

Household Cats and Children's Mental Health

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Despite household cats being the second most popular household pet in the United States, little is known about how cat ownership affects children's development. Although household cats are generally believed to have a positive effect on adult health there are potential risks and benefits of cat ownership for children. This study is a secondary analysis of the data presented in Gadomski et al. (2015) and considers the effects of household cat ownership on parent's report of children's mental health using data from a cross sectional survey of parents with 4-10 year old children attending a rural pediatric clinic (n=643). Parents provided information on household pet ownership and rated children's mental health. After controlling for child age, poverty, and parent depression, household cat ownership was associated with more attention problems (b=1.38, SE=.53, $p < .01$). Although this association does not imply causality, our results suggest the need for future research regarding the relationship between household cat ownership and children's mental health.

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Based on estimates from the Humane Society of the United States, domestic cats are the second most common household animal in the United States with 38% of households with children having a cat. Household pets play an important role in family life with 63.2% of owners describing their pet as another family member and 35.8% considering their animal to be a pet or companion (Newport, Jones, Saad & Carroll, 2006). In a study of children's social support networks, children often ranked household pets as a social support that provided comfort, esteem support and were seen as confidantes (McNicholas & Collis, 2002). While there has been recent reports about the benefit of pet dogs on children's risk for anxiety much less is known about the impact of pet cats on children's mental health (Gadomski et al., 2015).

There is some evidence to suggest that pet cats have a positive effect on children's development. Pet ownership provides children with many positive experiences such as companionship, a play partner, and the opportunity to learn from the responsibility of caretaking (Jennings, 1997; Melson, 2003). Children with pet cats or pet dogs have been found to be more prosocial than children who own pets other than cats or dogs or those who do not have pets (Vidović, Štetić & Bratko, 1999). Theoretically, children learn prosocial skills from caring for pets (e.g. feeding) and interacting with pets. This includes learning to read a pet's cues (e.g., whether a cat would like to play or be left alone) and interpret pet behavior, which in turn helps children develop prosocial skills, perspective taking skills, that assist when playing with peers (Daly & Morton, 2006).

Despite the widespread belief that household pets have a positive impact on owner's lives, Herzog (2011) argues that this belief is based on inconclusive evidence and

ignores the potential harmful effects of pet ownership (e.g., zoonosis). However, assessing the risks and benefits of cat ownership for children is difficult due to the scant amount of literature examining the effects of cat ownership during childhood. The purpose of this study is to explore the relationship between cat ownership in childhood and parent's report of children's mental health. It was hypothesized that similar to the results in Gadomski and colleagues (2015), cat ownership would be associated with lower risk of mental health problems.

Methods

Participants

Data used in this secondary data analysis come from a cross sectional study investigating the role of pets on children's health. More detailed information about the original study can be found in Gadomski et al. (2015). This study was conducted in a pediatric clinic setting in rural upstate New York and was conducted to assess the relationship between dog ownership and children's mental health. A sample of 643 children between the ages of 4 to 10 participated in the study. Of the 643 children included in the study, 180 children (28%) had a pet cat. The sample consisted of 45% female children and was predominantly white (96%).

Procedures

Parents coming to the clinic for well visits with children between the ages of 4 to 10 were approached in the waiting room and asked to participate in the study. Parents who agreed to participate completed questionnaires using a tablet computer in the waiting room prior to their appointment. The tablet computer used web-based children's health screener (Fothergill et al., 2013) which consists of questions regarding general health, somatic and mental health concerns, nutrition, physical activity, screen time,

anxiety, parental depression, and questions about household pets.

Measures

Pet Ownership. Parents reported the types of pets children had at home. This question was used to create three dichotomized variables to indicate household pet ownership: cat/no cat, other animals, no animals. Families were considered to have a cat if they had at least one cat in the home regardless of other pet ownership.

Child Mental Health. Children's mental health was screened using the Strengths and Difficulties Questionnaire (SDQ) Impact Supplement (Bourdon et al. 2005) and Pediatric Symptom Checklist-17 (PSC-17; Jellinek et al. 1999). The SDQ Impact Supplement was prompted if the parent indicated that the child had behavioral, or attention difficulties. If the child was having difficulties in one or more of these areas, parents were asked to rate how much these difficulties impacted their child in four life domains (home life, friendships, classroom learning, leisure activities) using a 3 point scale (0, not at all or a little; 1, a medium amount; 2, a great deal). If the child had an impact score of 1 or higher, indicating at least a medium amount of difficulties in a life domain, the child was further screened using the PSC-17. The PSC-17 is a shortened version of the full 35 item Pediatric Symptom Checklist that was developed to assess psychosocial problems among children and adolescents aged 6 to 16 years. It has been validated against structured psychiatric interviews and contains 3 subscales; internalizing which assesses withdrawn behavior common in anxiety and depression, externalizing which assesses disruptive behavior like physical aggression or rule breaking, and attention problems which assesses difficulties in focusing or maintaining attention. This measure allows for an assessment of the most common child behavior problems. Since the PSC-17 was

only given if the parent reported difficulties on the SDQ, only a portion of the sample ($n=177$) completed this questionnaire.

Parent Depression. Parental depression has been found to influence parent's ratings of their children's behavior problems (Pastor & Reuben, 2011). To control for the effect of parent depression, the screener included a 2-item Patient Health Questionnaire (PHQ-2), a commonly utilized depression screening tool with a sensitivity of 79% and a specificity of 89% for depressive disorder (Kroenke, Spitzer & Williams, 2003).

Poverty. The percentage of children living below the 2013 poverty level in the child's zip code was used as an SES proxy to control for the effect of poverty on children's mental health problems (US Census 2009).

Results

The descriptive statistics as well as correlations among study variables are provided in Table 1. When examining the bivariate relationships between age, sex, and poverty and the PSC-17 subscales, age was significantly correlated with the attention problems subscale such that parents reported more attention problems for older children ($r = .17, p < .05$). In addition, poverty was also significantly correlated with the externalizing ($r = .23, p < .01$), attention problems ($r = .18, p < .05$), and total PSC-17 ($r = .22, p < .01$) scales such that children living in areas with more poverty were reported to have more problem behaviors. As expected, parent depression was significantly correlated with their reports of children's mental health such that parents with higher depression scores reported more internalizing ($r = .40, p < .001$), externalizing ($r = .34, p < .001$), attention ($r = .21, p < .01$) and total behavioral problems ($r = .37, p < .001$) for their children. Consequently, age, poverty and parent depression were controlled for in further analyses.

We examined the statistical differences between the group of children with a pet cat ($n=180$) and those who did not have a pet cat ($n=463$). The results of these analyses can be found in Table 2. A higher proportion of children who owned cats were reported to have a history of a formal mental health diagnosis (13.5%) compared to children who did not have a pet cat (4.7%; Z -score = -3.75 , $p < .001$). Children with pet cats were also reported to have more difficulties on the SDQ that fell in the abnormal range (10.2%) compared to children who did not have a pet cat (6.7%; Z -Score -3.33 , $p < .001$). When examining current symptomatology on the PSC-17 children with pet cats had a higher average total score (13.5) compared to children without a cat (11.0; $t = -2.49$, $p = .01$) and children with a pet cat were reported to have more attention problems on average (6.0) than children without pet cats (4.8; $t=2.43$, $p = .01$).

Linear regression was performed to examine the relationship between cat ownership and the scales of the PSC-17 while controlling age, poverty, and parental depression which were found to be correlated with child behavior problems (Table 1). In the multivariate analyses summarized in Table 3, child age was associated attention problems ($b = .02$, $SE = .01$, $p = .02$) and internalizing problems ($b = .01$, $SE = .01$, $p < .01$) such that older children were reported to have more attention and internalizing behavior problems. In addition, poverty was significantly associated with more externalizing ($b = 13.17$, $SE = 3.74$, $p < .01$), more attention problems ($b = 10.40$, $SE = 3.53$, $p < .001$), and total problems ($b = 26.55$, $SE = 7.48$, $p < .01$) and parent depression was associated with more externalizing ($b = .90$, $SE = .20$, $p < .001$), attention problems ($b = .48$, $SE = .18$, $p = .01$), internalizing ($b = .60$, $SE = .11$, $p < .001$), and total problems ($b = 1.98$, $SE = 1.12$, $p = .03$). After controlling

for age, poverty, and parent depression, household cat ownership was only associated with the attention problems subscale of the PSC-17 ($b=1.38$, $SE=.53$, $p<.01$) as well as the total PSC-17 score ($b=2.50$, $SE=1.12$, $p=.03$). Other pet ownership was not significantly associated with parent report of child behavior problems.

Discussion

Contrary to our hypothesis that pet cats would be associated with fewer mental health problems, household cat ownership was significantly associated with parent report of child attention problems, but there was no relationship between household cat ownership and internalizing or externalizing behavior problems. Due to the cross-sectional nature of this data it is not possible to draw causal conclusions based on these results. Furthermore, it is not the intention of the authors to suggest that household cat ownership is the cause of attention problems in young children. One possible interpretation is that cats are chosen as pets by families of children with attention problems because they are easier to care for, an advantage to families challenged by a child's attention problems.

However, considering the literature regarding toxoplasmosis and risk of neurological based disorders like ADHD, exposure to *Toxoplasma gondii* (*T. gondii*) should also be considered as a possible risk factor for attention problems (Carter 2013). Toxoplasmosis is one of the more common zoonosis, and considerable attention has been spent on preventing toxoplasmosis infection in pregnant women who come into contact with household cats (Breugelmans, Naessens & Foulon, 2004; Jones et al., 2003; Pawlowski et al., 2001). Toxoplasmosis is caused by *T.gondii* that may be contracted from many sources such as contaminated soil, pets other than cats, and eating undercooked meat. Torrey and Yolken (2013) reported that *T. gondii* oocysts are a

significant public health problem as their oocysts remain viable for several years and are able to accumulate over time. In a study that evaluated these potential exposures, the prevalence of toxoplasmosis antibody was significantly higher for individuals who had owned cats (21%) compared to 9% of individuals who reported never owning a cat (Peterson, Tronca & Bonin, 1972). Toxoplasmosis affects the central nervous system, and is now recognized as a potential risk factor in the development of mental health disorders including schizophrenia, bipolar disorder, depression, ADHD, and autism (Carter 2013).

T. gondii has been found to increase dopamine metabolism in rat models which could cause a dopamine deficit (Prandovszky et al., 2011). Dysfunction in the dopaminergic system has been implicated in ADHD (Levy, 1991; Li, Sham, Owen & He, 2006, Swanson et al., 2000; Viggiano, Vallone & Sadile 2004; Volkow et al., 2009). Furthermore, treatment with dopamine agonists has been found to decrease symptoms of ADHD. Among the seven children involved in the trial, all children had significantly fewer attention problems and three of the children no longer met criteria for ADHD (Storebø, Simonsen, & Gluud, 2016; Waters et al., 2000).

In another study, Toxoplasma seropositivity was associated with lower reading and memory scores (Mendy, Vieira, Albatineh, & Gasana, 2015). Similarly, Toxoplasma seropositivity was associated with lower math scores (Ferreira et al., 2013). In this study Ferreira and colleagues (2013) also reported that children that were exposed to soil, sand or grass lawn at home were more than 9 times more likely to be infected with *T. Gondii*. A considerable amount of effort has been focused on preventing toxoplasmosis infection in pregnant women to protect children during the prenatal period (Breugelmans et al. 2004; Jones et al. 2003;

Pawlowski et al. 2001), but the possibility of exposure to *T. gondii* through household cat exposure still remains a possibility in the postnatal period.

Despite the evidence that Toxoplasmosis may impact children's cognitive development, the relationship between *T. gondii* infection and behavioral problems has been inconsistent. Sugden and colleagues (2016) reported that in a sample of 38 year olds, infection by *T. gondii* was not related to negative behavioral outcomes, including problems with attention and impulsivity. This study was unable to assess the timing of exposure. In another study Solmi and colleagues (2017) reported no evidence between cat ownership and psychotic symptoms at ages 13 and 18 years. Psychotic symptoms were examined because they are a symptom of schizophrenia. However, the onset of schizophrenia is typically in early adulthood (Sham, MacLean & Kendler, 1994). While the prospective nature of this study is a strength, more time is needed to assess the relationship between cat ownership and symptoms of schizophrenia. Future research on the risks associated with attention problems should assess the level of *T. gondii* exposure (e.g., household litter boxes, undercooked meat), the timing of exposure (i.e. prenatal/postnatal) and duration of exposure.

Household dog ownership has been associated with fewer symptoms of anxiety in children (Gadomski et al. 2015), we expected that pet cats would demonstrate a similar association. It is possible that we did not find this relationship because we were not able to examine the role of child-cat attachment. Compared to dogs, cats affiliate less with humans which would suggest the potential for a wider variation in child-cat attachment, making measures of cat attachment a necessary component in understanding the effect of cats on child mental health (Serpell, 1996). Child-cat attachment measures such

as the Companion Animal Bonding Scale (CABS; Poresky, 1997; Poresky, Hendrix, Mosier & Samuelson, 1987) capture whether the child spends a significant time caring for and playing with their cat. Theoretically, a stronger attachment of the child to a pet would translate into a larger effect of that pet on the child's emotional and mental health.

In conclusion, the risks and benefits of household cat ownership are not well

understood. Prospective longitudinal studies are needed to establish causal relationships between cat ownership and children's mental health. Future studies would be strengthened by considering the effect of cat ownership on children's mental health. Such studies should also assess potential exposure to *T. gondii* through cat ownership and measure child-cat attachment.

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