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1 Running head: CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

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4 **Psychological Risk Factors for Childhood Animal Cruelty: A Systematic Review**

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21 **Abstract**

22

23 Despite growing research into human-animal relationships, little is known about childhood
24 cruelty to non-human animals. The purpose of this review was to investigate the potential
25 psychological risk factors for childhood cruelty to animals. The aim was to assemble,
26 synthesise and evaluate the quality and breadth of existing empirical research and highlight
27 areas in need of further study. The review reveals a myriad of potential psychological risk
28 factors associated with childhood animal cruelty, but highlights the decrease in publications
29 on this topic over time and the lack of high quality publications. Investigating the factors
30 underlying cruel behaviour towards animals has great implications for animal welfare and
31 child wellbeing, as well as being vital for designing and implementing successful universal
32 and targeted interventions to prevent cruelty to animals.

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34 **Key words:** Animal Cruelty, Childhood, Human-Animal Interactions, Prevention, Risk
35 Factors

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43 Childhood Animal Cruelty

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45 Ascione (1993) defined animal cruelty as “socially unacceptable behavior that
46 intentionally causes unnecessary pain, suffering, or distress to and/or the death of an animal”
47 (p.228). Motivation can be defined as “an internal force originated from a need not satisfied
48 which impels the individuals to be involved in a specific behaviour” (Schiffman & Kanuk,
49 2004). Ascione (2005) proposed a classification system for the underlying motivations of
50 animal cruelty behaviour. The first category, explorative/curious animal abuse, likely applies
51 to very young children who may hurt non-human animals unintentionally due to a lack of
52 supervision and/or a lack of knowledge about the humane treatment of animals; they may
53 lack the cognitive maturity needed to understand cruelty to animals and may benefit through
54 appropriate animal related education. The second category, pathological animal abuse, is
55 likely to apply to children who are slightly older, where cruelty to animals may be
56 symptomatic of psychological difficulties. Children who fall into this category may suffer
57 from personality, conduct or other psychiatric disorders but may not yet have had
58 professional diagnosis (animal cruelty is part of the diagnostic criteria for Conduct Disorder;
59 American Psychological Association, 2013). The third category, delinquent animal abuse,
60 applies to adolescents where animal cruelty may be part of a broader pattern of delinquent
61 and antisocial behaviour (Walters & Noon, 2015). Other factors associated with childhood
62 animal cruelty include: peer reinforcement, behaviour imitation, mood enhancement, sexual
63 gratification, forced animal abuse, attachment to animals, phobias of particular animals,
64 abusive experiences and post-traumatic play, self-injury, rehearsal for interpersonal violence
65 and participating in animal abuse as a vehicle for emotional abuse (Ascione et al., 1997).

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

66 On initial inspection, research on childhood animal cruelty emerges from many
67 disciplines and, without systematic review, it is difficult to draw firm conclusions from the
68 literature. To date, there have been no systematic reviews on the topic of childhood animal
69 cruelty.

70 The Cochrane Collaboration and the National Institute for Health and Clinical
71 Excellence assess available evidence to inform guidelines, policy and practice (Saks &
72 Allsop, 2007). Systematic reviews are becoming common practice in research and are widely
73 believed to be at, or close to, the top of a hierarchy of evidence. With emphasis on judging
74 the quality of evidence, systematic reviews help to map out areas of uncertainty and identify
75 research gaps, as well as helping to ensure that clinical practice is kept up to date with the
76 best research evidence available. “A systematic review enables the reader to appraise
77 critically the most robust evidence available in an attempt to synthesize what is known, and
78 not known, about the efficacy of particular interventions” (Saks & Allsop, 2007, p. 34).

79 Our aim was to conduct a systematic review of published studies that have
80 investigated psychological risk factors associated with childhood animal cruelty.
81 Psychological risk factors can be defined as “a characteristic at the biological, psychological,
82 family, community, or cultural level that precedes and is associated with a higher likelihood
83 of problem outcomes” (O’Connell, Boat & Warner, 2009, p.28). Our study aims to provide
84 an unbiased synthesis of research in this area for the use of academics, policymakers,
85 practitioners and any others interested in this topic. It is vital that we understand any potential
86 factors that may play a role in children’s cruel behaviour toward animals in order to
87 successfully intervene and foster a positive and beneficial relationship between children and
88 animals. It is equally important that we identify strengths and weaknesses in the current
89 literature to better inform future studies.

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

90 The aims are to 1) identify the scope of research on psychological risk factors for
91 childhood animal cruelty and identify knowledge gaps, 2) assemble, summarise and evaluate
92 the empirical research base for psychological risk factors for childhood animal cruelty and 3)
93 provide recommendations for future research.

94 *Research Questions*

- 95 1) What are the psychological risk factors for childhood animal cruelty?
- 96 2) Are there age and gender differences in childhood animal cruelty?
- 97 3) How many published peer-reviewed articles have investigated psychological risk
98 factors for childhood animal cruelty?

99 **Method**100 *Protocol*

101 To identify valid literature, the PRISMA guidelines (Moher et al., 2009) were
102 consulted and a Boolean search was conducted on July 20, 2015 and again on February 01,
103 2016.

104 *Search Procedure*

105 Studies were identified by searching a large and varied range of electronic databases
106 to increase coverage and account for the diversity of journals that animal cruelty literature is
107 published in. The eighteen databases that were searched include: ERIC, Child Development
108 and Adolescent Studies, Environment Complete, GreenFILE, Family Studies Abstracts,
109 SocINDEX, Peace Research Abstracts, Psychology and Behavioural Sciences Collections,
110 EMBASE (including EMBASE classic), CAB Abstracts, MEDLINE (including MEDLINE
111 daily update), The Joanna Briggs Institute EBP Database, PsychINFO, ASSIA, PubMed,
112 Web of Science, Science Direct and Scopus. Search terms (Table 1.) for all of the databases

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

113 included at least one identifier for psychological risk factors, at least one identifier for animal
114 cruelty and at least one identifier for the target age group.

115 -----

116 Table 1 here

117 -----

118 *Eligibility Criteria*

119 Eligible studies were identified by applying pre-defined inclusion and exclusion
120 criteria. The criteria stated that a) studies had to be written in English, b) articles were in
121 peer-reviewed journals, c) primary research had to be empirical, and d) the study population
122 had to include children, adolescents, or adults retrospectively reporting on their childhood.
123 Review studies, books, dissertations, media analyses, magazine articles and conference
124 abstracts were excluded as well as non-English articles and those that did not include animal
125 cruelty as a stated measure in the investigation.

126 *Study Selection*

127 The study selection process consisted of three stages. Firstly, duplicate studies were
128 removed. Secondly, titles and abstracts were screened for relevance to animal cruelty.
129 Finally, studies were checked for eligibility using the pre-defined inclusion and exclusion
130 criteria.

131 The literature search resulted in a total of 838 citations. Following the removal of
132 duplicates, a total of 449 citations remained. During title and abstract screening, 269 papers
133 were removed, leaving a total of 180 articles for eligibility assessment. At this stage, 91
134 studies were removed as they were not directly relevant to childhood animal cruelty, 46
135 studies were removed due to article type, and 4 studies were removed as they were not

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

136 available in the English language. The final sample included 39 articles (4.7% of the total
137 initial pool). A flowchart of the study selection process is presented in Figure 1.

138 -----

139 Figure 1 here

140 -----

141 *Data Extraction and Evaluation*

142 Information was extracted from each of the final papers in order to achieve the aims
143 of the review. Data items included the psychological factors that were investigated and the
144 results of each study in order to identify commonly reported associations (see Table 2). Data
145 items also included the study type, animal cruelty measurement, participants (number, age,
146 and gender), and country of study and setting of research (Table 3). Additional data items
147 were extracted for exploratory purposes, including first author, date of publication and name
148 of journal.

149 -----

150 Table 2 and 3 here

151 -----

152 *Quality Assessment*

153 Individual studies were assessed using a validated quality assessment tool for studies
154 with diverse designs (QATSDD, Sirriyeh, 2012). These guidelines consist of 16 quality
155 criteria, all of which apply to mixed methods, 14 apply to qualitative studies and 14 apply to
156 quantitative studies. Each paper was scored from 0-3 for each item and entered into a scoring
157 grid by two independent researchers. A total score and percentage were then computed for

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

158 each study (Table 4). Case studies could not be easily assessed using this criteria and so were
159 not included in the quality assessment procedure. Using the obtained overall quality score,
160 each paper was categorised into the following: 1) quality criteria are very well met (80-100%)
161 , 2) quality criteria are well met (60-79%) , 3) quality criteria are fairly met (40-59%), 4)
162 quality criteria are slightly met (20-39%) and 5) quality criteria are hardly met (below 20%).
163 The publications were scored by two authors independently ($K=.78$), with the Cohen's kappa
164 demonstrating a substantial strength of agreement (Landis & Koch, 1977).

165 -----

166 Table 4 here

167 -----

168 **Results**

169 The final sample articles reviewed were published between 1971 and 2014, with the
170 majority of these published between 2001 and 2010 (51.3%). Despite the limitation to
171 English-language articles, there was an international representation of research, with the
172 majority (66.6%) from the USA (n=26). Other countries included Australia (n=6), the UK
173 (n=2) and Canada, Italy, Switzerland, Malaysia and China (1 study each).

174 The articles were published in a wide variety of disciplines, with the majority (n=17)
175 published in interdisciplinary journals including Child Abuse & Neglect (n=3) and the
176 Journal of Interpersonal Violence (n=9). Specific disciplines that articles were published in
177 included psychology (e.g., Journal of Applied Developmental Psychology, n=1),
178 psychotherapy (Journal of Child Psychotherapy, n=1), criminology (International Journal of
179 Offender Therapy and Comparative Criminology, n=2), child health and welfare (e.g., Child:
180 Care, Health and Development, n=1), psychiatry (e.g., Child Psychiatry and Human
181 Development, n=3), social sciences (Human Relations, n=1) and human-animal interactions

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

182 (Anthrozoos: A Multidisciplinary Journal of the Interactions of People & Animals, n=4;
183 Society & Animals, n=3). Meta-analysis was not appropriate due to the heterogeneous nature
184 of the included study designs, participants, measures and reported outcome measures; thus
185 the results of this review are in a descriptive and qualitative narrative synthesis.

186 *Age Group and Sample Sizes*

187 The majority of studies relied on retrospective reporting of childhood cruelty to
188 animals (41%), focusing on adults (n=17) or adolescents (n=16). A smaller number of studies
189 focused on children aged 5-11 years (n=14) or young children under 5 years (n=1). One study
190 did not specify the age group studied. Out of the 39 studies included, only 12.8% collected
191 data from children directly.

192 Excluding case studies and studies that used existing data, good sample sizes were
193 used overall (mean=300, range 38-893). Good size samples were used for children
194 (mean=291, range 50-532), adolescents (mean=182, range 50-281), adults (mean=281, range
195 102-860), parent report studies (mean=427, range 38-893) and mother and child reports
196 (mean=330, range 131-496).

197 *Methodology of Studies*

198 Questionnaires were the most common method of investigation (n=20, 51.3%), half of
199 which involved retrospective reporting with convicted adults. The second and third most
200 common methods used existing data (n=7) and data from psychiatric and/or behavioural
201 assessments (n=6). Other methods included interviews (n=5), retrospective interviews (n=4),
202 telephone interviews (n=2) and case studies (n=5).

203 The most common research settings were school classrooms (n=6) and prisons (n=6).
204 Other research settings included a child's home (n=2), therapy sessions (n=1), over the
205 telephone (n=1), an inpatient psychiatric hospital (n=2) and within a safe house (n=1). The

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

206 majority of studies (n=21, 53.8%) relied on existing data or did not specify the research
207 setting.

208 Studies used a varied selection of animal cruelty measures, including the Animal-
209 Related Trauma Inventory (Boat, 1994) (n=3), an item within the Child Behavior Checklist
210 (Achenbach, 1991) (n=5), Physical and Emotional Tormenting Against Animals Scale
211 (Baldry, 2004) (n=2), Children's Attitudes and Behaviours towards Animals Questionnaire
212 (Guymer et al., 2001) (n=2), Children and Animals Inventory (Dadds et al., 2004) (n=3),
213 Children's Treatment of Animals Questionnaire (Thompson & Gullone, 2003) (n=2) and
214 Attitudes Toward the Treatment of Animals Scale (Henry, 2004) (n=2). The following
215 measures were used in a single study each: Experiences with Animals (a modified version of
216 Flynn, 1999), item within the Child Assessment Schedule (Hodges et al., 1982), Pet
217 Maltreatment Assessment (Ascione & Weber, 1995), item from the Child Sexual Behavior
218 Inventory (Friedrich, 1997) and an item from the Children and Animals Assessment
219 Instrument (Ascione et al., 1997).

220 *Prevalence of Childhood Animal Cruelty*

221 Three studies found a relatively high rate of exposure to animal cruelty (Miller, 1997;
222 Thompson & Gullone, 2006; DeGue & DiLillo 2008). For example, DeGue and DiLillo
223 (2008) found that 22.9% of 860 college students in America reported some exposure to
224 animal cruelty. Three studies (Baldry, 2005; Gullone, 2008; Kellert & Felthous, 1985) found
225 a relatively high prevalence of animal cruelty behaviour: 40%, 20.6% and 60% respectively.
226 Lucia and Killias (2011) found that 48% of 3,648 pupils in 7th, 8th, and 9th grades (ages 13-
227 16 years) admitted to have maltreated an animal at least once.

228 *Psychological Risk Factors for Childhood Animal Cruelty*

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

229 The most common risk factor investigated in relation to childhood animal cruelty was
230 behavioural problems (n=19, 48.7%). The second and third most common factors were child
231 abuse and neglect by caregivers (n=14) and domestic abuse (n=10). Other factors included
232 witnessing animal abuse (n=8), bullying and victimisation (n=8), personality (n=8),
233 psychiatric problems and/or mental illness (n=8), family functioning/context (n=7), sexual
234 abuse (n=6), empathy (n=3) and coping style (n=1). The majority of studies investigated a
235 combination of several of these factors.

236 The most common finding was that childhood animal cruelty is one of many
237 symptoms of behavioural disturbance (n=16) and in particular, a symptom of conduct
238 disorder (n=4), fire setting, or within a triad with enuresis and fire setting (n=4). Animal
239 cruelty is common amongst those with general behavioural problems (Sanders, 2013), such as
240 problems with peers and sexually acting out (Boat, 2011), as well as aggression (n=4).
241 Childhood animal cruelty was also associated with more severe behavioural problems, such
242 as destructiveness and stealing (Tapia, 1971), temper tantrums, assaultive outbursts,
243 childhood fights and truancy (Felthous, 1980).

244 Anger, leading to aggression, was a commonly reported motivation of animal cruelty
245 behaviour. Overton (2011), for example, found that one quarter of 180 adult inmates were
246 motivated out of anger to be cruel to animals as a child. Sakheim et al. (1991) found that
247 children who were cruel to animals developed aggressive fantasies or became easily enraged
248 by peers or adults and that children's poorly controlled aggression took the form of behaving
249 in a cruel and sadistic manner towards animals (as well as towards younger children).
250 Sakheim also reports a link between childhood animal cruelty and severe fire setting, intense
251 anger at maternal rejection, neglect or abandonment and poor social comprehension and
252 judgement.

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

253 Childhood animal cruelty was found to be associated with bullying and victimisation
254 experiences in 7 studies (Sanders et al., 2013; Baldry, 2005; Henry & Sanders, 2007; Boat,
255 2011; Tapia, 1971; DeGue & DiLillo, 2008; Gullone, 2008). Abusing animals during
256 childhood ‘for fun’, an indicator of sadism, was one of 9 motivations reported (Hensley et al.,
257 2011; Hensley & Tallichet, 2005). Hensley et al. (2011) and Overton et al. (2011) found that
258 over 60% of adult inmate respondents reported that they were cruel to animals as a child ‘for
259 fun’. Dadds (2006) found that animal cruelty in boys was associated with an early
260 psychopathy pathway characterised by callous and unemotional traits (often seen in Conduct
261 Disorder; American Psychiatric Association, 2013), disregard and callous-lack of empathy
262 for others. Animal cruelty within this sub-group of children displaying conduct disorder may
263 reflect low meta-cognition or low reflective function (Patrick et al., 1994).

264 Animal cruelty is a symptom of various psychiatric and mental health issues as
265 highlighted by 9 studies (Felthous, 1980; Shapiro et al., 2006; Kruesi, 1989; Tapia, 1971;
266 Rogeness et al., 1984, Sverd et al., 1994; Ascione et al., 2003; Luk, 1999; Dadds, 2006). The
267 studies that investigated this link were mainly case studies or clinical data (e.g., from
268 Diagnostic and Statistical Manual of Mental Disorders classification criteria) and so animal
269 cruelty was one of many reported problematic symptoms. Shapiro (2006) describes a study of
270 a 7 year old girl who displayed social withdrawal, low productivity in school, ‘odd
271 behaviour’ as well as cruel fantasies and both real and symbolic cruelty to animals,
272 suggesting a possible link between early life stress, psychiatric illness and childhood animal
273 cruelty. Tapia (1971) found that factors relating to animal cruelty ranged from biological
274 factors (e.g., Organic Brain Syndrome) to mental illness, to environmental factors or a
275 combination of psycho-bio-social factors in 18 cases of children, all boys (ages 5-15 years).
276 Other psycho-biological studies have found associations between animal cruelty and low
277 levels of serotonin (5HIAA; Kruesi, 1989) and zero dopamine (Rogeness, 1984).

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

278 Three studies considered empathy in relation to childhood animal cruelty (Henry
279 2006; Lucia, 2011; and Thompson, 2008). Thompson and Gullone (2008) for example, found
280 that empathy and (to a lesser degree) attachment to parents and peers, negatively correlated
281 with animal cruelty but is positively associated with the humane treatment of animals.
282 Furthermore, animal cruelty was negatively correlated with prosocial behaviour. Thompson
283 and Gullone (2008) concluded that humane animal treatment fosters the normal development
284 of empathy and that empathy serves as a mediating role in the associations between animal
285 cruelty, attachment to parents and peers and humane animal treatment.

286 *Adverse Childhood Experiences*

287 A common finding was that childhood animal cruelty is associated with a cumulative
288 burden of aversive childhood experiences including: trauma and neglect (n=3), harsh
289 parenting (n=2), family conflict (n=1), parent's low education (n=1), and prolonged
290 separation from a father figure (n=1). Various forms of abuse were commonly related to
291 childhood cruelty to animals in the studies reviewed including domestic abuse (n=9), child
292 abuse (n=4) and sexual abuse (n=6). McEwan et al. (2014), for example, found that children
293 who were cruel to animals were more likely to have been maltreated by family members than
294 other children, but highlighted that not all children who are cruel to animals have been
295 maltreated. There seems to be an overlap between various forms of abuse within the home;
296 DeGue (2008) found that 60% of 860 college students who had witnessed or perpetrated
297 animal cruelty as children also reported experiences of childhood maltreatment and domestic
298 violence. Becker et al. (2004) concluded that family variables (such as marital violence and
299 harsh parenting) increase the likelihood of childhood animal cruelty. Although childhood
300 adversities were not included in the original search terms, these studies represented the
301 majority of studies on childhood animal cruelty. Therefore, these results may not be a

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

302 comprehensive synthesis in relation to childhood adversities and childhood animal cruelty
303 behaviour.

304 *Witnessing Animal Cruelty*

305 Witnessing animal cruelty could lead to the imitation of this behaviour (Overton,
306 2011) and was another common factor associated with childhood animal cruelty behaviour
307 (n=8). Children who frequently witnessed animal abuse reported higher levels of animal
308 cruelty behaviour (Thompson, 2006). Thompson concluded that the damaging effects of
309 witnessing animal cruelty are cumulative and animal cruelty is a widespread phenomenon.
310 The age of the child who witnesses animal cruelty and who the child observes may have an
311 effect. Hensley and Tallichet (2005) found that inmates who had observed a friend abuse
312 animals as a child were more likely to hurt or kill animals more frequently, while those who
313 were younger when they first witnessed animal cruelty hurt or killed animals at a younger
314 age.

315 *Age and Gender*

316 A number of gender and age differences were found in the literature. Childhood
317 animal cruelty is most commonly observed or reported in boys (n=5), male teenagers (n=1)
318 and retrospectively reported in adult males (n=6). However, Currie (2006) found no gender or
319 age differences and Mellor and Yeow (2008) found no gender differences in child animal
320 cruelty behaviour, although there were gender differences for risk factors of animal cruelty.

321 There seems to be conflicting evidence for age trends of animal cruelty. Much of the
322 animal cruelty literature focuses on teenagers, and animal cruelty as part of delinquency,
323 which greatly increases during adolescence. Some of the findings highlighted in this review
324 however, suggests that animal cruelty is also an issue with younger children. For example,
325 Tapia (1971) reported an average onset age for animal cruelty of 9.5 years, Boat (2011)

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

326 observed animal cruelty in children aged 3-17, and McEwan et al. (2014) found that most
327 reports of animal cruelty were in young children. Moreover, Hensley and Tallichet (2005)
328 found that those who had committed animal cruelty at a younger age were more likely to
329 have engaged in multiple acts of animal cruelty. There may be different developmental
330 trajectories for animal cruelty with risk factors specific to different age groups. The family
331 will be of great importance for younger children but peer group influence may become focal
332 to teenagers (Compas, Hinden & Gerdhardt, 1995).

333 Discussion

334 The aim of this study was to systematically review the existing literature to answer
335 three main research questions, 1) what are the psychological risk factors for childhood animal
336 cruelty? 2) Are there age and gender differences in childhood animal cruelty? And 3) how
337 many published peer-reviewed articles have investigated psychological risk factors for
338 childhood animal cruelty? The systematic review revealed a range of potential psychological
339 risk factors associated with childhood animal cruelty including, but not limited to: sadism,
340 callous and unemotional traits, and lack of empathy, mental health, conduct disorder, abuse,
341 fire setting, aggression, destructiveness and bullying. However, the review also highlights a
342 lack of high quality publications, and confirms the need for more stringent methodological
343 procedures to better explore these factors.

344 Within recent years, there has been a growing interest in the positive aspects of
345 human-animal relationships, although relatively little research has focused on negative
346 relationships between children and animals. Within the wealth of research into child
347 development, studies focusing on children's relationships with animals, specifically
348 childhood animal cruelty, remains underrepresented (McCardle et al., 2011). Few studies
349 were published prior to 2000 with scientific interest peaking between 2001 and 2010 (20

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

350 published studies), with only ten studies published since 2011. Psychologists working with
351 children tend to ignore reports of animal cruelty (Signal et al., 2013) and the cross-
352 disciplinary interest in animal cruelty may be hindering the gathering and interpretation of
353 findings. Since the 1970s to present, only two studies have been published in psychological
354 journals: *Journal of Applied Developmental Psychology* (Gullone & Robertson, 2008) and
355 *Psychology of Violence* (Lucia & Killias, 2011). Only seven studies have been published in
356 human-animal interaction journals: *Anthrozoos: A Multidisciplinary Journal of the*
357 *Interactions of People & Animals* (e.g., Henry, 2006), and *Society & Animals* (e.g.,
358 Thompson & Gullone, 2006).

359 The overall quality of the published research was relatively low; only 2 papers (5.9%)
360 scored 1 ('quality criteria are very well met'). Despite the majority of publications (not
361 including case studies) receiving a score of 2 ('quality criteria are well met'; rater 1: 61.8%;
362 rater 2: 64.7%), a large number of papers (rater 1: 29.4%; rater 2: 26.5%) received a score of
363 3 ('quality criteria are fairly met). One paper received a score of 4 ('quality criteria are
364 slightly met') and no publications received a score of 5 ('quality criteria are hardly met'). See
365 Sirriyeh (2012) for full assessment criteria. The lack of high quality publications needs to be
366 addressed in future studies.

367 The results from this review indicate a wide range of potential psychological risk
368 factors for childhood animal cruelty and highlights possible social and environmental factors
369 that may have an impact on child-animal relationships. Many studies in this review focused
370 on forms of abuse as a risk factor of animal cruelty (e.g., Baldry, 2005). The relationship
371 between family violence and animal cruelty appears to be comorbid; one form of abuse
372 appears to coexist with another. Children observe treatment of companion animals at home
373 and will vicariously learn this behaviour. Witnessing animal cruelty is a risk for childhood
374 animal cruelty. Hensley and Tallichet (2005) concluded that the onset and reoccurrence of

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

375 childhood animal cruelty is influenced by the behaviours of a child's family. Exposure to
376 violence can disrupt the development of empathy, which may lead to 'empathy deficits' and
377 thus increasing the likelihood of aggression (Ascione, 1993; Flynn, 1999). Normative
378 empathy levels emerge during childhood and may serve as a protective factor against
379 engaging in aggressive behaviour (Thompson & Gullone, 2003).

380 Children who are cruel to animals are at risk of developing conduct-disordered
381 behaviours (Boat, 2011) and delinquency, especially those who demonstrate aggression
382 (Lucia, 2011). Felthous and Kellert (1986) concluded that childhood animal cruelty may
383 represent a pattern of impulsive, diffuse aggression, antisocial behaviours (see also Arluke et
384 al., 1999), and is included under antisocial behaviour (The International Classification of
385 Diseases, World Health Organisation, 2004). Research linking cruelty to animals and other
386 forms of behavioural disturbance (see Lockwood & Ascione, 1998) led to the inclusion of
387 animal cruelty within the diagnosis for conduct disorder, first appearing in the revised third
388 edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric
389 Association, 1987). However, research establishing the diagnostic significance of animal
390 cruelty behaviour is still almost non-existent (Gleyzer et al., 2002). The roots of cruelty may
391 be first apparent in preschool years and so very early interventions may prevent antisocial
392 behaviour from escalating (Lewchanin & Randour, 2008).

393 Childhood animal cruelty was not specifically mentioned within the aims or
394 hypotheses in many of the published studies on mental health, and was instead one of many
395 symptoms reported as part of wider investigations. The results from this review indicate that
396 childhood animal cruelty can be one of many symptoms of various psychiatric and mental
397 health issues which can either occur as an isolated act (associated with a psychotic mental
398 state) or as a repeated act associated with a history of violent offending. Seven studies in this
399 review were published in psychiatric journals but animal cruelty was not the sole focus and

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

400 was often reported as a side note in case studies or as part of a diagnosis. Previous research
401 has found associations between cruelty to animals (during lifetime) and psychiatric disorders,
402 characterized by self-control deficits including lifetime alcohol use disorder, pathological
403 gambling, conduct disorder and personality disorders (Vaughn et al., 2009) and so childhood
404 animal cruelty may be a warning sign for compromised mental health. Future animal cruelty
405 research could investigate associations between mental health, animal cruelty behaviour, and
406 other behavioural disturbances, thus filling an important gap in the current human-animal
407 interaction research.

408 Gullone (2008) concluded that animal abuse is not an uncommon childhood
409 behaviour and appears more common in those who witness others committing animal cruelty.
410 McEwan et al. (2014) however, concluded that childhood animal cruelty was a relatively rare
411 phenomenon, having been reported in 9% of a sample of 2,232 children (5-12 years of age).
412 Three studies found a relatively high rate of exposure to animal cruelty and animal cruelty is
413 most commonly witnessed in boys, as indicated by various studies in this review. Exposure to
414 animal cruelty in childhood appears to be widespread and cumulative in nature, being a
415 'normal rite of childhood' beginning as early as 3 years of age (Boat, 2011), steadily
416 declining between 5 and 10 years (McEwan et al., 2014) and levelling off at around 12 years
417 of age (Boat, 2011). Frick et al. (1993) revealed that the median age that animal cruelty
418 appears is 6 ½ years, which is earlier than bullying and vandalism. The majority of studies on
419 childhood animal cruelty have not directly observed or measured animal cruelty in children,
420 instead focusing on retrospective reports from adults or reports of care-givers. If exposure to
421 animal cruelty and the act of animal cruelty in children is common, and children are
422 influenced and affected by members of their primary social environment, it may be more
423 beneficial to investigate children directly and intervene early on in childhood to prevent the
424 cycle of abuse before it begins.

425 *Research Gaps and Recommendations*

426 This review identified a number of gaps in the childhood animal cruelty literature.
427 Firstly, empathy (cognitive and affective) as well as compassion, were underrepresented in
428 the animal cruelty literature; three studies in this review investigated empathy whilst none
429 examined compassion. Empathy and compassion should be considered in future research as
430 studies have demonstrated a link between empathy and violence (McPhedran, 2009),
431 compassion and violence (Ascione & Arkow, 1999) and between violence toward animals
432 and violence toward humans (Ascione, 2001; Merz-Perez & Heide, 2003).

433 Another possible consideration that has been overlooked in relation to childhood
434 animal cruelty, but appears to be linked to cognitive empathy, is children's beliefs about
435 animal mind. Believing that non-human animals are sentient could have an effect on attitudes
436 towards the treatment of animals and may determine the nature of interactions with animals.
437 For example, Knight et al. (2004) found that lower scores on beliefs about animal mind were
438 related to higher acceptance of animals being used in experimentation, using animals for
439 personal decoration, for entertainment and for financial gain in adult males. Hills (1995)
440 found a link between empathy and beliefs about animal mind, concluding that
441 conceptualising animals as insentient may lead to unacceptable behaviours due to the relief of
442 ethical and moral impediments (Knight et al., 2004). Furthermore, children's beliefs about
443 animal minds may be related to attitudes towards animal cruelty, as well as compassion
444 toward animals, humane and caring behaviour toward animals, emotional attachment and
445 attitudes towards animals (Hawkins & Williams, *in press*). Therefore, perceived animal
446 sentience may have an effect on how children treat animals and requires further research; if
447 children believe animals are unemotional and insentient, are they more likely to harm them?
448 And if so, how can we change children's beliefs about animal mind to promote humane
449 behaviour towards animals?

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

450 Personality refers to individual differences in characteristic patterns of thinking,
451 feeling and behaving and may have a driving influence on intentions and acts of animal
452 cruelty in childhood, although personality variables in relation to childhood animal cruelty
453 are not well quantified (Oleson & Henry, 2009). The ‘Dark Triad’ for example, is
454 characterised by a lack of empathy as well as callousness and manipulation towards both
455 human and non-human animals (Kavanagh et al., 2013). Callousness has been studied
456 extensively in relation to aggression among children (Frick et al., 2003) and has been
457 associated with animal cruelty in children (Dadds, Whiting, & Hawes, 2006). Therefore,
458 researchers should consider integrating research methodologies for callousness into the study
459 of animal cruelty (e.g., Gupta, 2008).

460 Conversely, traits such as agreeableness, low extraversion and narcissism have been
461 associated with the opposition to the use of animals in research (Furnham et al., 2003). Eight
462 studies in this review investigated personality variables to some extent, with the majority of
463 the findings indicating an association between childhood animal cruelty and sadism (e.g.,
464 Hensley & Tallichet, 2005). Further research investigating individual differences and
465 personality could open up new avenues in this area and provide potentially useful and
466 significant discoveries, especially for the development of animal cruelty prevention
467 programmes. Moreover, neurobiology may be implicated in childhood animal cruelty (e.g.,
468 Tapia, 1971, Kruesi, 1989, Rogness, 1984) and cannot be overlooked given recent research
469 on the link with callousness and violent behaviour (Rosell & Siever, 2015).

470 Despite an international representation of research in this area, the cultural spread was
471 heavily biased towards the USA, which represented the majority of the studies included in
472 this review (66.6%), followed by Australia (15.4%). Therefore, results from this review lack
473 generalisability to other cultures and societies. Indeed, cultural differences in the treatment of

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

474 animals appear to be an important factor (Serpell, 1996) and future research should take this
475 into consideration.

476 The current research base relied heavily on retrospective reports, which are potentially
477 biased or inaccurate. Retrospective reports have been used to identify risk factors and links
478 between animal cruelty in childhood and future violence in adulthood (Flynn, 1999).
479 However, the reliability and validity of long-term recall is questionable (Hardt & Rutter,
480 2004). Future studies should place greater value on observational and cognitive research
481 methods to explore child-animal relationships in order to elevate the integrity of animal
482 cruelty research. However, due to the sensitivity of this topic, childhood animal cruelty may
483 be difficult to measure and experimental research may not be appropriate, which may explain
484 the lack of studies currently investigating this topic. Future research needs to overcome these
485 methodological difficulties to elevate the potential quality of future research in this area. One
486 possibility is to measure children's attitudes towards animal cruelty, which may be predictive
487 of behaviour (Hawkins & Williams, *in press*; Hawkins et al., *under review*).

488 Across this review, there was little consistency in the animal cruelty measures used
489 and there is currently no strong psychometric evidence to support the reliability or validity of
490 these measures, thus limiting cross-study comparisons and the possibility of meta-analysis.
491 Animal cruelty was commonly only one of many items on a checklist of behavioural
492 symptoms, such as within the Child Behaviour Checklist (Achenbach, 1991). Future studies
493 should aim to create standardised animal cruelty measures that are designed specifically for
494 animal cruelty in children. This would enable the use of consistent outcome measures and
495 allow greater comparisons between studies.

496 Animal cruelty is one symptom of a wide range of behavioural problems, such as
497 conduct disorder, and future research should explore this in greater depth; is animal cruelty

498 just one of a host of behavioural issues or is animal cruelty a specific form of behaviour
499 problems with a distinct causal pathway? Miller (2001) suggests that once a clearer picture of
500 childhood animal cruelty has been established through further investigation, methods to
501 prevent cruelty can be designed; childhood animal cruelty could potentially be prevented
502 through animal cruelty prevention programmes (Hawkins et al., *under review*).

503 **Conclusion**

504 This systematic review provides the first narrative meta-synthesis of empirical
505 research on psychological risk factors for childhood animal cruelty. Results show a range of
506 potential risk factors involved in childhood animal cruelty behaviour but these factors are
507 complex, multifaceted and may be interrelated. It is important to highlight the lack of high
508 quality research in this area. Due to the significant implications for society, child well-being
509 and safety, and animal welfare, it is important that future research addresses and improves
510 upon the methodological flaws outlined in this review.

511 Research on childhood cruelty to animals seems to have come to a standstill during
512 more recent years. The lack of standardised childhood animal cruelty measures as well as
513 sensitivity issues may be impeding the advancement of research in this area. There are
514 considerable advantages in addressing these problems. Research into childhood animal
515 cruelty will not only provide significant information to advance our scientific understanding
516 of animal cruelty behaviour and child-animal relationships in general, but could also produce
517 significant benefits for developing animal cruelty prevention programmes aimed to promote
518 compassionate and humane behaviour towards animals.

519

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CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

744

745 **Table 1.** Search Terms

Category	Search Terms
Age	“Child*” OR “preteen*” OR “preadolescen*” OR “juvenile*” OR “infan*” OR “minor*” OR “subteen*” OR “young*”
Animal cruelty	(“Animal*” or “pet*”) AND (“cruel*” OR “abus*” OR “tortur*” OR “neglect*” OR “harm*” OR “brutality” OR “mistreatment” or “maltreatment”)
Psychological risk factors	“Personality” OR “behavio* disorder” OR “callous*” OR “conduct disorder” OR “antisocial*” OR “psychopath*” OR “sociopath*” OR “sadis*” OR “sentien*” OR “psychiat*” OR “empath*” OR “apath*” OR “psychology*” OR “mental disorder”.

746 *Note.* The search terms were combined so that the results included at least one term from

747 each of the main categories.

748

. Overview of the Findings

First Author Publication year)	Psychological Factor(s) Investigated	Identified Psychological Risk Factors for Childhood Animal Cruelty
Miller (1997)	Abuse	<ul style="list-style-type: none"> AC experiences and aversive punitive and acrimonious childhood histories
Becker (2004)	Family risk factors and delinquency	<ul style="list-style-type: none"> Exposure to marital violence, harsh parenting and AC. AC related to self-reported aggression
Walters (1980)	Aggression and parental brutality	<ul style="list-style-type: none"> Aggression, brutal punishments by parents, temper tantrums, destructive or assaultive outbursts, childhood fights and school truancy, prolonged separation from father and alcoholic father figure, and setting uncontrolled fires
Thompson (2006)	Witnessing abuse	<ul style="list-style-type: none"> Witnessing AC. Higher levels of AC if witnessed a friend, relative, parent, or sibling harm an animal. "Frequently" witnessing AC reported higher levels of AC.
Henry (2006)	Empathy, family environment, sexual abuse	<ul style="list-style-type: none"> Sexual abuse. Caregiving subscale (ATTAS) differentiated abusers. AC scored high on Fantasy subscale.
Malloy (2005)	Abuse, bullying and victimisation	<ul style="list-style-type: none"> Witnessing violence, abuse from parents, bullying and other adverse experiences
Currie (2006)	Domestic abuse	<ul style="list-style-type: none"> Exposure to domestic violence
Scione (1997)	Domestic abuse	<ul style="list-style-type: none"> Domestic abuse
Walters (2013)	Bullying and victimisation	<ul style="list-style-type: none"> Bullying, victimization and behavioural problems
Henry (2007)	Bullying and victimization	<ul style="list-style-type: none"> Multiple acts of AC associated with bullying and low sensitivity to cruelty-related acts
Shapiro (2006)	Psychological/psychiatric disorder (schizophrenia)	<ul style="list-style-type: none"> Schizophrenia. Patient had symptoms of social withdrawal, low productivity in school, 'behaviour', cruel fantasies, and both real and symbolic cruelty to animals.
Yong (2013)	Psychological adjustment and Family functioning	<ul style="list-style-type: none"> Family functioning and child's externalizing coping style predicted only modest variance in AC. Family functioning more of a role in boys AC
Boat (2011)	Aggression, abuse, mental health	<ul style="list-style-type: none"> Bullying, problems with peers, sexual abuse and sexually acting out. AC reported as young as 3 and as old as 17
Walters (1985)	Aggression	<ul style="list-style-type: none"> Family violence, particularly alcoholism and paternal abuse. AC mostly minor and AC more often reported in aggressive criminals.
Truesi (1989)	Psychological/psychiatric disorder	<ul style="list-style-type: none"> Low serotonin levels
Capia (1971)	Aggression, behavioural problems/disorders, mental illness/brain disorder	<ul style="list-style-type: none"> Behavioural problems/disorders, all boys, usually young (average age 9.5), normal intelligence, aggressiveness, destructiveness, bullying, fighting, stealing, and fire setting
Walters 2008 (clinical commentary)	Personality traits, behavioural disorders, neglect and early life stress	<ul style="list-style-type: none"> Early life stress of neglect, sadism towards animals and severe conduct disorder.
Laughn (2011)	Childhood adversities, sexual abuse, bullying	<ul style="list-style-type: none"> Swearing and saying hurtful things, having a parent or other adult living within the home who went to jail or prison, and sexual abuse
McGue (2008)	Family violence	<ul style="list-style-type: none"> Child maltreatment, domestic violence and victimisation.
Walters (2015)	Family context	<ul style="list-style-type: none"> Family context and proactive and reactive externalizing variables
Walters (2011)	Sadism, aggression	<ul style="list-style-type: none"> AC motivations: 64% (of sample) for fun, 24% out of anger or witness AC, 22% sadistic motivation, 20% hated the animal, 16% to shock others (16%) and 14% for revenge

AC = animal cruelty

Overview of the Findings

Sadism, aggression/violence	<ul style="list-style-type: none"> • AC motivations: almost two thirds for fun, one fourth out of anger or imitation and one fifth out of hatred of the animal.
Empathy, delinquency, personality and family context	<ul style="list-style-type: none"> • AC motivations: 2.4% answered animals deserve it or it is fun. AC associated with vandalism and serious violent acts and lack of empathy
Childhood experiences (witnessing animal cruelty)	<ul style="list-style-type: none"> • Those who observed a friend abuse animals were more likely to hurt or kill animals more frequently and those who were younger when they first witnessed animal cruelty also hurt or killed animals at a younger age
Sexual abuse	<ul style="list-style-type: none"> • Sexual abuse
Psychological/psychiatric disorder	<ul style="list-style-type: none"> • Zero dopamine
Abuse and domestic violence	<ul style="list-style-type: none"> • Child maltreatment. AC not associated with domestic violence
Domestic violence	<ul style="list-style-type: none"> • Violence within the home
Empathy, attachment	<ul style="list-style-type: none"> • Empathy and (to a lesser degree) attachment significantly negatively correlated with animal cruelty
Conduct disorder, sexual abuse, domestic violence	<ul style="list-style-type: none"> • Histories of physical and/or sexual child abuse and domestic violence
Psychiatric disturbance	<ul style="list-style-type: none"> • AC one of many symptoms of psychiatric disturbance
Bullying, family conflict	<ul style="list-style-type: none"> • Witnessing abuse, bullying others and family conflict
Mental health and behavioural problems	<ul style="list-style-type: none"> • Parent-reported hyperactivity in boys, self-reported conduct problems in girls and parent-reported total difficulties
Behavioural problems	<ul style="list-style-type: none"> • Behavioural problems such as fire setting, intense anger at maternal rejection, neglect, or abandonment and poor social comprehension and judgment
Domestic abuse	<ul style="list-style-type: none"> • Domestic abuse
Domestic abuse, sexual abuse, psychiatric distress	<ul style="list-style-type: none"> • Maltreatment history, domestic abuse and sexual abuse.
Personality, aggression	<ul style="list-style-type: none"> • AC motivations: almost half out of anger, more than a third did so for fun.
Psychopathic traits, family factors	<ul style="list-style-type: none"> • Callous-unemotional traits, children's temperamental characteristics and parents low education
Psychological and behavioural disorders	<ul style="list-style-type: none"> • Conduct symptoms, higher self-esteem/self-perception, difficulties in family functioning

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

Description of Studies Found Following a Systematic Review into Childhood Animal Cruelty

Author (Publication year) Journal Name	Study Type	Animal Cruelty Measures/ Instruments	Participants	Setting and Country of Study
(1997)	Retrospective, self-report questionnaire	A-RTI	314 adults (inmates), 84% males (mean age 31)	Prisoner classification centre, US
r (2004)	10-year prospective study. Interviews and juvenile court records	CAS, CBCL	363 mothers and one of their children between ages 6 and 12 (mean 9.1)	Not specified,
us (1980)	Structured clinical interviews and multiple choice questionnaires	Not specified	346 adult male psychiatric patients Animal Cruelty Group subjects (N= 18)	Inpatient psych service, US
son (2006)	Self-report survey	CAI, CAAI, CTAQ	Community sample of 281 adolescents, 12-18 years (mean 14.8), 113 males, 168 females	School, Australia
(2006)	Retrospective self-report questionnaire	ATTAS, A-RTI	286 college students, 53.5% women, 18-50 years (mean 22.7)	Not specified Country: US
(2005)	Self-report questionnaire	PET Scale	Italian preadolescents, 268 girls, 264 boys, aged 9-12 years	School, Italy
(2006)	Interviews	CBCL	Community sample of 47 mothers with 2 children (5-17 years), domestic abuse victims	Not specified, Canada
ne (1997)	Surveys (mothers report)	PMA	38 women, domestic abuse victims	Safe house/sh US
ers (2013)	Retrospective surveys	EWA	241 male undergraduate students	Not specified,
(2007)	Surveys	A-RTI, ATTAS	185 college males, 18-48 years (Mean 22.2)	Not specified,
o (2006)	Case studies/observations	N/A	7 year old girl	Not specified,
(2013)	Matched case surveys	CABTA	Mothers and fathers of 729 children, 393 female and 336 male children, aged 6-12 years (mean 8.7)	School, China
(2011)	Retrospective study using psychiatric intake assessment	Other	Psychiatric intake children, 110 children, 11-17 years (mean 11.3), 71.8% male	N/A, US
(1985)	Retrospective interviews	Other	152 male adult criminals, mostly in 30's	Prison, US
(1989)	Case study/observations/interview	Other	12 year old girl	Not specified,
(1971)	Case studies	N/A	18 children, aged 5-15 (average 9.5) years, all boys	Not specified,
008 (clinical entary)	Case study/clinical commentary	N/A	Boy aged 8	Therapy, UK

d. Description of Studies Found Following a Systematic Review into Childhood Animal Cruelty

1)	Data derived from Waves I and II of the National Epidemiologic Survey on Alcohol and Related Conditions (structured psychiatric interviews), retrospective reporting	Other	709 adults, 18 years and older	N/A, US
5)	Retrospective, computer-based, self-report measure	AVI	860 college students, 75.6% female	Not specified, US
5)	Retrospective. Data from Pathways to Desistance sample (Mulvey, 2012), baseline interviews	Other	Data from 1354 adjudicated delinquents aged 14-19 years (mean 16 years), 86.4% male	N/A, US
1)	Retrospective, self-administered questionnaires	Other	180 adult inmates	Prison, US
1)	Retrospective questionnaires	Other	180 adult inmates (mean age 35)	Prison, US
	Data from the 2006 Swiss National Self-Reported Delinquency Survey	Other	3,648 pupils in 7th, 8th, and 9th grades	N/A, Switzerland
	Interviews or questionnaires		Ages 13-16 years	
05)	Self-report questionnaires	Other	261 adult male inmates	Prison, US
3)	Data from various US prisons collected by FBI special agents. In-depth interviews by FBI agents. Retrospective	Other	36 sexually orientated murderers (adult men)	N/A, US
84)	Clinical data (e.g. DSM classification)	Other	20 boys , ages 6-16 years (mean 11)	Psychiatric hospital, US
4)	Data from the Environmental Risk (E-Risk) Longitudinal Twin Study. Assessments/interviews (mothers reports)	CBCL	2,232 children, 5-12 years (49% boys)	Home visits, UK
	National, longitudinal, and multigenerational sample collected by the National Youth Survey Family Study (Multistage cluster sampling design, interviews)	Other	1,614 individuals, 11-31 years old	N/A, US
008)	Self-report questionnaires	CTAQ, CAI	281 students (12-18 years, mean 14.8, 113 males, 168 females)	Classroom, Australia
5)	Coding sheet for information from files of boys who had received residential treatment	Other	50 early- to late adolescent boys	N/A, US
	Survey of psychiatrically hospitalized children and adolescents (diagnosed via interviews). Case studies	N/A	388 children and adolescents/adults, 13-24 years old, 249 were boys	N/A, US

Description of Studies Found Following a Systematic Review into Childhood Animal Cruelty

Self-report questionnaires	PET scale	249 adolescents, aged 12 to 16 (mean 14) years, 144 female	Classroom, Australia
Questionnaire (parent report)	CABTA	496 children aged between 6 and 12 years and parents, 148 boys	Classroom, Malaysia
Psychological test data, psychiatric evaluations, and social histories examined.	Other	50 children in residential care, predominantly male, age 6-17 (mean 12)	N/A, US
Mothers report, telephone interview	Other	102 adult women, 23 to 66 years (mean 38.5)	Over the phone, Australia
Caregivers reports	CBCL, CSBI	6-12-year-old children, sexually abused sample (N=481), psychiatric comparison group (n=412)	Not stated, US
Retrospective questionnaires	Other	261 adult inmates	Prison, US
Parent and child self-report questionnaires	CAI	131 children aged 6 to 13 years (mean 10), 67 males and 64 females	At child's home, Australia
Questionnaires for children, teachers (telephone interview) and parents reanalysis of previously collected data	CBCL	Clinic sample of 141 children, ages of 5-12 years	In school/over the phone/at child's home, Australia

Violence Inventory (modified version of the Boat Inventory on Animal-Related Experiences (A-RTI); Boat, 1994), Four Checklist (Achenbach, 1991), CAI: The Children and Animals Inventory (Dadds et al., 2004), CAAI: Children and Animals Instrument (Ascione et al., 1997), CTAQ: Children's Treatment of Animals Questionnaire (Thompson & Gullone, 2004), Physical and Emotional Tormenting against animals scale (Baldry, 2004), CABTA: The Children's Attitudes and Animals questionnaire (Guymer et al., 2001), CSBI: Child Sexual Behaviour Inventory (Friedrich, 1997), CAS: Child Sexual Abuse Scale (Hodges et al., 1982), ATTAS: Attitudes Toward the Treatment of Animals Scale (Henry, 2004), EWA: Experiences with Animal Abuse (Flynn, 1999) and PMA: Pet Maltreatment Assessment (Ascione & Weber, 1995).

CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

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755 **Table 4.** Quality Assessment Results

Paper	Rater 1		Rater 2	
	Quality Score %	Category	Quality Score %	Category
1	76.2	2	76.2	2
2	76.2	2	76.2	2
3	27.1	4	27.1	4
4	66.7	2	66.7	2
5	66.7	2	66.7	2
6	61.9	2	61.9	2
7	52.4	3	50	3
8	52.1	3	52.1	3
9	57.1	3	57.1	3
10	66.7	2	66.7	2
12	73.8	2	73.8	2
13	50	3	50	3
14	68.8	2	68.8	2
18	85.7	1	88.1	1
19	64.3	2	64.3	2
20	76.2	2	76.2	2
21	61.9	2	61.9	2
22	57.1	3	57.1	3
23	73.8	2	73.8	2
24	61.9	2	64.3	2
25	47.9	3	47.9	3
26	64.3	2	64.3	2
27	71.4	2	71.4	2
28	83.3	1	83.3	1
29	71.4	2	73.8	2
30	73.8	2	73.8	2
32	69	2	71.4	2
33	66.7	2	66.7	2
34	45.2	3	42.9	3
35	56.3	3	56.3	3
36	57.1	3	61.9	2
37	59.5	3	59.5	3
38	71.4	2	71.4	2
39	66.7	2	66.7	2

756 *Note:* (Reliability: $\kappa=.78$). Case studies not included.

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CHILDHOOD ANIMAL CRUELTY: A SYSTEMATIC REVIEW

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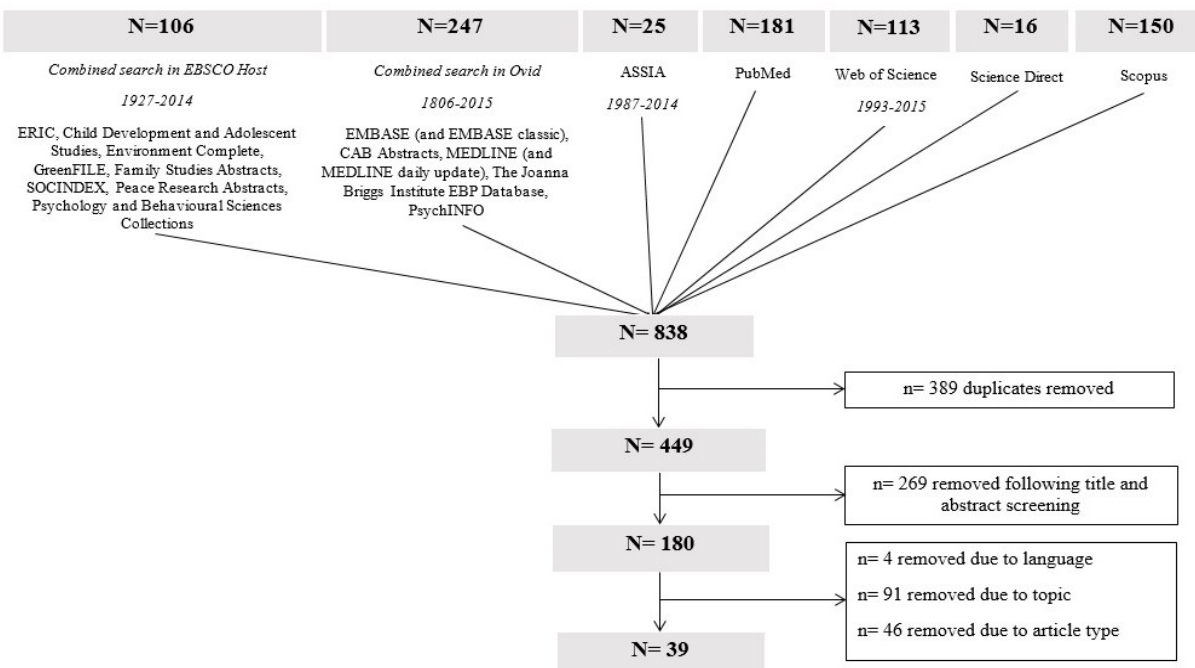


Figure 1. A Flowchart of the Study Selection Process