



Is childhood cruelty to animals a marker for physical maltreatment in a prospective cohort study of children? ☆



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ABSTRACT

Childhood cruelty to animals is thought to indicate that a child may have been maltreated. This study examined: (a) prevalence of cruelty to animals among 5- to 12-year-old children; (b) the association between cruelty to animals, child physical maltreatment, and adult domestic violence; and (c) whether cruelty to animals is a marker of maltreatment taking into account age, persistence of cruelty, and socioeconomic disadvantage. Data were from the Environmental Risk (E-Risk) Longitudinal Twin Study, an epidemiological representative cohort of 2,232 children living in the United Kingdom. Mothers reported on cruelty to animals when children were 5, 7, 10, and 12 years, on child maltreatment up to age 12, and adult domestic violence. Nine percent of children were cruel to animals during the study and 2.6% persistently (≥ 2 time-points). Children cruel to animals were more likely to have been maltreated than other children ($OR = 3.32$) although the majority (56.4%) had not been maltreated. Animal cruelty was not associated with domestic violence when maltreatment was controlled for. In disadvantaged families, 6 in 10 children cruel to animals had been maltreated. In other families, the likelihood of maltreatment increased with age (from 3 in 10 5-year-olds to 4.5 in 10 12-year-olds) and persistence (4.5 in 10 of those persistently cruel). Although childhood cruelty to animals is associated with maltreatment, not every child showing cruelty had been maltreated. The usefulness of cruelty to animals as a marker for maltreatment increases with the child's age, persistence of behavior, and poorer social background.

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Introduction

In recent years there has been increasing interest in the phenomenon of children being cruel to animals. This has been driven, in part, by a number of organizations, such as the American Humane Association and the Links Group in the United Kingdom, who highlight the possible links between cruelty to animals and child abuse, elder abuse, and domestic violence. Childhood cruelty to animals has been described as “an indicator of child abuse” (Becker & French, 2004, p. 403) on the basis

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that it was more prevalent among seriously mentally ill youth who had been sexually abused than among those who had not been abused (McClellan, Adams, Douglas, McCurry, & Storck, 1995). Among adolescent boys in residential treatment for conduct disorder, physical and sexual abuse occurred in the histories of those cruel to animals 1.5 times as often as those who were not cruel (Duncan, Thomas, & Miller, 2005). Similarly, children noted to be cruel to animals during psychiatric intake assessments were found to have a history of sexual abuse 2.3 times as often as other children from a matched control sample (Boat et al., 2011).

Childhood cruelty to animals also seems to occur more often in homes with domestic violence than in other homes, suggesting that cruelty to animals may take place in response to witnessing violence as well as being a direct victim of abuse. Duncan et al. (2005) found that boys who had conduct disorder and who were cruel to animals had been exposed to domestic violence 1.5 times as often as boys with conduct disorder but who were not cruel to animals. In a general population sample, Baldry (2003) found that children who reported being exposed to domestic violence were cruel to animals 1.4 times as often as children not exposed to domestic violence. Similarly, college students who reported being exposed to family violence (child abuse and/or domestic violence) also reported being cruel to animals 1.7 times as often as those not exposed to family violence (DeGue & DiLillo, 2009). In community samples of families that had experienced domestic violence, children were reported to be cruel to animals more than twice as frequently as children from homes with no domestic violence (Becker, Stuewig, Herrera, & McCloskey, 2004; Currie, 2006). Finally, in samples of women in domestic violence shelters there is evidence that a significant minority of their children have perpetrated animal cruelty (see Ascione, 2007, for review).

Although there is suggestion that childhood cruelty to animals could be an indicator of child maltreatment and other forms of family violence, this has yet to be demonstrated empirically. A statistically significant association between two variables does not necessarily mean that one is a reliable marker for the other. For example, there is a significant association between gender and committing a crime: Over 80% of people convicted or cautioned for indictable offenses in the United Kingdom are males (Clarke, 2011). However, being a male is not a good marker of criminality as most men have not committed a crime in their lifetime. Commonly used statistics, such as odds ratios, must be interpreted in the context of the prevalence of the behavior in the population under study. Before advocating for the use of childhood cruelty to animals as a marker for child maltreatment or other family violence it is important to test, not just if there is a statistical association between them, but if one is actually a reliable marker for the other. To do this, it is necessary to use statistical tests designed specifically for this purpose, such as the positive predictive value (PPV). The PPV gives the proportion of those identified using a putative marker who are true positives; for example, the proportion of children who are cruel to animals who have been maltreated. Conversely, it indicates the proportion who are false positives; those who are cruel to animals but who have *not* been maltreated.

The aims of this study were to (a) establish the prevalence of children who were cruel to animals between the ages of 5 and 12 years; (b) test the association between childhood cruelty to animals, child physical maltreatment, and adult domestic violence; (c) test the credentials of childhood cruelty to animals as a marker of child maltreatment using the positive predictive value (PPV); and (d) investigate whether the PPV varies according to age, persistence of cruel behavior, and family socioeconomic disadvantage.

Methods

Participants

Participants were members of the Environmental Risk (E-Risk) Longitudinal Twin Study, which tracks the development of a nationally representative birth cohort of 2,232 British children. The sample was drawn from a larger birth registry of twins born in England and Wales from 1994 through 1995 (Trouton, Spinath, & Plomin, 2002). Details about the sample have been reported previously (Moffitt & the E-Risk Study Team, 2002). Briefly, the E-Risk sample was constructed from 1999 through 2000, when 1,116 families with same-sex 5-year-old twins (93% of those eligible) participated in home-visit assessments. Families were recruited to represent the United Kingdom population of families with newborns in the 1990s, based on residential location throughout England and Wales and mother's age (i.e. older mothers having twins via assisted reproduction were under selected and teenaged mothers with twins were over selected). Follow-up home visits were conducted when the children were aged 7 years (98% participation), 10 years (96%), and 12 years (96%). Sex is evenly distributed (49% were boys). Parents gave informed consent and children gave assent. Ethical approval was granted by the Joint South London and Maudsley and the Institute of Psychiatry NHS Ethics Committee.

Measures

Childhood cruelty to animals. This was assessed using the item Cruel to Animals in the Child Behavior Checklist (CBCL; Achenbach, 1991). Mothers were given the instrument as a face to face interview and the reporting period was 6 months prior to the interview. Each item was rated as being *not true* (0), *somewhat or sometimes true* (1), or *very true or often true* (2); children who scored 1 or 2 were combined to create a group of children who have been cruel to animals.

Child physical maltreatment. We assessed physical maltreatment by an adult (Dodge, Bates, & Pettit, 1990; Jaffee et al., 2005; Lansford et al., 2002) using a standardized clinical interview protocol designed to enhance mothers' comfort with

reporting valid child maltreatment information, while also meeting researchers' responsibilities for referral under the UK Children Act. No family has left the study after intervention. When mothers reported any maltreatment, interviewers followed with standardized probes (e.g., accidental harm was ruled out; harm by age peers was coded as bullying, not maltreatment). Sexual abuse was queried directly. Over the years of data collection, the study maintained a cumulative dossier for each child, composed of recorded debriefings with interviewers who had coded any indication of maltreatment at any of the four successive home visits, recorded narratives of the four successive caregiver interviews at child ages 5, 7, 10, and 12 years (covering the period from birth to 12 years), and information from clinicians whenever the study made a referral. Based on review of each child's cumulative dossier, two clinical psychologists (T.E.M. and the project coordinator) reached consensus for whether physical maltreatment had occurred. Examples of maltreatment in E-Risk children included the following: The mother smacked the child weekly, leaving marks or bruises; child was repeatedly beaten by a young adult step-sibling; child was routinely smacked by father when drunk, "just to humiliate him"; child was fondled sexually and often slapped by the mother's boyfriend. Many, but not all, cases identified in the course of our research were under investigation by police or social services, already on the child-protection register, or in foster care at follow-up, having been removed from their parents because of *abuse*. For this article, we combined children who experienced probable (15.4%) or definite (5.7%) physical maltreatment by age 12. This group included a small number of children who were sexually abused, a third of whom were also physically maltreated.

Adult domestic violence. This was assessed by inquiring about 12 acts of physical violence. These included all nine items from the Conflict Tactics Scale (Form R; Straus, 1990) plus an additional three items that describe other abusive behaviors (pushed/grabbed/shoved; slapped; shaken; thrown an object; kicked/bit/hit with fist; hit with something; twisted arm; thrown bodily; beat up; choked/strangled; threatened with knife/gun; used knife/gun). Mothers were asked about their own violence toward any partner and about any partners' violence toward them over the entire period since the twins' birth; responses were *not true* (coded 0) or *true* (coded 2). Another response option (coded 1) was available for women who felt uncertain about their responses, but it was virtually unused. The measure represents the variety of acts of violence mothers experienced as both victims and perpetrators. Scores were summed (range: 0–40; $M = 2.75$, $SD = 5.67$). The internal consistency of the physical abuse scale was $\alpha = .89$. Intercoder agreement for this measure was high (latent $r = .77$; Moffitt et al., 1997). Moreover, this scale is a strong predictor of which couples in the general population experience clinically significant violence, involving injury and intervention by official agencies (Moffitt, Robins, & Caspi, 2001). Mothers who had experienced one or more incidents of domestic violence were considered to be exposed.

Socioeconomic disadvantage. This was assessed when children were aged 5 (Kim-Cohen, Moffitt, Caspi, & Taylor, 2004), and was defined as families who met two or more of the following criteria: (a) head of household has no educational qualifications; (b) head of household is employed in an unskilled occupation or is not in the labor force; (c) total household gross annual income is less than £10,000; (d) family receives at least one government benefit, excluding disability benefit; (e) family housing is government subsidized; (f) family has no access to a vehicle; and (g) family lives in the poorest of six neighborhood categories, in an area dominated by government subsidized housing, low incomes, high unemployment, and single-parent families. Four hundred and forty-three families, or 39.7% of the sample, fell into the category of socioeconomic disadvantage.

Statistical methods

We first examined the prevalence of childhood cruelty to animals over time at ages 5, 7, 10, and 12 years. Cochran's Q test and post hoc McNemar tests were used to test whether the changes in prevalence were significant.

Secondly, we examined the association between cruelty to animals and child maltreatment using percentages and odds ratios. The association between childhood cruelty to animals, child maltreatment and adult domestic violence was tested by entering simultaneously domestic violence and child maltreatment in a logistic regression model. This analysis establishes to what extent these two forms of violence exposure increased the likelihood of childhood cruelty to animals, controlling for the effects of child gender and socioeconomic disadvantage.

Thirdly, we tested the value of childhood cruelty to animals as a marker for child maltreatment using the positive predictive value (PPV), calculated as follows: $PPV = N \text{ true positives} / (N \text{ true positives} + N \text{ false positives})$. True positives were classified as children who were cruel to animals and who had also been maltreated and false positives were those who were cruel to animals but who had not been maltreated. The PPV gave the proportion of children who were cruel to animals who had also been maltreated. This was calculated using: Any report of cruelty to animals between 5 and 12 years; reports at age 5, 7, 10, and 12, separately; and persistent cruelty, defined as having reports at two or more ages. For each of the conditions above, the PPV was calculated separately for children living in disadvantaged socioeconomic conditions versus the rest of the sample.

Results

Frequency of cruelty to animals

Most reports of cruelty to animals were in younger children and only occurred over a limited period of time. Table 1 shows a steady decline in cruelty to animals from 5 to 10 years of age, with a leveling off at 12 years. More boys than girls

Table 1

Raw data for mothers' reports of cruelty to animals at 5, 7, 10, and 12 years.

Age	Total N with data	N (%) Not true	N (%) Somewhat/ sometimes true	N (%) Very often true	N (%) Cruel to animals		
					All ^a	Boys	Girls
5	2,229	2,098 (94.1%)	101 (4.5%)	30 (1.3%)	131 (5.9%)	98 (9.0%)	33 (2.9%)
7	2,178	2,100 (96.4%)	67 (3.1%)	11 (0.5%)	78 (3.6%)	56 (5.2%)	22 (2.0%)
10	2,138	2,106 (98.5%)	28 (1.3%)	4 (0.2%)	32 (1.5%)	24 (2.3%)	8 (0.7%)
12	2,141	2,107 (98.4%)	34 (1.6%)	0 (0.0%)	34 (1.6%)	25 (2.4%)	9 (0.8%)

Note: The categories Somewhat/sometimes true and Very often true were combined to create a dichotomous variable (shown in final 3 columns) at each age.

^a Cochran's Q test showed a change in prevalence over age ($Q(3) = 114.72, p < .001$), with post hoc McNemar tests showing a significant decline from 5 to 7 years ($\chi^2 = 16.34, p < .001$) and 7 to 10 years ($\chi^2 = 24.89, p < .001$).

were cruel to animals at each age (ratio of 3:1). Fig. 1, which includes only those with data at all four time points ($N = 2,074$, 92.3%), shows that the majority of children ($n = 1,879$; 90.6%) were not cruel at any age. Of the 124 children who were cruel to animals at 5 years, most were only reported to be cruel at this age ($n = 85$; 68.5% of this group) or at this and one other age only ($n = 31$; 25.0%). The 77 children cruel to animals at 7 years were similarly likely to show this behavior only at 7 years ($n = 38$; 49.4%) or at this and one other age only ($n = 31$; 40.3%). At 10 years, 30 children were cruel to animals, 6 (20.0%) of whom only had reports at this age and 15 (50.0%) at two ages. Finally, at 12 years 32 children were cruel to animals, mostly at only 12 years ($n = 11$; 34.4%) or at 12 years and one other age only ($n = 13$; 40.6%). Very few children were reported to be cruel to animals at all four ages ($n = 3$; 0.1% of sample) or at three ages ($n = 7$; 0.3% of sample), and relatively few were cruel at two ages ($n = 45$; 2.2% of sample).

Is there an association between child maltreatment and cruelty to animals?

Initially, children who were cruel to animals were selected and the proportion that had been maltreated was examined. Children with a report of cruelty at any age were included in the group *Cruel to animals* ($n = 204$, 9.1%). Fig. 2 shows that children who were cruel to animals during the study had an elevated rate of child maltreatment. Among children who were not cruel to animals, 18.9% had been maltreated, whereas just over twice as many of those who were cruel to animals had been maltreated (43.6%, $OR = 3.32$, 95% CIs [2.36, 4.68], $p < .001$). Over half of children who were cruel to animals had not been maltreated (56.4%).

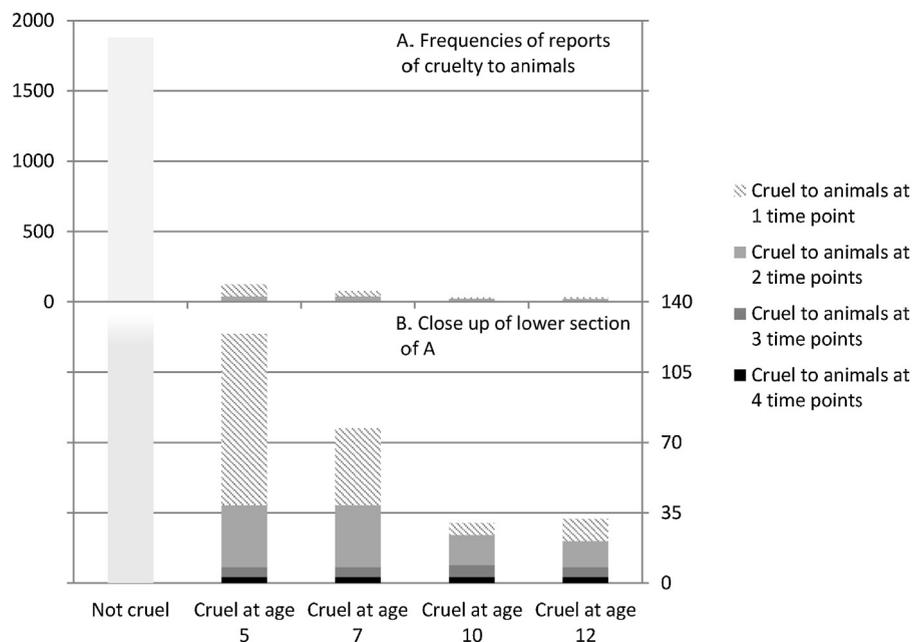


Fig. 1. Frequency of reports of cruelty to animals by age and persistence. Note: (A) Frequencies of children with no reports of cruelty and reports of cruelty to animals at age 5, 7, 10 or 12 years. Children with data at all waves of data collection included, $N = 2,074$. (B) Close up of the lower section of panel A. Each column indicates the number of children reported to be cruel to animals at that age, and the number of time points at which these children had reports of cruelty to animals. Three (0.1%) were cruel at all four ages, 7 (0.3%) were cruel at three ages, 45 (2.2%) were cruel at two ages, 140 (6.8%) were cruel at one age; and 1,879 (90.6%) were not reported to be cruel to animals at any age.

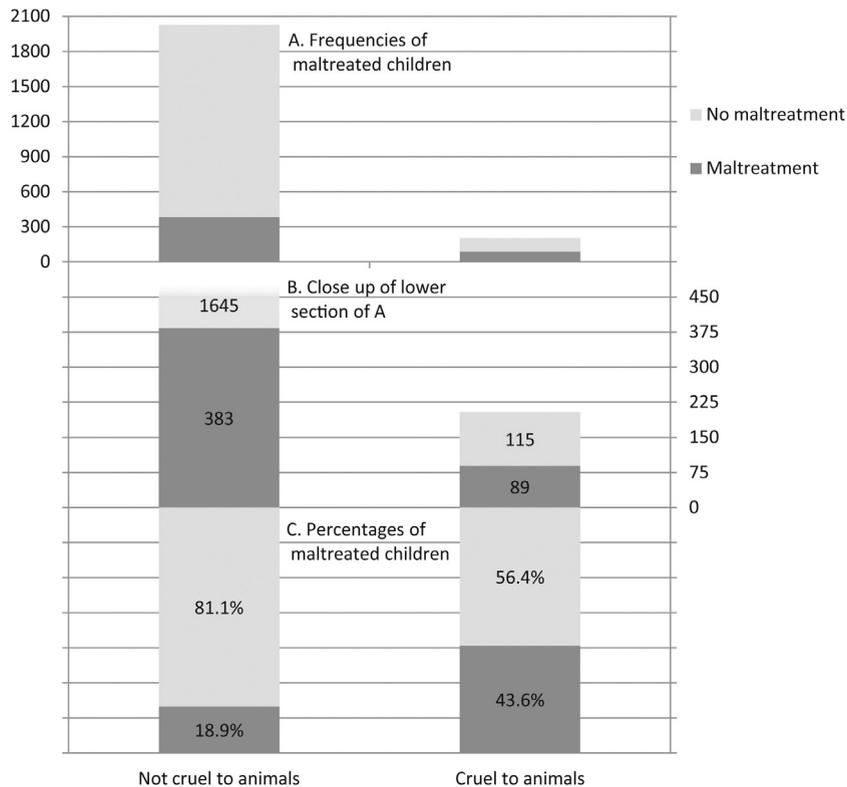


Fig. 2. Frequencies and percentages of maltreated children in those with or without reports of cruelty to animals. *Note:* (A) Frequencies of maltreated children in groups with and without reports of cruelty to animals. (B) Close up of lower part of panel A, showing frequencies of maltreated and non-maltreated children in each group. (C) Percentages of maltreated and non-maltreated children in each group. Not cruel to animals, $N=2,028$. Cruel to animals, $N=204$.

The data were then looked at the other way around, selecting children who had been maltreated and looking at the proportion that were also cruel to animals. Children who had been maltreated by the age of 12 ($n=472$, 21.1%) had an elevated rate of cruelty to animals. Among children who had not been maltreated, 6.5% were cruel to animals, whereas 18.9% of those who had been maltreated were cruel to animals. The majority (81.1%) of those who had been maltreated were *not* cruel to animals.

It is of note that the association between cruelty to animals and physical maltreatment was not symmetrical. Only 1 in every 5 children who had been maltreated was cruel to animals, whereas nearly half of those who were cruel to animals had been maltreated.

Is there an association between cruelty to animals and exposure to adult domestic violence?

Fig. 3 shows the percentages and frequencies of children who were cruel to animals in four groups: (a) 7.0% of those with no maltreatment and no domestic violence; (b) 6.2% of those with domestic violence only; (c) 15.4% of those with child maltreatment only; and (d) 22.0% of those with domestic violence and child maltreatment. In all groups a minority of children were reported to be cruel to animals, although the proportion increased in children who had experienced maltreatment only or both maltreatment and adult domestic violence. A logistic regression model, with cruelty to animals as the outcome variable and child gender, child maltreatment, domestic violence, and socioeconomic disadvantage as predictor variables was specified (the data was clustered by family and robust standard errors were calculated, to control for the relatedness of twins in pairs). The overall model was significant, Wald $\chi^2(4)=76.49$, $p<.001$. Child maltreatment was significantly associated with cruelty to animals, $OR=2.89$, 95% CI [2.02, 4.13], $p<.001$, as was child gender (boys were more likely than girls to be cruel to animals; $OR=2.87$, 95% CI [1.95, 4.22], $p<.001$). Neither adult domestic violence ($OR=1.12$, 95% CI [0.77, 1.61], $p=.56$) nor socioeconomic disadvantage ($OR=1.04$, 95% CI [0.95, 1.14], $p=.40$) were associated with cruelty to animals. In summary, there was little evidence that adult domestic violence was associated with childhood cruelty to animals when the effect of child maltreatment was accounted for.

Of the children who were cruel to animals, 27.1% had been maltreated and were from homes with adult domestic violence, 16.1% had been maltreated only, 14.6% were from homes with domestic violence only, and 42.2% were from homes with no family violence. Although there may be domestic violence in the homes of some children who were cruel to animals but who

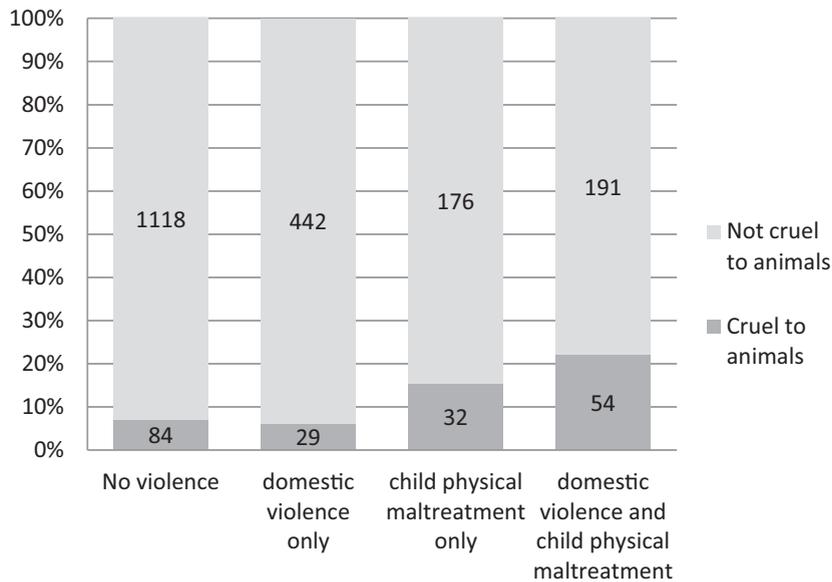


Fig. 3. Percentages and frequencies of children reported to be cruel to animals in those with or without family violence. Note: Percentages (Y-axis) and frequencies (data labels) of children with any report of cruelty to animals in those experiencing no family violence ($N=1,202$), domestic violence only ($N=471$), child physical maltreatment only ($N=208$), or both family violence and child physical maltreatment ($N=245$). Children with data available for both domestic violence and child maltreatment included, $N=2,126$.

had not been maltreated, two fifths of those who were cruel to animals did not seem to have been exposed to any family violence.

Is cruelty to animals a marker for child maltreatment?

The positive predictive value (PPV) calculated under a number of conditions is presented in Table 2. A number of important points arise from this. First, using a report of cruelty to animals at any one time point, just over 4 in 10 children who were cruel to animals between the ages of 5 and 12 had been maltreated ($PPV=.44$). Second, PPV was lowest at 5 years and increased through to 12 years, though this was mostly driven by the group who were not disadvantaged. In the non-disadvantaged group, 3 in 10 children identified as cruel to animals at 5 years had been maltreated, 3.5 in 10 at seven years, 4 in 10 at 10

Table 2

Summary of positive predictive value and odds ratio of cruelty to animals as a marker for child physical maltreatment by age, persistence of cruelty, and socioeconomic disadvantage.

Age	Socioeconomic disadvantage group	N (%) child cruelty to animals (Marker)	N (%) child physical maltreatment (Cases)	Positive predictive value	Odds ratio (95% CI)
Any	All	204 (9.1%)	472 (21.1%)	.44	3.32 (2.36–4.68)
	Disadvantaged	100 (11.3%)	273 (30.8%)	.54	3.04 (1.90–4.87)
	Non-disadvantaged	104 (7.7%)	199 (14.8%)	.34	3.33 (1.98–5.61)
5	All	131 (5.9%)	470 (21.1%)	.42	2.93 (1.94–4.44)
	Disadvantaged	66 (7.5%)	271 (30.7%)	.55	2.98 (1.65–5.38)
	Non-disadvantaged	65 (4.8%)	199 (14.8%)	.29	2.52 (1.38–4.61)
7	All	78 (3.6%)	465 (21.3%)	.47	3.53 (2.07–6.02)
	Disadvantaged	36 (4.2%)	271 (31.3%)	.61	3.67 (1.68–8.00)
	Non-disadvantaged	42 (3.2%)	194 (14.8%)	.36	3.39 (1.52–7.54)
10	All	32 (1.5%)	460 (21.5%)	.50	3.74 (1.75–7.99)
	Disadvantaged	17 (2.0%)	270 (31.9%)	.59	3.13 (1.05–9.27)
	Non-disadvantaged	15 (1.2%)	190 (14.7%)	.40	3.96 (1.27–12.32)
12	All	34 (1.6%)	460 (21.5%)	.56	4.79 (2.23–10.26)
	Disadvantaged	23 (2.7%)	267 (31.2%)	.61	3.57 (1.41–9.08)
	Non-disadvantaged	11 (0.9%)	193 (15.0%)	.45	4.81 (1.15–20.15)
Persistent	All	57 (2.6%)	472 (21.1%)	.54	4.69 (2.48–8.88)
	Disadvantaged	34 (3.8%)	273 (30.8%)	.62	3.85 (1.64–9.01)
	Non-disadvantaged	23 (1.7%)	199 (14.8%)	.43	4.62 (1.71–12.47)

Note: Persistent cruelty was defined as reports at two or more time points.

years, and 4.5 in 10 at 12 years. Reports in younger children from non-disadvantaged families were less likely to indicate maltreatment, but as cruelty to animals became a less common behavior in this group its importance as a marker increased.

Third, in the socioeconomically disadvantaged group just over half of those cruel to animals had been maltreated, regardless of age. PPV is affected by the frequency of the problem being studied, such that when the problem to be identified is common there is a lower proportion of false positives and a higher PPV. The higher rate of maltreatment in the disadvantaged group compared to the non-disadvantaged group (around 31% versus 15%) may have contributed to a higher PPV in the former.

Fourth, in the non-disadvantaged group, persistent cruelty to animals (reported at two or more time points, suggesting behavior persisting for at least two years) was a better marker of maltreatment than cruelty reported only at 5 or 7 years, but was comparable to cruelty reported at 10 or 12 years. In the disadvantaged group persistent cruelty had the same significance as cruelty reported at any age, with around 6 in 10 children persistently cruel to animals having been maltreated.

Despite the increased risk of maltreatment in children who were cruel to animals, around 40% of those in the disadvantaged group and up to 70% of other children had *not* been maltreated.

Discussion

Prevalence of childhood cruelty to animals

Based on mothers' reports, cruelty to animals was a relatively rare phenomenon, occurring in around 9% of this sample of 5–12 year olds. Most cruelty to animals was reported in younger children at only one wave of data collection, suggesting behavior that was fleeting and that declined with age.

This is consistent with the characterization of cruelty to animals in some infants or younger children as being due to poor impulse and motor control (Ascione, McCabe, Phillips, & Tedeschi, 2010), and it corresponds with the decline in externalizing behavior, including aggression, that typically occurs during childhood (Bongers, Koot, Van Der Ende, & Verhulst, 2004). There are also important advances in children's understanding of others' perspectives and emotions during childhood and adolescence (Decety, 2010; Tonks, Williams, Frampton, Yates, & Slater, 2007), which might also be applied to animals. There is some evidence that in adults empathy toward people is associated with empathic responses to animals (Westbury & Neumann, 2008) and that female (but not male) animal abusers show lower empathy and perspective taking than controls (Schwartz, Fremouw, Schenk, & Ragatz, 2012), though the developmental trajectory and precise nature of this relationship is unclear (see McPhedran, 2009b, for a review). It is also probable that, through education and guidance from others, children learn what is considered to be appropriate, socially acceptable behavior with animals during this period of childhood.

A further possibility, however, is that as children get older their cruelty to animals becomes more covert. This is supported by Dadds et al. (2004) who, using the Cruelty to Animals Inventory, demonstrated higher correlations between parent-report and self-report in children aged 6–9 years (boys: $r = .58$; girls: $r = .83$) than those aged 10–13 years (boys: $r = .35$; girls: $r = .57$). This means that it is possible that the decline in cruelty to animals was less pronounced than the current data suggest, as some mothers may have been unaware of cruelty when it occurred in children aged 10–12 years.

Although cruelty to animals seemed to be a relatively short-lived behavior for most of those reported to be cruel, in a very small number of cases it appeared to be more stable. Ten children (0.4% of the sample; 5.1% of those cruel to animals) had reports at three or four waves of data collection. This is consistent with other UK data using self-reports in a general population sample of teenagers (1.7% of the sample; 13.0% of those cruel to animals) (McVie, 2007). It is possible that this group might represent those for whom cruelty to animals is a more troubling behavior symptomatic of psychological disturbance (Ascione et al., 2010), such as those who are developing life-course persistent antisocial behavior (Moffitt, 1993). However, without further data it is not possible to confirm this and so caution should be applied to this interpretation.

Childhood cruelty to animals and child maltreatment

In this study children who were cruel to animals were twice as likely to have been physically maltreated as children not cruel to animals. This is largely consistent with data from child psychiatric and domestic abuse settings (Baldry, 2003; Becker et al., 2004; Boat et al., 2011; Currie, 2006; DeGue & DiLillo, 2009; Duncan et al., 2005), suggesting that children from the general population who are reported to be cruel to animals are at a similarly increased risk of having been maltreated as those seen in clinical settings.

There are a number of reasons why an abusive family environment might be associated with childhood cruelty to animals. Much discussion has focused on the direct causal role that abuse might have on the development of childhood cruelty, through social learning of controlling and punitive interaction styles and a lack of modeling of prosocial behaviors and appropriate behaviors with animals (see Duncan & Miller, 2002; McPhedran, 2009a, for reviews).

However, it is also possible that they co-occur for other reasons. Both child maltreatment and cruelty to animals occurred more frequently in those who were socially and economically disadvantaged, and factors associated with disadvantage may act to increase the likelihood of both problems. Although the socioeconomic disadvantage variable used in this study was not associated with cruelty to animals when the effect of maltreatment was controlled for, it is possible that other unmeasured factors influenced the development of problem behaviors. It is recognized that domestic violence occurs more commonly when multiple dysfunctional factors – such as poverty, limited parental education, criminality, and drug and alcohol

abuse – are present (McPhedran, 2009a), and these factors may also increase the likelihood of children being cruel to animals. McVie (2007) described adolescent animal abusers as a “problematic, risk prone, vulnerable and deprived group” (p. 45), who were more likely than non-offenders to be from lone parent families, have poor parental supervision, poor school commitment, be members of gangs, be highly influenced by peers, use drugs and alcohol, be a victim of crime, and be maltreated or neglected. It seems likely that a wide range of contextual factors contribute to the development of childhood cruelty to animals, beyond the experience of physical maltreatment.

Aggressive and antisocial behavior that emerges in early childhood, and that marked by callous and unemotional traits, has been shown to be substantially heritable (Arseneault et al., 2003; Moffitt, 2005; Rhee & Waldman, 2002; Viding, Blair, Moffitt, & Plomin, 2005). This means that aggressive behavior may cluster in some families because of shared genetic risk. Although not specifically addressing cruelty to animals, there is evidence from the current sample for both genetic transmission of risk of antisocial behavior and for maltreatment playing an environmentally mediated role in the development of child antisocial behavior (Jaffee, Caspi, Moffitt, & Taylor, 2004). Other researchers have found an association between cruelty to animals and callous and unemotional traits, but not family conflict, suggesting that some children may be at increased risk of developing cruelty to animals in the absence of a dysfunctional family environment (Dadds, Whiting, & Hawes, 2006).

Limits to the association between childhood cruelty to animals and physical maltreatment

The marked non-overlap between maltreatment and childhood cruelty to animals should be highlighted. Just over half of those who were cruel to animals had not been maltreated. It was hypothesized that exposure to adult domestic violence could be a reason why non-maltreated children were cruel to animals, though there was no significant association between cruelty to animals and domestic violence when maltreatment status was accounted for. Although a small number of non-maltreated children who were cruel to animals had been exposed to adult domestic violence, this was no more than expected by chance. Over 40% of children who were cruel to animals were from families with no reports of maltreatment or domestic violence, a figure consistent with another recent population study based on retrospective self-reported cruelty to animals and family violence exposure in a US sample (DeGue & DiLillo, 2009). It is possible that some of these children had been victimized in other ways such as bullying (Baldry, 2005). However, childhood cruelty to animals can also occur in apparently healthy families (Dadds, Turner, & McAloon, 2002).

Over 80% of maltreated children were not cruel to animals, which is in line with a number of other studies that suggest only a minority of children exposed to family violence show cruelty to animals (Becker et al., 2004; Currie, 2006; DeGue & DiLillo, 2009). It is clear that there is not a straightforward pathway from violence exposure to cruelty to animals and there are wide individual differences in vulnerability and resilience. Jaffee, Caspi, Moffitt, Polo-Tomas, and Taylor (2007) showed that individual child characteristics (such as above average IQ and well-adjusted temperament), family factors (parents without antisocial personality symptoms or substance abuse problems), and neighborhood factors (living in lower crime neighborhoods with high levels of social cohesion and informal social control) are all likely to interact to influence resilience to maltreatment. The authors emphasized the need to study the individual in the context of their family and social environment to understand how factors at different levels interact with each other: this is likely to be more useful than using single factors to try to predict outcomes.

Do domestic violence and physical maltreatment have an additive effect on childhood cruelty to animals?

Although not statistically significant, results suggested that children who were both maltreated and from homes with adult domestic violence were more likely to be cruel to animals than children who had been maltreated only. This requires replication to establish whether maltreatment and exposure to domestic violence act as cumulative stressors, reducing the likelihood that children are able to cope. It may also be the case that parents are less able to support maltreated children when they are also the victims of violence. It is possible that child maltreatment in households where adult domestic violence also occurs is qualitatively different from that in other households, for example being perpetrated by a primary caregiver versus someone with a less significant relationship with the child. Finally, domestic violence could be qualitatively different in households where there is also child maltreatment, for example being more likely to occur in front of children.

How useful is childhood cruelty to animals as a marker for physical maltreatment?

Regardless of the possible reasons for the association between childhood cruelty to animals and physical maltreatment, it is useful to understand what this means in terms of the likelihood that children presenting as being cruel to animals have been maltreated. Between 3 and 6 children out of every 10 who were cruel to animals had been maltreated, varying by age, persistence of cruelty, and socioeconomic background. Of those who were *not* disadvantaged, only a minority of those reported to be cruel to animals had been maltreated, with the proportion increasing slightly with age and persistence of cruelty.

In children from disadvantaged families around 6 in 10 who were cruel to animals had been maltreated, regardless of the age of the child or the persistence of their behavior. In this group cruelty to animals acted as a better marker of maltreatment, despite there being no significant association between socioeconomic disadvantage and cruelty to animals

in the whole sample. The PPV is affected by the prevalence of maltreatment, and its higher rate in the disadvantaged group (~30%) versus the rest of the sample (~15%) made false positives less likely in the former group.

The variation in the marker status of cruelty to animals in different groups of children adds important information for clinicians. It is important to consider that there is an increased risk that these children have been maltreated. However, many – up to 70% of younger children from non-disadvantaged backgrounds – will not have been maltreated. Lack of temporal specificity should also be considered. The precise timing of maltreatment was not established in the current study, meaning that children who were reported to be cruel to animals could have been maltreated several years previously: Cruelty to animals may not indicate *current* risk of maltreatment.

Given the potential impact of allegations of child maltreatment it is important that childhood cruelty to animals is not treated as evidence of child maltreatment in-and-of-itself. Instead, professionals should seek to understand the significance of the child's cruelty in the context of their other behavior, family and neighborhood environment (Ascione et al., 2010).

Strengths and limitations of the current study

The current study has a number of strengths and advantages over previous research. The sample is representative of the UK general population, making findings applicable beyond those derived from highly specific populations, such as prisoners or psychiatric patients, or from groups of higher than average socioeconomic status, like college or university students. The study design combined a longitudinal design with interviews with mothers on multiple occasions to establish detailed accounts of child maltreatment, adult domestic violence, and child behavior problems, avoiding the potential biases that accompany retrospective self-report and reliance on official records.

Childhood cruelty to animals was tested as a marker of maltreatment at different ages and levels of persistence, rather than simply collapsing across ages, exploring the possibility that cruelty to animals at different ages might have different significance. Finally, the sample was stratified by socioeconomic disadvantage to ensure that the association between cruelty to animals and maltreatment was not simply an artifact of their association with poverty.

A first limitation of the study is the reliance on a single item in the CBCL to assess cruelty to animals, which relies on mothers' knowledge of and interpretation of their children's cruel behavior, and assumes that all acts of cruelty to animals are qualitatively the same. It will be necessary in future research to gain more detailed descriptions of children's cruelty to animals, using instruments such as the Cruelty to Animals Inventory (CAI, self and informant versions; Dadds et al., 2004) to establish if cruelty of differing severity or type have different significance in terms of the risk of maltreatment and/or child psychopathology. A second limitation is that our sample was composed of twins, and thus, we cannot be certain that our results generalize to singletons. However, rates of probable or definite child maltreatment in our sample (21.1%) were roughly similar to lifetime prevalence rates of maltreatment as measured in the Developmental Victimization Survey, in which the lifetime prevalence of maltreatment was 15.1% in a nationally representative sample of 2- to 17-year-olds in the United States (Finkelhor, Ormrod, & Turner, 2009). In addition, the rate of cruelty to animals in our cohort of twin children (9.1%) approaches the 6.9% observed in a study of 6- to 12-year-old singletons that relied on parents' reports using the same instrument as the one used in the E-Risk Study (Becker et al., 2004). A third limitation is the absence of information about participants' access to animals in the E-Risk Study. The extent to which children were cruel to animals may be influenced by the presence of animals in their immediate environment. It is possible that children from deprived neighborhoods had only limited access to animals compared to children from more affluent or rural areas. However, a study from the United Kingdom has shown that families involved with social services are as likely to own pets as other families, suggesting that children in families affected by child maltreatment and/or domestic violence are no less likely to have access to animals (Hackett & Uprichard, 2007). In the E-Risk sample, cruelty to animals was as common among children from a disadvantaged background (11.3%) as other children (7.7%; see Table 2), further suggesting that many children from deprived neighborhoods had access to animals.

Summary

A significant minority of mothers reported that their children aged 5–12 years were cruel to animals, though reports of persistent cruelty were rare. Most cruelty to animals was reported in younger children, and the apparent rarity of cruelty in children aged 10–12 years is likely to be accounted for by both a genuine decline in cruel behavior and a decline in mothers' awareness of what may be a covert behavior in older children.

Childhood cruelty to animals was more common in those who had been physically maltreated than in those not maltreated, though only a minority of maltreated children was cruel to animals. As a marker for maltreatment, cruelty to animals was more likely to indicate a history of maltreatment in children from socioeconomically disadvantaged families: Around 6 in 10 children who were cruel to animals in this group had been maltreated. In other children only a minority of those who were cruel to animals had been maltreated, especially those who were aged 5–7 years. Although childhood cruelty to animals may indicate that there is an increased risk that a child has been maltreated, there is no way to tell if the risk is current and on-going. The relationship between child maltreatment and childhood cruelty to animals is likely to be complex

and moderated by a range of other child, family and neighborhood level factors: Any approach to cruelty to animals should try to understand this behavior in the context of the child's other behavior and broader social environment.

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