCD) Study, a large, nationally representative dataset of American youth. In a cross-sectional sample of 6,069 adolescents, there were significant, but small, relationships between owning a non-dog pet and lower levels of positive affect, and both dog owners and non-dog pet owners reported higher perceived stress compared with non-pet owners. Dog ownership was associated with higher odds of using healthy coping strategies compared with non-pet owners, but this relationship was not significant when controlling for demographic variables. Dog owners reported higher odds of having a walking routine and spending time outdoors compared with non-pet owners. Overall, the results suggest no buffering effect of pet ownership on youth mental wellbeing, but dog ownership is associated with some healthy coping behaviors linked to walking.

Keywords

adaptive coping; adolescence; COVID-19; human–animal interaction; pets

The pandemic associated with the coronavirus disease (COVID-19) has caused significant life disruptions for youth worldwide. In addition to the physical health challenges of COVID-19, the social isolation caused by lockdowns, school closures, and social distancing

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guidelines have the potential to significantly impact child and adolescent mental health and wellbeing (Fegert et al., 2020; Rothe et al., 2021). Adolescents are at particular risk, given the importance of social relationships during this developmental period (Hair et al., 2002). Given this risk, there is a need for identifying contextual resources that may help promote stress reduction and adaptive coping during the acute and extended phases of the pandemic. Pets can play a role in providing emotional support for youth (Covert et al., 1985; Melson & Schwartz, 1994) and are not subject to the same social distancing restrictions as human social contacts during COVID-19. However, recent research on companion animals and child and adolescent development have produced mixed findings related to pet ownership and youth outcomes (Miles et al., 2017; Purewal et al., 2017), suggesting that additional research is needed to explore if and when pets may be beneficial for adolescents. Therefore, exploring the role of companion animals for teenagers during COVID-19 may provide important information about if and how pets can support adaptive coping with stressors, both during the pandemic and more broadly.

The COVID-19 pandemic has had a significant impact on child and adolescent mental health. The pandemic has caused significant disruptions of daily life, including school closures and modifications in access to routine medical care (Flaxman et al., 2020). For adolescents, the lack of peer contact caused by school closures, lockdowns, and social distancing guidelines has the potential to create social isolation and negatively impact wellbeing (Gifford-Smith et al., 2003; Oberle et al., 2010). Adolescence is an important developmental period for strengthening peer relationships, as youth become more independent and develop autonomy (Allen & Loeb, 2015; Brown & Larson, 2009; Dowdy & Kliwer, 1998). Combined with the other mental health stressors associated with COVID-19, lack of peer support and interaction may exacerbate these stressors. In fact, adolescents have reported feeling worried about school and peer relationships during the COVID-19 pandemic (Ellis et al., 2020). These long-term disruptions have the potential to cause anxiety and stress, which in turn negatively impact adolescent mental health (Lee, 2020).

Given these challenges, there is a significant need for identifying contextual assets within the developmental system that can support adolescent resilience and adaptive coping with stress. Adaptive coping strategies can include spending time with family members within the household unit, connecting with friends virtually, and engaging in physical activity (Ellis et al., 2020; Jiao et al., 2020). Although teenagers are finding ways to connect with peers virtually, this increase in screen time, combined with the increase in screen time accompanying virtual schooling, may have mixed benefits (Ellis et al., 2020). Therefore, there is a need to identify other resources within the family environment that can help support wellbeing during the immediate and long-term phases of COVID-19, as well as during future potential pandemics or other stressful events.

Companion animal relationships can be a social resource for adolescents during the COVID-19 pandemic. Pets may provide emotional support for youth, especially in the absence of other social relationships (Garrity et al., 1989). Pet relationships have been associated with adaptive social connections, prosocial behaviors such as empathy (Jacobson & Chang, 2018; Vidović et al., 1999), and socioemotional skills (Dueñas et al., 2021). These socioemotional skills may be key in fostering the emotional resilience that is needed to

adaptively cope with the stressors associated with the COVID-19 pandemic. Children and adolescents often turn to their pets for support and emotional comfort when experiencing stress (Melson & Schwarz, 1994). A relationship with an animal can become part of an adolescent's representation of social resources and allows for social contact that is physically accessible during the COVID-19 pandemic (Piper & Uttley, 2019). Companion animal interactions can be a way for adolescents to have a safe place for emotional disclosure during times of stress (Kurdek, 2009). Furthermore, pet relationships do not have some of the risks associated with virtual interaction with peers, such as focusing on negative experiences and feelings, and co-rumination (Ellis et al., 2020; Rose, 2002). Although understudied in youth, there is some initial evidence that adolescents who own pets are less lonely than non-pet owners (Black, 2012).

This type of emotional comfort may help support successful regulation of emotions during distress, a key component of resilience (Troy & Mauss, 2011). In fact, there is some evidence that emotional regulation can be supported by interactions with animals (Flynn et al., 2020; Kršková et al., 2010). The physical presence of an animal may also have a physiological effect on reducing anxiety (Ein et al., 2019; Kerns et al., 2018), further supporting emotional regulation and resilience, even in challenging situations. The physical comfort provided by pets may be particularly important during the COVID-19-pandemic, where physical touch is limited (Young et al., 2020). Recent research has shown that companion animals can buffer the effects of stress on affect in particular (Janssens et al., 2021; Kerns et al., 2018).

Pets can also be a catalyst for facilitating social interactions between people (Wood et al., 2015) and therefore may help strengthen the social context within a family by acting as a social bridge. Pet caretaking tasks can also be a regular way in which children can interact positively with their parents or siblings. Time with family has been found to support mental health during COVID-19 (Ellis et al., 2020), and this finding may extend to pets. Attachment to pets has been associated with enhanced communication with parents and peers, supporting the idea that pets may contribute positively to the social dynamics in the family (Marsa-Sambola et al., 2017).

In addition to the socioemotional support that may be provided by a strong companion animal relationship, attachment to a pet has also been associated with the utilization of adaptive social coping skills during times of stress for adolescents (Mueller & Callina, 2014). Pets may help facilitate functional activities that are associated with adaptive coping, such as physical activity through walking and being outdoors. Initial research has suggested that youth are not getting recommended levels of physical activity during the COVID-19 pandemic and that physical exercise may be an important strategy for fostering positive mental health outcomes (Ellis et al., 2020). Dogs in particular have been associated with increased levels of physical activity (Mein & Grant, 2018) and may provide the motivation and opportunity for teenagers to spend time outdoors and walk their dogs while adhering to social distancing guidelines. Relatedly, caring for a pet maintains a sense of routine, further supporting wellbeing (Nieforth & O'Haire, 2020). In fact, one qualitative study focused on older adults found that pet owners reported exercise, routine, and a sense of normalcy

as positive ways in which their pets helped them during the pandemic (Applebaum et al., 2021).

However, there is also a substantial body of research that suggests that the relationship between companion animals and mental health is not uniformly positive. Studies of pet owners across the age spectrum have found in some cases that pet ownership is either not associated with mental health or is linked with negative outcomes (Mathers et al., 2010; Mueller et al., 2021; Parslow et al., 2005; Sharpley et al., 2020). Taken together, these factors suggest that it is worthwhile to explore how pets may (or may not) be an aspect of the developmental system that promotes healthy coping strategies, which in turn support wellbeing during the pandemic.

Emerging research on pets during the pandemic has provided initial insights on the potential role that pets can play in supporting mental health, although the majority of this research is with adult populations. Across several of these studies, adult pet owners have reported perceiving a positive impact of their companion animals on their mental health and wellbeing (Applebaum et al., 2021; Ratschen et al., 2020; Shoesmith et al., 2021). One recent study in the United States found that within individuals with moderate to high mental health symptoms during COVID-19, high attachment to pets predicted higher odds of transitioning to a less severe symptom profile (Adams et al., 2021). A similar study in the United Kingdom found that pet owners had smaller decreases in mental health during the pandemic (Ratschen et al., 2020). However, other studies have had mixed findings with regard to pets and mental health during the pandemic (Oliva & Johnston, 2021), including some research with adolescents that found no buffering effect of pets on loneliness (Mueller et al., 2021). The growing body of research on this topic suggests that further exploration is warranted to assess if and how pets may be associated with adolescent stress and wellbeing in the specific context of COVID-19 across representative, non-convenience samples.

The evidence has, in many cases, been stronger for the benefits of dog ownership as compared with other types of pets (e.g., Mueller et al., 2021; Oliva & Johnston, 2021), as has also been the case prior to COVID-19 (e.g., Bao & Schreer, 2016; Carr et al., 2020; Gadomski et al., 2017; Ikeuchi et al., 2021). For social and emotional support, these patterns could be a function of attachment; adolescents with dogs often report higher levels of pet attachment and satisfaction (Cassels et al., 2017; Charmaraman et al., 2020; Muldoon, Williams, Lawrence, et al., 2019), which could be the basis of providing relationally oriented support that buffers the effects of social isolation and stress. Dogs also are uniquely suited to adaptive coping strategies that involve physical exercise, walking, and being outdoors, compared with other types of pets. Given the potential for these differential effects of dog ownership, it is important to explore species differences in the context of the pandemic.

Current Study

There has been a high degree of interest in the role that animals can play in supporting mental health during the pandemic (Fine, 2021). However, existing research has focused largely on adult samples and have utilized convenience-based sampling strategies given the

unexpected onset of COVID-19. Adolescents are facing critical mental health challenges during a developmentally important time period for social development, and therefore it is crucial to explore how pets may be a contextual asset during this time. Using data collected during COVID-19 from a nationally representative and diverse sample of adolescents, the goals of this study were to assess if dog owners, non-dog pet owners, and non-pet owners differed in 1) stress levels and positive affect, and 2) use of adaptive coping strategies such as increased time outdoors, regular walking, and healthy behaviors.

Methods

Data used in the preparation of this article were obtained from the Adolescent Brain Cognitive DevelopmentSM (ABCD) Study (<https://abcdstudy.org>), held in the NIMH Data Archive (NDA). This is a multisite, longitudinal study designed to recruit more than 10,000 children ages 9–10 years and follow them over 10 years into early adulthood. The overall study procedures were approved by each local ethics committee of the relevant institutions per National Institutes of Health (NIH) human subjects research guidelines.

Participants and Procedure

The ABCD Study is collecting annual and/or bi-annual physical, cognitive, social, emotional, environmental, behavioral, and academic assessments of youth over a 10-year period, beginning in 2016. A baseline cohort of 11,878 youth enrolled at 9–10 years of age, along with their parents/guardians; participants are included in the study until they are 19 or 20 years old. Initial participants were recruited to participate in the ABCD Study between July 2016 and August 2018. Recruitment areas were determined by locations of 21 study sites (catchment areas), which closely matched the sociodemographic composition of the US population. Within the catchment areas, participants were recruited through school-based probability sampling, where schools within each area were coded based on geographic location and sociodemographic characteristics using data from the National Center for Education Statistics and converted into databases that were used to generate lists for random selection (Garavan et al., 2018). The sample target uses a slight oversampling of racial/ethnic minority youth to ensure a demographically diverse sample. For more information on recruitment and inclusion criteria see <https://abcdstudy.org/scientists/> and Garavan et al. (2018). All adult participants (parents/guardians) provided written informed consent, and all youth provided written assent along with permission from a parent/guardian. Our specific analyses did not include any additional inclusion/exclusion criteria beyond the general criteria for the ABCD Study.

This study analyzed a subset of de-identified youth survey data from the ABCD COVID Rapid Response Research (RRR) Survey (<https://doi.org/10.15154/1520584>). Surveys were administered electronically three times; survey one was sent May 16–22, 2020, survey two was sent June 24–27, 2020, and survey three was sent August 4–5, 2020, and youth were 11 to 13 years of age at the time of data collection. In addition, parent-reported demographic data were derived from the ABCD Annual Curated Release 3.0 (<https://doi.org/10.15154/1519007>).

For this analysis, we used data from 7,555 youth participants who completed the second RRR survey, owing to the inclusion of our outcome measures of interest in the second survey. Approximately 20% of the second survey sample ($n = 1,486$) was missing data for all the key variables of interest (including pet ownership) and therefore were removed from the sample for analysis. The final analytic sample size was 6,069; there were no systematic demographic differences between the original and analytic sample, and data were assumed to be missing completely at random.

Measures

Demographics and Pet Ownership—Youth participants reported their age (recorded in months, re-coded to years) and gender (male, female). Participants' parents/guardians were also asked to identify their child's racial and ethnic identity. Owing to sample sizes in the categories, racial/ethnic identity was combined into non-mutually exclusive analytic categories of white, Black/African American, Asian (Asian Indian, Chinese, Japanese, Vietnamese, Korean, Filipino), Indigenous (American Indian, Native American, Alaska Native), and Hispanic/Latinx. Race/ethnicity items were not mutually exclusive in the ABCD Study, and therefore we treated each category as an independent binary variable in the regression models. The reference group for each race/ethnicity category is the absence of that identity. For instance, the reference group for "Hispanic" is "Non-Hispanic." Parents/guardians reported their highest level of education obtained in 20 categories, ranging from never attended/kindergarten only through professional/doctoral degree, which was recoded in to three categories for analysis: high school education or less; some college (through bachelor's degree), graduate degree and higher. Parent education was dummy coded in the regression analyses, with *high school education or less* as the reference group. See Table 1 for demographic data.

Pet ownership was measured by asking youth participants if they lived with a pet in the family, and if so, what kind of pet(s) did they have (dog, cat, horse, fish, small animal [e.g. rabbit, hamster, bird], or other). Overall, 4,436 participants (73.1% of the sample) reported currently having a pet. Species of pet ownership was recoded into three mutually exclusive categories: no pet ($n = 1,633$; 27%), dog owners (participants who have a dog, may also have other pets as well; $n = 3,240$; 53%), and non-dog pet owners (participants who have one or more non-dog pets but who do *not* have a dog; $n = 1,196$; 20%). Of the 1,196 youth with non-dog pets, 812 (67.9%) had a cat, 286 (23.9%) had a small animal, 198 (16.6%) had fish, 8 (0.7%) had a horse, and 141 (11.8%) had another type of pet (categories sum to > 100% owing to multiple select option for pets). Pet ownership was dummy coded in the regression analyses, with *no pet* as the reference category. See Table 1 for pet ownership status stratified by demographic variables.

Affect and Stress

Positive Affect: Positive affect was measured using the NIH Emotion Battery (Gershon et al., 2013). This measure is a 9-item scale that asks participants to rate how each feeling (attentive, delighted, calm, at ease, enthusiastic, interested, confident, energetic, concentrated) describes them within the past week. Each item was rated on a three-point scale scored with values from 1 to 5: 1 = Not true; 3 = Somewhat true; 5 = Very true. An

average score was calculated from the nine items, with a higher score indicative of higher positive affect. The items demonstrated excellent reliability, $\alpha = 0.87$.

Perceived Stress: Perceived stress was measured using the two items from the Perceived Stress Scale (Cohen et al., 1983). The two items asked youth how much in the last month they 1) felt difficulties were piling up so high that they could not overcome them; and 2) felt they were unable to control the important things in life. Participants were asked to rate how often they felt the emotion described: never (0), almost never (1), sometimes (2), fairly often (3), very often (4). The items were averaged, and the resulting score was dichotomized such that “never” or “almost never” responses were coded as 0 (no/low stress, $n = 5,270$, 86.8%), and “sometimes,” “fairly often,” or “very often” responses were coded as 1 (stress, $n = 611$, 10.1%).

Adaptive Coping

Healthy Coping Behaviors: In order to understand youth coping during COVID-19, participants were asked if they had done any of the following activities within the past week: 1) exercised (such as walking, running, or an online exercise class), 2) engaged in healthy behaviors (like trying to eat healthy, getting plenty of sleep), or 3) made time to relax (yes/no for each item). These items were summed and dichotomized into whether participants coped with any of the noted healthy behaviors (score of 1–3; $n = 4,699$, 77.4%) or none of these behaviors (score of 0; $n = 1,370$, 22.6%).

Walking Routine: Walking routines were measured by participants answering the question, “During the past week, on how many days did you walk for at least 10 minutes at a time?” Participants could select no walking of at least 10 minutes, one day, two days, three days, four days, five days, six days, seven days, or don’t know. This variable was dichotomized into participants with no walking routine (fewer than five days per week; $n = 3,426$, 56.5%) and participants with a walking routine (5 or more days per week $n = 2,107$, 34.7%); “don’t know” responses were recoded as missing.

Regular Outdoor Time: Participants were asked how regularly they participated in outdoor activities over the past week. They could select never (0), rarely (1), occasionally (2), frequently (3), or very frequently (4). This variable was dichotomized into never/rarely participating in outdoor activities ($n = 2,377$, 39.2%) and occasionally/frequently/very frequently participating in outdoor activities ($n = 3,558$, 58.6%).

Data Analysis—All analyses were performed in RStudio version 1.3.1056. Descriptive statistics and frequencies are reported for all pet ownership, demographic, and health indicator variables. Outcome variables were predicted in separate models (see Tables 2 through 6). We used binomial logistic regression to predict the dichotomous outcomes – stress, walking routine, and being outdoors at least 5 days per week – and we used multiple regression for the continuous outcome, positive affect.

Variables were tested for the necessary assumptions for generalized linear models, including independence of observations, linearity (for logistic regression, linearity of the relationship between predictors and the logit of the outcome), and multicollinearity; and for

multiple regressions specifically, homoscedasticity (i.e., normal distribution of residuals). Although racial/ethnic identity variables were non-mutually exclusive, they did not violate assumptions of multicollinearity, and therefore we used them as independent predictors in the models. We report p values, 95% confidence intervals, and standardized coefficients to support interpretation of the significance and meaningfulness of our findings. For logistic regression models, model fit was assessed using the chi-square test of model coefficients and Nagelkerke R^2 . For hierarchical multiple regression models, model fit was assessed using R^2 values, $p < 0.05$.

For each outcome, a base model includes the pet ownership indicator variable (three categories: dog owners, non-dog pet owners, and no pets) as a predictor, and the covariates model includes pet ownership and demographic predictors (age, gender, racial/ethnic identity, parent education). Where pet ownership and demographic variables were significant predictors of health indicators in the covariates model, we examined potential interaction effects in an interaction effects model. Nonsignificant interactions were trimmed for some models to improve model fit and aid interpretability.

For interaction effects that were statistically significant in the logistic regression models ($p < 0.05$), we examined odds ratios to help us interpret the magnitude of the effect. Using the estimates of the coefficients from the logistic regression models, we calculated the odds of moving from the referent group to the comparison group for each outcome of interest, following recommendations by Chen (2003). For instance, Equation 1 is a simplified (hypothetical) logistic regression model in which dog ownership, race (identifying as white), and their interaction predict the binary outcome, stress.

$$\text{logit}(P_{\text{stress}}) = b_0 + b_{1\text{dog}} + b_{2\text{white}} + b_{3\text{dogxwhite}} \quad \text{Equation 1.}$$

In this equation, b is the estimated coefficient of each predictor in the logistic regression model. To determine the odds of having depression among non-dog owners for unemployed versus employed individuals, we calculated the exponentiated coefficient for employed, since $b_{1\text{dog}}$ would be set to 0 (Equation 2). To determine the odds of having depression among dog owners for unemployed versus employed individuals, we exponentiated the sum of the coefficients for dog ownership and the interaction of dog ownership and employment, $b_{3\text{dogxwhite}}$ (Equation 3).

$$\text{OR} = \frac{\text{Oddsfor}(b_{1\text{dog}} = 0 \text{ and } b_{2\text{white}} = 1)}{\text{Oddsfor}(b_{1\text{dog}} = 0 \text{ and } b_{2\text{white}} = 0)} = \exp(b_{\text{white}}) \quad \text{Equation 2.}$$

$$\text{OR} = \frac{\text{Oddsfor}(b_{1\text{dog}} = 1 \text{ and } b_{2\text{white}} = 1)}{\text{Oddsfor}(b_{1\text{dog}} = 1 \text{ and } b_{2\text{white}} = 0)} = \exp(b_{\text{white}} + b_{\text{dogxwhite}}) \quad \text{Equation 3.}$$

Results

Pet Ownership, Positive Affect, and Stress

Regression results indicated that dog ownership was not significantly associated with positive affect, both with and without covariates included in the model. Owning a non-dog pet was associated with lower levels of positive affect compared with not having a pet, although the magnitude of this relationship was relatively small when controlling for covariates. There were no significant interactions between demographic covariates and pet ownership status in predicting positive affect and model fit was not improved with the addition of the interaction effects ($F_{(2)} = 0.36$, $p = 0.69$). See Table 2 for full regression results.

When controlling for covariates, both participants who owned dogs and those who had non-dog pets had significantly higher odds of experiencing stress. However, odds ratios and confidence intervals indicate that these relationships are small (dog owners OR: 1.02; other pet owners OR: 1.04). The interaction model did not detect any significant interactions between demographic covariates and pet ownership, and model fit was not improved with the addition of interaction terms ($\chi^2_{(6)} = 5.19$, $p = 0.52$; see Table 3).

Pet Ownership and Adaptive Coping Behaviors

Logistic regression results indicated that dog ownership was associated with higher odds of using healthy coping behaviors compared with non-pet owners (OR: 1.25), but this relationship was not significant when controlling for demographic covariates; sex, racial/ethnic identity, and parental education level were all predictive of healthy coping (see Table 4). There were no differences between non-dog pet owners and non-pet owners on healthy coping. The main effects of demographic covariates appear to be independent of pet ownership, as findings did not reveal any significant interactions.

Dog ownership was associated with higher odds of having a walking routine (at least 10 minutes, 5 days a week), both alone and with covariates. There were no differences between non-dog pet owners and non-pet owners regarding likelihood of having a walking routine (see Table 5). Additionally, there were significant interactions between identifying as Hispanic and both dog ownership and non-dog pet ownership. For parsimony and to improve model fit, an additional model was run with non-significant interactions trimmed, which demonstrated significantly better model fit than the covariates only model ($\chi^2_{(14)} = 8.07$, $p = 0.02$). Individuals who identified as Hispanic were half as likely to routinely walk compared with those who did not identify as Hispanic (OR: 0.51). However, for participants identifying as Hispanic, having a pet was associated with increased odds of having a walking routine (dog owners OR: 1.81; other pet owners OR: 1.36).

All pet owners (dogs and non-dogs) had significantly higher odds of being outdoors at least 5 days per week compared with non-pet owners, but the magnitude of these associations was reduced when controlling for covariates, and only dog ownership remained a significant predictor (OR: 1.15, see Table 6). We tested an additional model to examine interactions associated with pet ownership and demographic characteristics together, but as model fit was not significantly improved in the interaction effects model over the covariates-only model

($\chi^2_{(14)} = 19.78, p = 0.14$) and as there were no interaction effects that met our threshold for statistical significance ($p < 0.05$), we decided to retain the main effects model and do not report the interaction effects model here.

Discussion

The aim of this study was to assess the relationship between youth pet ownership and adolescent wellbeing and adaptive coping during COVID-19, extending prior research in this area by moving beyond convenience samples and using a large, nationally representative dataset of American youth. For youth mental health and wellbeing indicators, results were mixed and did not support the hypothesis that pet ownership served as a buffer for the mental health challenges associated with the pandemic. Owning a non-dog pet was associated with lower levels of positive affect, but this finding was small in effect size and not replicated for dog owners. Both dog owners and non-dog pet owners reported higher perceived stress, but again these relationships were small in magnitude (odds ratios close to 1.0). Neither of these findings were moderated by demographic covariates. These results align with other research on pet ownership and adolescent psychological health during the pandemic that found associations between pet ownership and poorer mental health indicators, and that youth dog owners often seem to fare better on these outcomes than other non-dog pet owners (Mueller et al., 2021). These findings also align with a recent systematic review of companion animals and child and adolescent development that found inconsistent evidence for mental health outcomes (Purewal et al., 2017). Although some past research has demonstrated that pet ownership can be a buffer in certain acute circumstances, like following a social loss (Carr et al., 2019), it may be that the stress-related effects of the pandemic are more global in nature and that pet relationships may be different for adolescents as compared with adults. However, these findings should not be considered causal and be interpreted with caution owing to the small magnitude of the relationships and cross-sectional nature of the data.

More clear findings emerged regarding adaptive coping, which included healthy coping strategies (exercise, engaging in healthy eating and getting sleep, and making time to relax), as well as maintaining a walking routine and spending time outdoors. Dog ownership was associated with higher odds of using healthy coping behaviors compared with non-pet owners, but this relationship was not significant when controlling for demographic variables and there were no significant interaction relationships. These findings highlight the systematic differences between dog owners and non-pet owners; factors associated with likelihood to own a dog are factors that may also be related to use of healthy coping behaviors regardless of pet ownership. Future longitudinal research should track reasons for pet acquisition and specific interactions between teenagers and pets to disentangle the individual and contextual variables influencing these relationships.

Dog owners reported higher odds of having a walking routine and spending time outdoors compared with non-pet owners, and these associations remained significant (although slightly reduced in magnitude) when controlling for demographic covariates. These findings are consistent with a considerable body of research documenting positive associations between dog ownership and physical activity (Chase et al., 2021; Mein & Grant, 2018;

Westgarth et al., 2019). Non-dog pet ownership was not associated with these behaviors when controlling for covariates. These findings underscore the differences between dog ownership and non-dog pet ownership particularly regarding physical activity behaviors. Interactions with dogs often include walking or active behaviors, and the presence of the dog might be motivational for teenagers to be outside and physically active on a more regular basis. While not causal, these findings suggest that for families with dogs it may be a helpful strategy to encourage adolescents with dogs to participate in walking, being outdoors, and other activities that can help maintain a sense of routine. Attachment to pets has been shown to weaken across adolescence (Muldoon, Williams, & Currie, 2019), and walking could be a way for teenagers to remain engaged with their dogs in a positive way. If adolescents can participate in these healthy coping behaviors with their dogs, it may also be useful to examine barriers to safe physical space for these interactions, in order to promote equitable access to the benefits of dog ownership. Future research should explore the contextual barriers and facilitators for dog walking for teenagers. It is important to note that these adaptive coping behaviors did not seem to translate to lower stress in this cross-sectional sample. However, these data were collected during the first peak of the COVID-19 pandemic, and this major life disruption may have been too significant to be meaningfully impacted by dog walking or spending time outdoors. It may be that the benefits associated with regular walking and outdoor time will emerge over time. Therefore, future longitudinal exploration of these associations is necessary to understand the specific sequelae of outcomes and the specific mediating and moderating relationships among companion animal ownership, coping strategies, and wellbeing.

There was also a significant interaction between identifying as Hispanic and youth dog ownership in predicting having a walk routine: for youth identifying as Hispanic, having a dog was associated with more than double the odds of walking routinely. For non-Hispanic youth, this relationship was weaker. These results highlight the notion that pet interactions are not the same for everyone; pets are an integral part of the family system and there are significant complexities in who may benefit (or not benefit) from pet ownership and in which specific circumstances. These findings further point to the need for large scale, longitudinal analyses to identify profiles of pet ownership and provide more specificity in understanding these relationships.

Limitations and Conclusions

Although this analysis leveraged a large dataset, the findings are still limited by the cross-sectional nature of the data. The data also did not provide information on timing and reasons for pet acquisition, which are important in understanding these relationships and are often affected by demographic variables (Vink et al., 2019). The results do suggest that there may be selection effects regarding who chooses to have a pet, and these variables may also be related to adaptive coping. Future longitudinal research should explore these relationships in more detail, to assess how sociodemographic factors may moderate associations between pet ownership and mental and physical health over time. Further, this study included a relatively low percentage of participants who reported experiencing high levels of stress (~10%). The low prevalence of stress in this sample could have obscured any potential buffering effects associated with pets. Similarly, this analysis did not include any measures of non-animal

social support. Social support could potentially confound the relationship between pet ownership and adaptive coping in that youth with high levels of human social support do not have a significant need for support from a companion animal. Exploring adolescent social resources (including pets) using a more comprehensive measurement model is a critical next step in understanding specificity in the relationship between interactions with companion animals and resilience.

In addition, owing to the large size of the ABCD Study with limited space for measures, the study does not include any measures of pet relationship quality or time spent interacting with a pet. Lack of data on relationship quality significantly limits our ability to understand how attachment, companionship, and time spent with a pet could moderate relationships between pet ownership status and stress and adaptive coping. As previously noted, attachment to pets can change across adolescence as youth become more independent (Muldoon, Williams, & Currie, 2019), and these age-related changes could moderate associations between pet relationships and mental health. It is also possible that any potential positive effects of pet ownership on adolescent wellbeing during the pandemic would be predicted by relationship quality or time spent caring for the pet, as prior work has shown that attachment is related to adaptive coping in this age group (Mueller & Callina, 2014). Relatedly, this study focuses on adolescence, a time period where youth are typically living within a family system, and pets are part of this complex system. In fact, past research has demonstrated relationships between adolescent communication with family members and pet relationships (Marsa-Sambola et al., 2017). Pets are likely cared for by various members of the family; adolescents may not be responsible for all aspects of pet care, particularly related to financial resources. Future research should combine large population-based studies with other methodologies to explore the complexities of youth–pet relationships in more detail, to further explore how responsibility, care, and family dynamics all intersect within the youth–pet relationship.

Despite these limitations, this study is the first to use a large, nationally representative dataset assessing the relationship between pet ownership and youth wellbeing and adaptive coping during COVID-19 in the United States. The results suggest no buffering effect of pet ownership on mental wellbeing but that dog ownership is associated with healthy coping behaviors, including having a walking routine and spending time outdoors. The relative effects of companion animal ownership compared with other factors that influence health behaviors are likely small and so should be interpreted in the context of the other family and community-level variables that contribute to healthy coping. As the COVID-19 pandemic evolves, it will be important to continue research on family-level contextual factors, such as pet ownership, that can contribute to adaptive coping through the next transition and future potential stressors.

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Table 1.

Demographic covariates stratified by pet ownership status.

	Total Sample	No Pet	Dog Owners	Non-Dog Pet Owners
	<i>n</i> = 6,069	<i>n</i> = 1,633	<i>n</i> = 3,240	<i>n</i> = 1,196
	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>
<i>Age (years)</i>	12.57 (0.86)	12.48 (0.84)	12.61 (0.86)	12.59 (0.85)
<i>Gender</i>	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Female	3,005 (49.5%)	750 (45.9%)	1,636 (50.5%)	619 (51.8%)
Male	3,064 (50.5%)	883 (54.1%)	1,604 (49.5%)	577 (48.2%)
<i>Race/Ethnicity</i> [*]				
White	4,857 (80.0%)	1,001 (61.3%)	2,851 (88.0%)	1,005 (84.0%)
Black	961 (15.8%)	510 (31.2%)	322 (9.9%)	129 (10.8%)
Hispanic	1,040 (17.1%)	339 (20.8%)	522 (16.1%)	179 (15.0%)
Asian	492 (8.1%)	173 (10.6%)	204 (6.3%)	115 (9.6%)
Indigenous	190 (3.1%)	37 (2.3%)	124 (3.8%)	29 (2.4%)
<i>Parent Education</i> ^{**}				
High school or less	654 (10.8%)	243 (14.9%)	276 (8.5%)	135 (11.3%)
Any undergraduate	3,574 (58.9%)	937 (57.4%)	1,935 (59.7%)	702 (58.7%)
Graduate degree	1,832 (30.2%)	450 (27.6%)	1,023 (31.6%)	359 (30.0%)

^{*} Racial/ethnic identity groups are not mutually exclusive.

^{**} *n* missing = 9.

Table 2.

Multiple regression model parameters for pet ownership predicting positive affect.

	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	95% CI
Base Model						
<i>Pet Ownership (reference: no pets)</i>						
Dogs	-0.04	0.03	-0.05	-1.54	0.12	-0.11, 0.01
Other pets	-0.09	0.03	-0.11	-2.71	0.01	-0.18, -0.03
Covariates Model						
<i>Pet Ownership (reference: no pets)</i>						
Dogs	-0.04	0.03	-0.05	-1.40	0.16	-0.11, 0.02
Other pets	-0.09	0.04	-0.11	-2.63	0.01	-0.18, -0.03
<i>Sex (reference: male)</i>						
Female	-0.10	0.02	-0.05	-4.09	< 0.001	-0.08, -0.03
<i>Age</i>	-0.01	0.01	-0.01	-0.93	0.35	-0.04, 0.01
<i>Race/Ethnicity</i>						
White	0.02	0.04	0.01	0.50	0.62	-0.03, 0.04
Black	0.01	0.04	0.004	0.24	0.81	-0.03, 0.04
Hispanic	-0.06	0.03	-0.03	-1.89	0.06	-0.05, 0.00
Asian	-0.04	0.05	-0.01	-0.81	0.42	-0.04, 0.02
Indigenous	-0.10	0.07	-0.02	-1.48	0.14	-0.05, 0.01
<i>Parental Education (reference: high school or less)</i>						
Some college	0.01	0.04	0.01	0.22	0.83	-0.08, 0.10
Graduate degree	0.04	0.04	0.04	0.83	0.41	-0.06, 0.14
Interactions Model						
<i>Dog owner × sex</i>	-0.04	0.06	-0.02	-0.77	0.44	-0.09, 0.04
<i>Other pet owner × sex</i>	-0.01	0.07	-0.003	-0.09	0.93	-0.08, 0.07

Table 3.

Logistic regression results for pet ownership predicting perceived stress.

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>OR</i>	95% C.I. for <i>OR</i>
Base Model					
<i>Pet Ownership (reference: no pets)</i>					
Dogs	0.01	0.01	0.14	1.01	1.00, 1.03
Other pets	0.03	0.01	0.01	1.03	1.01, 1.06
Covariates Model					
<i>Pet Ownership (reference: no pets)</i>					
Dogs	0.02	0.01	0.02	1.02	1.00, 1.04
Other pets	0.04	0.01	0.001	1.04	1.02, 1.06
<i>Sex (reference: male)</i>					
Female	0.05	0.01	< 0.001	1.05	1.03, 1.06
<i>Age</i>	0.002	0.005	0.73	1.00	0.99, 1.01
<i>Race/Ethnicity</i>					
White	−0.01	0.01	0.69	0.99	0.97, 1.02
Black	0.04	0.01	0.02	1.04	1.01, 1.07
Hispanic	0.04	0.01	< 0.001	1.04	1.02, 1.07
Asian	< 0.001	0.02	0.98	1.00	0.97, 1.03
Indigenous	0.04	0.02	0.12	1.04	0.99, 1.08
<i>Parental Education (reference: high school or less)</i>					
Some college	0.004	0.01	0.78	1.00	0.98, 1.03
Graduate degree	−0.01	0.01	0.46	0.99	0.96, 1.02
Interactions Model					
<i>Dog owner × sex</i>	0.03	0.02	0.15	1.03	0.99, 1.07
<i>Other pet owner × sex</i>	0.02	0.02	0.35	1.02	0.98, 1.07
<i>Dog owner × Black</i>	−0.01	0.03	0.78	0.99	0.94, 1.04
<i>Other pet owner × Black</i>	< 0.001	0.03	0.99	1.00	0.94, 1.07
<i>Dog owner × Hispanic</i>	0.01	0.02	0.59	1.01	0.97, 1.06
<i>Other pet owner × Hispanic</i>	−0.04	0.03	0.24	0.96	0.91, 1.03

Note: OR = odds ratio.

Table 4.

Logistic regression results for pet ownership predicting use of healthy coping behaviors.

	<i>B</i>	<i>SE</i>	<i>p</i>	OR	95% CI for OR
Base Model					
<i>Pet Ownership (reference: no pets)</i>					
Dogs	0.22	0.07	0.002	1.25	1.08, 1.44
Other pets	0.04	0.09	0.66	1.04	0.87, 1.24
Covariates Model					
<i>Pet Ownership (reference: no pets)</i>					
Dogs	-0.01	0.08	0.91	0.99	0.85, 1.15
Other pets	-0.18	0.09	0.06	0.84	0.70, 1.01
<i>Sex (reference: male)</i>					
Female	0.34	0.06	< 0.001	1.40	1.24, 1.59
<i>Age</i>	0.02	0.04	0.60	1.02	0.95, 1.10
<i>Race/Ethnicity</i>					
White	0.26	0.10	0.01	1.30	1.07, 1.58
Black	-0.43	0.11	< 0.001	0.65	0.53, 0.80
Hispanic	-0.30	0.08	< 0.001	0.74	0.63, 0.87
Asian	0.17	0.13	0.19	1.19	0.93, 1.53
Indigenous	-0.27	0.17	0.11	0.77	0.56, 1.07
<i>Parental Education (reference: high school or less)</i>					
Some college	0.35	0.10	< 0.001	1.42	1.17, 1.72
Graduate degree	0.75	0.11	< 0.001	2.12	1.70, 2.64
Interactions Model					
<i>Dog owner × sex</i>	0.16	0.15	0.29	1.17	0.87, 1.57
<i>Other pet owner × sex</i>	-0.01	0.18	0.98	0.99	0.69, 1.43
<i>Dog owner × white</i>	-0.21	0.22	0.33	0.81	0.53, 1.24
<i>Other pet owner × white</i>	-0.21	0.27	0.44	0.81	0.47, 1.38
<i>Dog owner × Black</i>	0.09	0.23	0.70	1.09	0.70, 1.73
<i>Other pet owner × Black</i>	0.11	0.30	0.72	1.12	0.62, 2.02
<i>Dog owner × Hispanic</i>	0.37	0.19	0.05	1.45	0.99, 2.11
<i>Other pet owner × Hispanic</i>	0.39	0.25	0.11	1.48	0.92, 2.41
<i>Dog owner × Some college</i>	-0.15	0.22	0.48	0.86	0.56, 1.31
<i>Other owner × Some college</i>	-0.31	0.27	0.24	0.73	0.43, 1.23
<i>Dog owner × Graduate degree</i>	-0.30	0.26	0.25	0.74	0.45, 1.23

	<i>B</i>	<i>SE</i>	<i>p</i>	OR	95% CI for OR
<i>Other pet owner × Graduate degree</i>	−0.36	0.32	0.25	0.70	0.37, 1.29

Note: OR = odds ratio.

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Table 5.

Logistic regression results for pet ownership predicting walking routine.

	<i>B</i>	<i>SE</i>	<i>p</i>	OR	95% CI for OR
Base Model					
<i>Pet Ownership (reference: no pets)</i>					
Dogs	0.41	0.07	< 0.001	1.50	1.32, 1.71
Other pets	0.04	0.08	0.64	1.04	0.88, 1.23
Covariates Model					
<i>Pet Ownership (reference: no pets)</i>					
Dogs	0.20	0.07	0.004	1.23	1.07, 1.41
Other pets	-0.16	0.09	0.08	0.85	0.72, 1.02
<i>Sex (reference: male)</i>					
Female	-0.03	0.06	0.56	0.97	0.87, 1.08
<i>Age</i>					
	-0.01	0.03	0.70	0.99	0.93, 1.05
<i>Race/Ethnicity</i>					
White	0.29	0.10	0.005	1.33	1.09, 1.63
Black	-0.47	0.11	< 0.001	0.62	0.50, 0.77
Hispanic	-0.32	0.08	< 0.001	0.73	0.62, 0.86
Asian	0.02	0.11	0.84	1.02	0.82, 1.27
Indigenous	-0.19	0.17	0.27	0.83	0.59, 1.15
<i>Parental Education (reference: high school or less)</i>					
Some college	0.18	0.10	0.09	1.20	0.98, 1.47
Graduate degree	0.47	0.11	< 0.001	1.60	1.28, 1.99
Interactions Model					
<i>Dog owner × Hispanic</i>	0.48	0.19	0.01	1.61	1.12, 2.31
<i>Other pet owner × Hispanic</i>	0.56	0.24	0.02	1.75	1.08, 2.82

Note: OR = odds ratio.

Table 6.

Logistic regression results for pet ownership predicting being outdoors at least 5 days/week.

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>OR</i>	95% CI for OR
Base Model					
<i>Pet Ownership (reference: no pets)</i>					
Dogs	0.42	0.06	< 0.001	1.52	1.34, 1.72
Other pets	0.26	0.08	0.001	1.30	1.12, 1.52
Covariates Model					
<i>Pet Ownership (reference: no pets)</i>					
Dogs	0.14	0.07	0.04	1.15	1.01, 1.31
Other pets	-0.01	0.08	0.92	0.99	0.84, 1.17
<i>Sex (reference: male)</i>					
Female	0.12	0.06	0.03	1.13	1.01, 1.26
<i>Age</i>	-0.14	0.03	< 0.001	0.87	0.81, 0.92
<i>Race/Ethnicity</i>					
White	0.41	0.09	< 0.001	1.50	1.26, 1.79
Black	-0.55	0.10	< 0.001	0.58	0.48, 0.70
Hispanic	-0.65	0.08	< 0.001	0.52	0.45, 0.61
Asian	-0.25	0.10	0.02	0.78	0.64, 0.96
Indigenous	-0.01	0.16	0.94	0.99	0.73, 1.35
<i>Parental Education (reference: high school or less)</i>					
Some college	0.31	0.09	0.001	1.37	1.14, 1.64
Graduate degree	0.70	0.10	< 0.001	2.00	1.64, 2.45
Interactions Model					
<i>Dog owner × sex</i>	0.002	0.13	0.99	1.00	0.77, 1.30
<i>Other pet owner × sex</i>	-0.17	0.16	0.31	0.85	0.61, 1.17
<i>Dog owner × age</i>	0.15	0.08	0.05	1.16	1.00, 1.35
<i>Other pet owner × age</i>	0.03	0.10	0.76	1.03	0.85, 1.24
<i>Dog owner × White</i>	0.10	0.19	0.61	1.10	0.75, 1.62
<i>Other pet owner × White</i>	0.24	0.25	0.34	1.27	0.78, 2.06
<i>Dog owner × Black</i>	0.46	0.21	0.03	1.58	1.04, 2.39
<i>Other pet owner × Black</i>	0.39	0.28	0.17	1.47	0.84, 2.57
<i>Dog owner × Hispanic</i>	0.31	0.17	0.07	1.37	0.97, 1.93
<i>Other pet owner × Hispanic</i>	0.26	0.23	0.25	1.30	0.83, 2.01
<i>Dog owner × Some college</i>	0.20	0.21	0.33	1.23	0.81, 1.85

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>OR</i>	95% CI for OR
<i>Other owner × Some college</i>	−0.24	0.26	0.35	0.78	0.47, 1.30
<i>Dog owner × Graduate degree</i>	0.27	0.23	0.24	1.32	0.83, 2.08
<i>Other pet owner × Graduate degree</i>	−0.43	0.29	0.14	0.65	0.37, 1.14

Note: OR = odds ratio.