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Attitude toward animals in school aged children: A systematic literature review of influencing factors and educational strategies (2010–2025)

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Abstract This systematic literature review investigates the attitudes of elementary school children (aged 6–12) toward animals, focusing on key influencing factors and educational strategies implemented between 2010 and 2025. Following a rigorous screening and critical appraisal process, 27 scientific articles were analyzed via a thematic approach. The findings reveal five primary themes shaping children's attitudes: (1) animal preference, (2) pet ownership, (3) gender differences, (4) the physical environment and access to nature, and (5) educational interventions. Children tend to favor animals that are perceived as attractive and familiar while displaying negative attitudes toward those deemed dangerous or repulsive. Pet ownership and direct interactions with animals correlate with heightened empathy and more favorable dispositions. Notably, girls demonstrate greater empathy and moral concern toward animals than boys do. The living environment, whether urban or rural, affects exposure to local fauna, although its direct impact on attitudes remains inconsistent. Effective educational interventions integrate scientific knowledge with emotional engagement, incorporating concepts such as animal sentience and children's belief in the mental and emotional capacities of animals (Child-BAM). While many programs yield positive outcomes, gaps persist in longitudinal research, cross-cultural representation (particularly beyond WEIRD populations), and robust theoretical foundations. Future studies should employ mixed-method designs, account for moderator or mediator variables, and develop contextually grounded, sustainable interventions. In summary, cultivating positive attitudes toward animals during early childhood not only advances animal welfare but also fosters a generation characterized by greater empathy, environmental awareness, and ecological justice.

Keywords: pro animal, biodiversity, empathy, moral attitudes, ethics

1. Introduction

Human attitudes toward animals constitute a critical concern within animal welfare research, reflecting deeper societal values, ethical frameworks, and moral principles (Serpell, 2004). However, the pervasive exploitation of animals, often devoid of ethical consideration, remains a widespread practice. Animals are frequently relegated to a subordinate status and are viewed primarily as instruments for human benefit (Vollum et al., 2004). Such perceptions risk fostering negative attitudes toward animals, perpetuating cycles of disregard and harm (Beatson et al., 2009). Substantive progress in animal welfare requires a paradigm shift toward prowelfare and protectionist attitudes among the general public. Only through such transformative perspectives can meaningful, sustainable change be achieved.

Attitudes toward animals comprise three fundamental components, including the affective (emotional responses), cognitive (beliefs and knowledge), and behavioral (actions and intentions) dimensions of human–animal interactions. These attitudes exhibit considerable variability across populations, ranging from highly positive orientations where animals are regarded as family members to markedly negative perspectives where animals are viewed merely as exploitable resources. The perceived role of animals significantly influences human categorization patterns and ethical evaluations. When animals are recognized as possessing intrinsic value, ethical considerations toward them are substantially strengthened. Conversely, when animals are conceptualized primarily as resources or instruments for human benefit, ethical concerns are markedly diminished (Almeida et al., 2014). The frameworks of speciesism and anthropocentrism further entrench negative attitudes toward animals by reinforcing hierarchical worldviews that position humans as central and other species as subordinates (Banach & Stel, 2024; Comaskey & Eith, 2023; Wilks et al., 2021). These ideological constructs systematically disadvantage nonhuman animals in moral consideration and practical treatment.

Understanding children's attitudes toward animals provides critical insights into the future trajectory of humanism, environmental ethics, and global sustainability efforts. This understanding is essential for achieving key sustainable development goals (SDGs), particularly those pertaining to quality education, biodiversity conservation, and the welfare of

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living organisms (Bruder et al., 2022; Spanjol & Zucca, 2023). Children's attitudes toward animals play a pivotal role in shaping a generation characterized by empathy, environmental concern, and ethical consideration for other species (Ascione & Weber, 1996; Binngießer & Randler, 2015; Fonseca et al., 2011; Heise et al., 2016). The human–animal relationship has emerged as a profound moral dilemma in contemporary society (Bègue & Laine, 2017). The ongoing biodiversity crisis, a pressing global challenge, is inextricably linked to human attitudes and behaviors toward animals. Consequently, effective conservation strategies must integrate not only scientific interventions but also ethical frameworks and cross-cultural educational initiatives (Bruder et al., 2022; Härtel et al., 2023). Cultivating positive attitudes toward animals serves as a foundational element in advancing both conservation success and animal welfare (Batt, 2009).

Research indicates a developmental trajectory in children's perceptions of animals, with early childhood characterized by attributing high moral standing to animals, which typically diminishes during adolescence and adulthood (Binngießer et al., 2013; Neldner & Wilks, 2022; Wilks et al., 2021). During the elementary school years (ages 6–12), children develop categorical frameworks for understanding animals, classifying them along dimensions such as good/bad, edible/inedible, and tame/dangerous (Corbacho-Cuello et al., 2024). These classifications, rooted in psychological schema theory, serve as cognitive tools for organizing information about animals while simultaneously shaping lasting attitudes and behavioral tendencies toward animals and the environment (Pagani, 2011). Consequently, the elementary school period represents a critical window for establishing moral and ethical foundations regarding human-nonhuman relationships.

Extensive research has investigated elementary school children's attitudes toward animals (Fonseca et al., 2011; Herbert & Lynch, 2017; Nicoll et al., 2008; Samuels, 2018), revealing their fundamental connections to empathy (Taylor & Signal, 2005), moral development, and ethical concerns for other beings (Bègue & Laine, 2017; Fonseca et al., 2011). Scholars emphasize the necessity of fostering intrinsic respect for living creatures during this formative period (Yanco et al., 2021). The study of children's animal attitudes extends beyond welfare considerations, representing a critical component of inclusive character education (Arkow, 2006; Yanco et al., 2021). Effective educational interventions must therefore integrate not only factual knowledge about animals but also perceptions, ethical reasoning, respect, and responsibility toward them (Mariti et al., 2011; Unti & DeRosa, 2003).

Research has employed diverse methodological approaches to examine children's attitudes toward animals, ranging from descriptive investigations of animal preferences (Kellert, 1985b, 1985a; Kidd & Kidd, 1990; Stanisstreet et al., 1993) to experimental studies assessing the efficacy of animal-focused educational interventions (Nicoll et al., 2008; Samuels et al., 2016). Recent work by Henseler Kozachenko and Piazza (2021) and Neldner and Wilks (2022) has shifted focus toward children's evaluative judgments of animals, particularly with respect to moral status comparisons and life valuations. However, this emphasis on cognitive appraisal represents only one dimension of attitude formation. A comprehensive understanding requires the integration of the tripartite model of attitudes, encompassing cognitive (beliefs), affective (emotional responses), and conative (behavioral tendencies) components. Consequently, research must extend beyond singular assessments of value judgments or preferences to capture the multifaceted nature of children's attitudes toward animals.

Building upon these established research approaches, a systematic literature review methodology offers a rigorous framework for synthesizing existing knowledge, identifying critical research gaps, and advancing the scholarly understanding of children's attitudes toward animals. Given the evolving nature of research in this domain, there is a pressing need to comprehensively analyze contemporary literature (2010-2025) examining elementary students' animal attitudes. This study specifically aims to (1) systematically identify key factors influencing children's attitudes toward animals and (2) evaluate effective educational strategies for fostering positive animal-related dispositions. By addressing these objectives, the current review seeks to contribute both theoretically and practically to the fields of developmental psychology and humane education.

2. Materials and Methods

2.1. Search bar and keywords

In December 2024, we conducted a comprehensive systematic search following established PRISMA guidelines. The data collection process commenced with an exhaustive search of the Scopus database, which was selected for its rigorous journal coverage in psychological and educational research. Our search strategy employed a Boolean protocol designed to capture the full spectrum of terminology used in studies of children's animal attitudes:

("attitude* toward* animal" OR "humane attitude" OR "animal attitude" OR "belief about animal" OR "perception of animal")

AND

("child" OR "elementary school" OR "primary education" OR "elementary student*" OR "elementary education")

Inclusion criteria

The review applied the following five inclusion criteria to ensure methodological consistency and conceptual relevance:

1. Publication standards: Only empirical studies published in peer-reviewed academic journals were considered.
2. Participant Characteristics: Studies were required to include elementary school-aged participants (6--12 years) as their primary sample.

3. Attitudinal Focus: Research needs to examine general attitudes toward animals rather than focusing on specific animal categories (e.g., pets, wildlife) or restricted contexts.
4. Accessibility: Articles were limited to English-language publications with full-text availability.
5. Temporal parameters: The review included studies published between January 2010 and December 2025.

While the search strategy did not explicitly include "behavior toward animals" as a keyword, we incorporated studies examining behavioral tendencies on the basis of the tripartite attitude model (Ajzen & Fishbein, 2005; Herzog et al., 2001). This theoretical framework recognizes behavioral (conative) components as integral to attitudinal constructs. Consequently, articles investigating children's behavioral dispositions or the treatment of animals were included in our analysis, provided that they met all other inclusion criteria.

2.2. Article extraction and critical appraisal

From the initial pool of 200 articles identified through the Scopus database, one duplicate article was removed, resulting in 199 articles eligible for title and abstract screening. Following this screening, 141 articles were excluded because of irrelevance, leaving 58 articles for full-text eligibility assessment. Upon full-text review, an additional 31 articles were excluded for the following reasons: failure to address attitudes toward animals, unavailability of full-text versions, noncompliance with the target population (elementary school-aged children), nonempirical article types, or nonEnglish language publications. The remaining 27 articles subsequently underwent critical appraisal via a standardized checklist to assess methodological quality. All 27 articles met the inclusion criteria and were deemed suitable for final synthesis, resulting in 27 articles being retained for analysis. The article selection process is presented in Figure 1.

2.3. Data coding and analysis

The 27 selected articles, summarized in table 1 and organized chronologically by publication year and study type, were analyzed through narrative synthesis and thematic analysis (Percy et al., 2015). Five key themes emerged regarding determinants of children's animal attitudes, including (1) animal preferences, (2) pet ownership, (3) gender differences, (4) the physical environment, and (5) access to nature. The sample comprised 15 determinant studies, 10 intervention studies, and 2 qualitative studies. Following the inductive approach of Braun and Clarke (2006), we employed a color coding system to visually identify patterns, assigning matching colors to similar findings and distinct colors to divergent results, thereby facilitating theme development through comparative analysis.

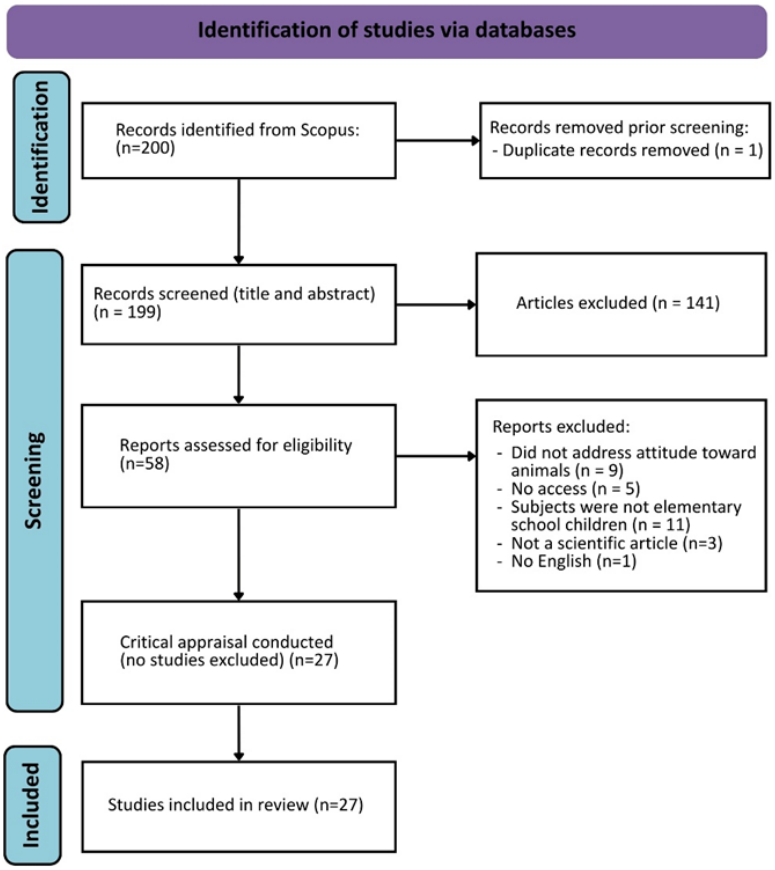

Figure 1 PRISMA flow diagram of the study selection process: database search results, abstract screening, and full-text retrieval.

3. Results

The comprehensive analysis of 27 selected articles revealed five predominant themes influencing children's attitudes toward animals: (1) animal preferences, (2) pet ownership experiences, (3) gender differences, (4) physical environment characteristics and access to natural spaces, and (5) educational strategies and intervention programs specifically designed to enhance children's positive attitudes toward animals. These findings collectively provide a robust framework for understanding the multifaceted determinants of children's animal-related attitudes and the most effective approaches for their cultivation.

3.1. Animal preferences

In general, analyses have revealed that children consistently prefer attractive, nonthreatening, and familiar animals such as dogs, rabbits, and tortoises, often exhibiting protective attitudes toward these species (Almeida et al., 2014; Ballouard et al., 2020; Prokop & Tunnicliffe, 2010). Conversely, they display aversion toward animals perceived as threatening (snakes, wolves), disgusting (cockroaches, woodlice), or disease-carrying (rats), with these negative attitudes driven primarily by fear, disgust sensitivity, and perceived health risks (Alfoldi & Alfoldi, 2019; Ballouard et al., 2012; Fančovičová & Prokop, 2018; Prokop & Tunnicliffe, 2010).

Children typically exhibit negative perceptions of invertebrates, particularly those associated with pain (e.g., bees, wasps) or those perceived as unattractive, threatening, or linked to unclean environments (Breuer et al., 2015; Schlegel et al., 2015). However, this aversion is not universal; brightly colored or flying insects often receive more favorable evaluations. Notably, Schonfelder and Bogner (2017) reported that children demonstrate considerable interest in bees, valuing their ecological contributions (e.g., honey production) while maintaining conditional perceptions of risk. Most children consider bees harmless unless provoked, with attitudes heavily influenced by personal experiences (e.g., previous stings). This dichotomy highlights how children's invertebrate evaluations balance aesthetic preferences, perceived utility, and individual experiences.

Children's negative attitudes extend to wild animals involved in human–wildlife conflicts, particularly species perceived as threats to human safety or livelihoods. In Brazil, jaguars (Panthera onca) are widely viewed as dangerous predators that endanger livestock, leading children to internalize sociocultural norms that legitimize their eradication (Marchini & Macdonald, 2020). Similarly, Slovenian children develop unfavorable perceptions of wild boars (Sus scrofa) because of their crop-raising behavior and destruction of agricultural lands (Siard & Jordan, 2018). These case studies demonstrate how children's attitudes toward wildlife are shaped by local ecological conflicts and prevailing community values, often prioritizing human interests over conservation concerns.

Research has demonstrated that direct interactions can modify children's negative perceptions of certain animals, although with varying effectiveness. Ballouard et al. (2012) reported that structured field activities involving snakes significantly reduce children's fear and increase their protective attitudes, suggesting that experiential learning can overcome fear-based stereotypes. However, Fančovičová and Prokop (2018) reported that while direct observation of woodlice improved children's conservation attitudes, it failed to substantially reduce their disgust responses. These contrasting findings indicate that while direct experience can effectively alter the cognitive evaluations of animals, its capacity to mitigate deep-seated emotional aversions (e.g., disgust) appears more limited, highlighting the complex interplay between cognitive and affective components in attitude formation.

Research reveals a concerning disconnect in children's ecological awareness, demonstrating greater recognition of exotic, media-promoted species than local fauna in their immediate environments (Ballouard et al., 2011). This media effect extends to conservation preferences, with children disproportionately valuing protection for charismatic megafauna featured in popular media over locally relevant species. Such skewed perceptions may inadvertently undermine conservation efforts for indigenous ecosystems while reflecting the powerful influence of media in shaping environmental attitudes during formative years.

3.2. Pet ownership

Children who actively care for pets demonstrate heightened empathy and understanding of animal welfare, often viewing their pets as family members, which enhances their emotional well-being (Hawkins & Williams, 2017; Menor-Campos et al., 2019; Prokop & Tunnicliffe, 2010). These interactions foster recognition of animals' emotions and needs, increasing children's tolerance for natural animal behaviors while strengthening their belief in ethical treatment (Binngießer et al., 2013). Such daily engagement serves as critical experiential learning, cultivating both emotional bonds and cognitive awareness of animal sentience.

Elaborating further, Burich and Williams (2020) reported that children with prior livestock care experience presented more positive attitudes toward farm animals and greater tolerance for typical livestock characteristics (e.g., odors, vocalizations) than did those with limited or no direct contact. Their research revealed a clear dichotomy: while children with hands-on livestock experience demonstrated adaptive responses, those lacking direct exposure frequently reported discomfort and heightened sensitivity to animal-related stimuli. These findings underscore how regular, meaningful interactions with livestock can foster children's emotional adaptation and positive perceptions of farm animals.

Ballouard et al. (2020) identified a concerning paradox in children's conservation attitudes, while strong affection for charismatic species, such as Hermann's tortoise (Testudo hermanni), can foster interest in wildlife protection, it may simultaneously threaten vulnerable populations. Their research revealed that children's attraction to tortoises' appealing appearance and behaviors often translate into desires to keep them pets. This well-intended but ecologically harmful impulse, if acted upon through wildlife collection, could significantly impact wild populations already facing habitat pressures. The findings underscore the critical need to channel children's natural fascination with wildlife into appropriate conservation behaviors rather than extractive practices.

While pet ownership is positively correlated with children's animal attitudes, research indicates that structured educational experiences exert a more substantial influence on knowledge acquisition and attitude formation. Ellsworth et al. (2017) examined this phenomenon through the 4-H school program, which provides skills development and knowledge about companion animals, particularly dogs. Their findings revealed that although many participants were dog owners, pet ownership alone failed to fully account for the observed attitude changes. Instead, the program's effectiveness stemmed from its experiential learning components, suggesting that deliberate educational interventions, when properly designed, can surpass the impact of passive pet ownership in shaping children's understanding of and attitudes toward animals.

3.3. Gender

Research reveals consistent gender-based patterns in children's animal-related attitudes and preferences. Boys typically demonstrate greater interest in and affinity for animals commonly perceived as threatening or unappealing, including predatory species and invertebrates (Almeida et al., 2014; Schlegel et al., 2015). In contrast, girls show stronger preferences for domesticated and charismatic animals (e.g., rabbits and squirrels) and exhibit more protective attitudes overall, even toward less favored species (Fančovičová & Prokop, 2018). Notably, girls consistently display more positive animal attitudes than boys across multiple studies, although this manifests differently, while boys may approach feared animals with curiosity, girls demonstrate greater general concern for animal welfare (Binngießer et al., 2013).

Research has demonstrated significant gender-based divergences in children's ethical perspectives on animal welfare issues. Girls consistently exhibit greater empathy and concern regarding practices involving animal suffering, including slaughter, experimentation, and habitat destruction (Zhbanova et al., 2020). This pattern reflects fundamentally different value systems: girls predominantly express humanistic and moralistic orientations characterized by protective attitudes, whereas boys more frequently articulate utilitarian and dominionistic perspectives that emphasize human dominance and practical benefits. These findings suggest that gender shapes not only children's affective responses to animals but also their underlying moral frameworks for conceptualizing human–animal relationships.

In addition, Siard and Jordan (2018) reported that women express greater fear of wild boar (Sus scrofa) than men do, reflecting both evolutionary and experiential factors. Women's heightened wariness may stem from historical vulnerability to predators, whereas men's reduced fear correlates with more frequent direct encounters during male-dominated outdoor activities. These differences highlight how biological predispositions and socialization patterns jointly shape wildlife attitudes.

Research highlights distinct gender considerations in conservation strategies. Marchini and Macdonald (2020) emphasize the critical role of engaging adult males in conservation programs, particularly for species such as jaguars (Panthera onca), given their predominant influence on wildlife-related decision-making. Conversely, Schuttler et al. (2019) reported that girls often demonstrate less familiarity with local fauna, suggesting that targeted outdoor experiential learning may be essential to strengthen their connection with native wildlife. These findings underscore the need for gender-differentiated approaches in conservation education to address varying knowledge gaps, social roles, and engagement opportunities effectively.

3.4. Physical environment and access to nature

The physical environment, particularly geographic proximity to animal habitats and degree of urbanization, significantly influences children's attitudes toward animals. However, mere physical closeness proves insufficient without substantive direct experiences with wildlife. Ballouard et al. (2020) demonstrated this principle through their study of Hermann's tortoises (Testudo hermanni), finding that children living near natural habitats developed more positive attitudes when they had authentic interactions with the species. These findings emphasize that emotional engagement during in situ wildlife encounters enhances both affective bonds and ecological awareness more effectively than does passive proximity alone.

Comparative research by Bowie et al. (2021) highlights striking differences in children's attitudes toward bonobos (Pan paniscus) on the basis of their lived experience. In Ilonga-Pôo, where children coexist with bonobos in their natural habitat, frequent direct observations of bonobo behavior cultivate profound empathy and moral concern, in which some children even equate consuming bonobos with cannibalism. Conversely, urban Kinshasa children, geographically and experientially distant from bonobo habitats, displayed more neutral conservation attitudes shaped primarily by formal education and media rather than ecological immersion. These findings demonstrate how sustained, firsthand wildlife experiences foster deeper ethical engagement than indirect knowledge acquisition alone does.

While access to green spaces promotes children's interest in animals over plants (Alfoldi & Alfoldi, 2019), mere geographical proximity does not guarantee positive attitudes, such as in Siard and Jordan (2018), who reported similar perceptions across Slovenian communities despite varying exposure, as conflicts were viewed societally rather than personally. These findings highlight that meaningful, positive interactions drive animal empathy more than passive proximity alone does, particularly when human–wildlife conflicts frame encounters.

Schuttler et al. (2019) revealed a paradox in their urban-exurban-rural comparative study: while rural children had more direct wildlife encounters, all groups shared similar animal preferences, favoring charismatic species, including pandas and wolves, while fearing snakes and spiders. This striking uniformity across geographical zones suggests that media exposure and formal education may override local environmental experiences in shaping children's perceptions, highlighting the powerful role of cultural and virtual influences alongside physical proximity.

3.5. Educational strategies or programs to improve children's attitudes toward animals

Research consistently highlights the critical role of early childhood education in shaping lasting attitudes toward animals (Ballouard et al., 2012; Bexell et al., 2013; Fančovičová & Prokop, 2018; Hawkins & Williams, 2017; Iqbal et al., 2024; Jerger et al., 2022; Leeds et al., 2017; Marchini & Macdonald, 2020; Tsai & Kaufman, 2014; Williams et al., 2022). Almeida et al. (2014) emphasize that elementary school years constitute a sensitive period for developing animal-related values, as children's foundational empathy skills and moral frameworks are particularly malleable during this developmental stage. These findings underline the importance of implementing targeted humane education programs while children's cognitive and affective schemas regarding animals are still forming. As such, the field of humane education has been identified in multiple studies as an effective pedagogical approach for interventions aimed at improving attitudes toward animals (Binngießer et al., 2013; Iqbal et al., 2024; Prokop & Tunnicliffe, 2010; Williams et al., 2022).

This systematic review identifies two primary mechanisms for cultivating children's positive attitudes toward animals: (1) enhancing scientific knowledge about animal biology and ecology and (2) reshaping perceptions of the intrinsic value and ecological roles of animals. Particularly impactful is targeted education about misunderstood or feared species, as accurate information can counteract negative biases while promoting evidence-based appreciation. These complementary approaches, cognitive enrichment and value reorientation, collectively address both the informational and the affective dimensions of attitude formation.

Research has demonstrated that structured ecological education can significantly improve children's perceptions of undervalued species. Breuer et al. (2015) and Schlegel et al. (2015) reported that teaching about the ecosystem roles of invertebrates, including pollination, pest control, and nutrient cycling, combined with direct nature experiences, enhanced both the understanding of biodiversity and the appreciation of species. Similarly, Fančovičová and Prokop (2018) successfully increased children's interest in woodlice by examining their morphological adaptations and ecological functions within food webs. These studies collectively show that contextualizing less charistic species within their ecological networks can effectively shift children's attitudes from aversion to scientific appreciation.

Research has demonstrated that immersive, hands-on wildlife education programs effectively reshaped children's attitudes toward feared or misunderstood species. Ballouard et al. (2012) reported that direct snake-handling experiences reduced aversion while fostering protective instincts, paralleled by the Great Ape Education Project's success in enhancing ape knowledge through interactive learning (Leeds et al., 2017). Similarly, Bowie et al. (2021) ape reintroduction initiatives and the Marchini and Macdonald (2020) Jaguar Education Program, which uses films, discussions, and family activities, show that combining ecological knowledge with emotional engagement improves conservation attitudes, even in human–wildlife conflict scenarios. These programs collectively prove that firsthand experiences coupled with science education can convert negative perceptions into informed stewardship.

Empirical evidence consistently demonstrates that hands-on interactions with animals significantly enhance children's conservation attitudes and ecological understanding. Structured programs such as snake handling in life in the shrub project (Ballouard et al., 2012), biodiversity camps (Bexell et al., 2013), and livestock care (Burich & Williams, 2020) effectively reduce fear while deepening empathy and species-specific knowledge. Similarly, animal care initiatives, including 4-H programs (Ellsworth et al., 2017) and Rabbit Rescuers (Williams et al., 2022), cultivate responsibility and welfare awareness through sustained pet guardianship. Notably, even exposure to less charistic local fauna such as invertebrates fosters positive conservation attitudes when framed through ecological significance (Schlegel et al., 2015). These findings collectively underscore that direct, meaningful animal interactions, whether through structured programs or routine care, serve as powerful catalysts for developing pro-conservation values across diverse species.

Teaching children about animal sentience, particularly their capacity to experience emotions (e.g., happiness, pain, fear), fosters intrinsic appreciation and empathy, directly enhancing awareness of animal rights and welfare needs (Bexell et al., 2013; Burich & Williams, 2020; Ellsworth et al., 2017; Iqbal et al., 2024; Tsai & Kaufman, 2014). Central to this is Beliefs about Animal Minds (BAM), the cognitive-affective recognition that animals possess mental capacities such as emotions, thought, and consciousness. Hawkins and Williams (2016) demonstrated that Child-BAM (the child-specific manifestation of BAM) strongly predicts attitudes, from which children with high child-BAM exhibit greater compassion, whereas those with low child-BAM are

more tolerant of cruelty, whether intentional or neglectful. Although the statistical link requires further validation, these findings underscore that foundational beliefs about animal sentience shape behavioral tendencies toward animals.

Elaborating further, Hawkins and Williams (2017) empirically validated the efficacy of child-BAM-focused interventions through their evaluation of four Scottish SPCA programs, including Animal-Friendly Citizens (AFC), You and Your Pet (YYP), Wildlife Welfare (WW), and Food and Farm Animal Welfare (FFAW). While all the programs significantly improved children's animal welfare knowledge, YYP and FFAW additionally enhanced children's beliefs in their cognitive-emotional capacities (Child-BAM). Although attitude changes and pet attachment improvements did not reach statistical significance, positive trends emerged across all interventions. These results suggest that brief (1-hour) educational sessions effectively strengthen the cognitive understanding of animal welfare but require greater intensity and duration to meaningfully influence affective (e.g., empathy) and behavioral dimensions. Accordingly, the findings highlight the need for sustained, iterative programs to cultivate deeply rooted attitudinal and emotional shifts toward animals.

Table 1 Summary of selected articles.

Citation	Qualitative Study	Determinant study	Intervention Study	Country	Sample Size	age	Findings
Prokop & Tunnicliffe, 2010		√		Slovakia	1.297	10 - 15 years	Children have good knowledge of less popular animals but less positive attitudes. Having a pet at home is associated with more positive attitudes toward animals.
Ballouard et al., 2011		√		France	251	7 -11 years	Children have very limited knowledge of local biodiversity compared to exotic animals. Children are more familiar with company logos and virtual characters, such as Pokémon,than with native animals and plants in the environment.
Ballouard et al., 2012			√	France	520	6 -11 years	Field experiences involving physical contact with snakes, showed increased positive attitudes toward snakes and expressed a desire to protect snakes.
Bexell et al., 2009			√	People's Republic of China	60	8-12 years	Participation in conservation education camp programsdemonstrates a conservation attitude toward animals and the environment. In addition, expresses an intention to help animals and nature.
Binngießer et al., 2013		√		German	543	11-17 years	Girls have more positive attitudes toward animals than boys, who are more supportive of the use of animals for hunting and consumption. Children who own pets show pro-animal attitudes and are more likely to engage in animal-related activities. These activities tend to decline as children get older.
Almeida et al., 2014		√		Portuguese	210	8-10 years	Children have strong preferences for popular animals and lack empathy

						for less popular animals such as insects and reptiles. Gender differences in preferences and attitudes toward animals.
Tsai & Kaufman, 2014		√	Taiwan	51	9-11 years	Interaction with virtual dogs for a long time and involving competition can increase positive attitudes toward animals. Children tend to develop an emotional bond with virtual dogs and believe that dogs have their own personalities and needs.
Schlegel et al., 2015	√		Switzerland	363	10-12 years old	Children aged 10 to 12 years have low levels of knowledge about local invertebrates, and are more familiar with exotic animals.
Breuer et al., 2015	√		Switzerland	246	9-13 years	Children have diverse views on invertebrates, which can be categorized into seven positive categories and nine negative categories. Fear and disgust related to invertebrates were identified as two separate emotions, with no significant correlation between the two.
Williams et al., 2022	√		English	1.217	6-13 years	Children's Beliefs about Animal Minds (BAM) is positively related to attitudes toward animals although it has a weak relationship.
Leeds et al., 2017		√	Africa	1.271	9-14 years	Conservation films and extracurricular activities can be effective in improving students' knowledge and attitudes toward great apes in primate range areas.
Schonfelder & Bogner, 2017	√		German	499	10-22 years	Children's perception of bees tends to be positive, although it shows a moderate level of danger perception. Bee stings are the main reason for fear. Children also have an interest and willingness to protect bees.
Hawkins & Williams, 2017		√	English	1.217	7-13 years	There was a positive trend in attitudes toward animals across all animalwelfare programs although significant changes were not found.
Ellsworth et al., 2017	√		United States of America	150	6-17 years	Participants in 4-H Dog Clubs have more positive attitudes toward pets than participants in 4-H Non-Dog Clubs.
Fančovičová & Prokop, 2018		√	Slovakia	226	10-15 years	Direct activity did not affect disgust sensitivity to woodlice. Disgust sensitivity was negatively correlated with conservation scores, indicating that individuals who were

							more sensitive to disgust were less willing to protect unpleasant animals.
Siard & Jordan, 2018		√		Slovenia	478	11-15 years	Students' attitudes about wild boar were influenced by age and gender, but not much by place of residence.
Alfoldi & Alfoldi, 2019		√		Hungary	744	13-14 years	Students (91.3%) preferred animals to plants, with no significant differences based on gender, residence size, or house type.
Schuttler et al., 2019		√		United States of America	2.759	9-14 years	The level of urbanization (suburban, exurban, or rural) does not substantially influence attitudes toward animals.
Menor-Campos et al., 2019		√		Spanish	416	6-13 years	More pro-animal attitudes were observed in older children, from higher school year groups, and those who owned pets. Research also shows that children's beliefs about the sentient abilities of animals are positively correlated with attitudes toward animals.
Marchini & Macdonald, 2020			√	Brazil	151	11-18 years	The intervention effectively changed students' and students' fathers' perceptions of jaguars. Students involved in the education and elaboration program reported an increase in more positive attitudes, and a decrease in negative perceptions about the impact of jaguars.
Zhbanova et al., 2020	√			United States of America Middle West	64	6-8 years	Girls were more likely to have humanistic and moralistic views, while boys were more likely to make statements about acts of violence against animals.
Bowie et al., 2021		√		Africa	126	8-15 years	Perceptions and attitudes toward animals are influenced by the level of direct contact and geographic proximity to bonobo habitat.
Ballouard et al., 2020		√		France	1.545	7-11 years	Most children's high liking for harvest tortoises is then associated with a strong desire to protect. On the other hand, it encourages protective behavior while also creating a desire to nurture.
Burich & Williams, 2020	√			English	22	6-11 years	While children recognize farm animals as sentient and express care toward them, their understanding of these animals' biological needs remains limited and frequently inaccurate. Lacking direct experience, children often view farm animals as objects rather than beings requiring welfare consideration.

					However, by age 10, children begin engaging with ethical questions surrounding animal use for food.
Jerger et al., 2022	√	United States of America	239	6-12 years	Children showed increased affiliation and willingness scores after participating in the ambassador animal education program.
Williams et al., 2022	√	Scotland	123	5-7 years	The intervention group (with both the mechanical toy rabbit and the soft toy rabbit) had less tolerance for animal cruelty after the intervention compared to before the intervention. In contrast, children in the control group showed no change in attitudes.
Iqbal et al., 2024	√	United Kingdom	120	8-9 years	Mr T's Tickles Workshop intervention improved children's ability to recognize dog emotions and kept their attitudes toward dog cruelty stable because they were initially high (not deteriorating).

4. Discussion

4.1. Determinant and qualitative studies

Despite the identification of consistent predictors of children's animal attitudes, including animal preferences, pet ownership, gender, the physical environment, and nature access, current research lacks a mechanistic understanding of how these factors interact to produce differential attitudinal outcomes across populations. While studies demonstrate that these variables influence perceptions, the underlying processes explaining why some children develop more positive attitudes than others under similar conditions remain unclear. Key unanswered questions include whether pet ownership moderates gender-based empathy differences, how environmental access intersects with cultural norms, and why comparable exposures yield varying results. This knowledge gap limits the development of tailored interventions, highlighting the need for studies that examine synergistic factor interactions rather than isolated variables, particularly across diverse socioeconomic and cultural contexts.

A consistent pattern emerges regarding the primacy of direct experience, whether through pet ownership or other animal interactions, in shaping children's attitudes. However, current research is limited by three key constraints: (1) the predominance of descriptive/correlational designs that cannot establish causal mechanisms or test mediating/moderating variables; (2) the absence of comprehensive theoretical models explaining the psychological processes underlying attitude formation; and (3) severe geographical bias, with studies overwhelmingly sampling WEIRD populations (western, educated, industrialized, rich, and Democratic) from Europe, America, and Africa (Bruder et al., 2022). These limitations accentuate the urgent need for experimental and longitudinal designs to uncover causal pathways; culturally adapted theoretical frameworks; and the intentional inclusion of Asian, Indigenous, and Global South perspectives to determine the universality versus context dependence of identified determinants.

Hence, qualitative methods offer critical insights into the nuanced formation and evolution of children's perceptions, emotions, and moral reasoning toward animals, dynamics often hidden by quantitative surveys alone. The two qualitative studies analyzed in this review exemplify this strength: Burich and Williams (2020) used focus groups to uncover children's moral ambivalence toward farm animals, revealing coexisting empathy for animals and acceptance of slaughter practices. Similarly, Zhbanova et al. (2020) employed projective scene-construction techniques to elicit implicit attitudes, exposing latent aggression toward feared animals alongside expressed concern. These approaches capture subtleties inaccessible to scales, such as symbolic representations of unarticulated beliefs Zhbanova et al. (2020) or protective behavioral intentions (Bexell et al., 2013). By privileging children's voices and contextualized interactions, qualitative research illuminates the contradictions, cultural influences, and developmental processes shaping animal attitudes, a vital complement to dominant quantitative paradigms.

4.2. Intervention studies

Interventions promoting positive attitudes toward animals integrate multiple theoretical perspectives, adapting approaches to specific contexts rather than relying on singular frameworks (Hawkins & Williams, 2017). These programs primarily synthesize (1) empathy and moral development theory, which emphasizes animal sentience and intrinsic value (Bexell et al., 2013; Burich & Williams, 2020; Tsai & Kaufman, 2014); (2) experiential learning and conservation psychology, which leverages direct animal interactions (Ballouard et al., 2012; Fančovičová & Prokop, 2018); and (3) social learning theory, which models attitude change through observation (Hawkins & Williams, 2017; Jerger et al., 2022; Marchini & Macdonald, 2020). This tripartite integration addresses the cognitive (knowledge), affective (empathy), and behavioral (experience) dimensions of attitude formation, which are unified by the core objective of fostering welfare awareness through sentience education while balancing animals' ecological roles and inherent worth.

Research has demonstrated that successful educational interventions require both cognitive and affective engagement to meaningfully shape children's attitudes toward animals. Two synergistic approaches prove most effective: (1) delivering accurate scientific information to correct misconceptions (e.g., explaining pigs' mud-wallowing as thermoregulation rather than dirtiness (Almeida et al., 2017); and (2) facilitating direct, positive animal experiences. While ecological knowledge, particularly about maligned species, such as invertebrates, reduces negative perceptions by highlighting their ecosystem roles (pollination, pest control) Breuer et al., 2015; Schlegel et al., 2015), knowledge alone proves insufficient without emotional resonance. The most impactful programs combine factual learning with opportunities for wonder, care, or connection, addressing both the understanding and feeling dimensions of attitude formation. This dual approach transforms abstract knowledge into personal relevance and ethical concern.

Empirical evidence confirms that direct animal interactions, including the controlled handling of feared species (e.g., snakes) and the responsible care of livestock, significantly reduce phobic responses while enhancing empathy and ethical responsibility. Benchmark programs (Life in the Shrub, Rabbit Rescuers, 4-H) demonstrate superior efficacy of kinesthetic and affective engagement over passive instruction, aligning with Contact Theory's (Pettigrew & Tropp, 2006) core principles: prejudice reduction requires (1) equal-status interaction, (2) shared goals, (3) institutional support, and (4) meaningful cooperation. When adapted for animal education, through structured encounters with maligned species (invertebrates, reptiles), this framework transforms aversion into acceptance by replacing cognitive biases (disgust, threat perception) with embodied, positive experiences. Crucially, these interventions must maintain Allport's optimal conditions to avoid backfire effects, explaining why supervised and reciprocal human–animal interactions generate more durable attitude changes than brief or observational exposures do.

Research has demonstrated that emotionally engaging children in understanding animal sentience, particularly their capacity to experience happiness, pain, and other states, creates more stable and ethically grounded attitudes than knowledge-based approaches alone. Studies have shown that when children recognize animals' emotional lives, they develop stronger empathy, deeper comprehension of animal welfare needs, and greater intrinsic motivation for humane treatment (Bexell et al., 2013; Ellsworth et al., 2017; Tsai & Kaufman, 2014). This affective connection transforms abstract concepts of animal rights into personal ethical commitments, making attitudes more enduring. By focusing on emotional resonance alongside factual knowledge, educators can foster genuine compassion that translates into consistent, long-term pro-animal behaviors.

While existing interventions demonstrate effectiveness, critical gaps remain in understanding how key components, such as knowledge acquisition and hands-on experiences, interact or whether their combined effects surpass those of individual approaches. The potential moderating role of child characteristics (age, gender, and prior experience) also remains underexplored. Additionally, most programs target specific species or local ecosystems, limiting generalizability. Future research should investigate these component interactions and moderating factors to develop more potent, tailored interventions while expanding studies to encompass diverse animal species and cultural contexts, ensuring broader relevance and ecological validity across populations.

However, current interventions often lack sufficient duration to effectively internalize animal welfare concepts, foster durable emotional connections, or instigate meaningful behavioral change. Extended or repeated program exposure allows participants to deeply process information, cultivate sustained emotional engagement, and practice relevant skills, all of which are essential for transforming superficial knowledge into lasting attitudes and behavior modifications. Research confirms that longitudinal interventions generate more persistent effects on both attitudes and actual pro-animal actions than brief exposures do. However, program length must be strategically paired with evidence-based theoretical frameworks to ensure alignment between intervention design, learning objectives, and desired outcomes.

Accordingly, this systematic review identified several critical limitations across the analyzed studies that warrant attention in future research. First, the predominance of short-term, nonlongitudinal designs fails to assess whether intervention effects persist over time, as immediate posttest improvements may not reflect lasting attitude changes (Ellsworth et al., 2017; Hawkins & Williams, 2017; Marchini & Macdonald, 2020). Second, many studies lack rigorous experimental designs capable of establishing causal relationships between interventions and outcomes. Third, participant selection biases, including overrepresentation of animal-interested individuals and prior program exposure (Pettigrew & Tropp, 2006), compromise the generalizability of findings. Fourth, reliance on child self-reports introduces social desirability biases that require careful interpretation (Hawkins & Williams, 2017). Finally, inconsistent implementation across educators highlights the need for

standardized delivery protocols in multisite studies (Marchini & Macdonald, 2020). Together, these limitations emphasize the importance of employing longitudinal, randomized controlled designs with diverse participant pools, objective outcome measures, and rigorous implementation fidelity checks in future research.

Furthermore, current research frequently overlooks key demographic variables, including age, gender, socioeconomic status, and prior experience(Leeds et al., 2017; Prokop & Tunnicliffe, 2010; Williams et al., 2022), limiting both the precision and generalizability of findings. To enhance long-term impact, studies emphasize the necessity of (1) reinforcing mechanisms through follow-up activities and evaluations to sustain intervention effects (Bexell et al., 2013; Burich & Williams, 2020; Jerger et al., 2022; Marchini & Macdonald, 2020; Williams et al., 2022) and (2) integrating pedagogical approaches that combine direct experiences with complementary strategies such as guided discussions, narrative techniques, and value-based reflection (Fančovičová & Prokop, 2018; Leeds et al., 2017). These multidimensional strategies address both the specificity of learning objectives and the broad applicability of attitude–behavior changes across contexts.

Research indicates that early-age education (particularly around age 10) effectively cultivates complex moral understanding of animals (Prokop & Tunnicliffe, 2008), including appreciation for less charismatic species such as invertebrates (Schlegel et al., 2015) and snakes (Ballouard et al., 2012). These findings highlight that intervention success hinges on (1) robust methodological designs with controlled variables, (2) careful participant selection, (3) enhanced internal validity, and (4) holistic, sustained implementation. Future studies should prioritize rigorous experimental protocols, sociocultural contextualization, and longitudinal evaluations to strengthen empirical evidence and ensure lasting behavioral impacts.

Thus far, future studies should strongly consider adopting mixed-method designs to comprehensively capture the complexity of children's attitudes toward animals. As demonstrated by Williams et al. (2022), this approach enables researchers to quantitatively measure intervention outcomes (e.g., knowledge gains, attitude shifts) while qualitatively exploring the lived experiences and perceptual changes underlying these metrics. Similarly, Bexell et al. (2013) summer camp studies effectively integrated (1) quantitative ethograms tracking behavioral frequencies and (2) qualitative analyses of participant journals and observational data. This dual approach not only confirmed statistically significant changes but also revealed the processes driving attitude transformation and how children emotionally engage with animals and reflect on ethical dilemmas through program activities. By triangulating numerical trends with rich narrative data, mixed methods enhance both the validity and practical applicability of findings, offering insights into both the outcomes and mechanisms of attitude change.

5. Final Considerations

This systematic review advances a holistic understanding of the multidimensional factors shaping elementary school children's attitudes toward animals, demonstrating that these attitudes emerge from complex interactions among affective, cognitive, experiential, social, and cultural influences. The review identifies five interconnected themes forming a comprehensive framework. These include children's perceptions and preferences toward animals, their emotional affinities and aversions, experiences with pet ownership, gender-related differences in attitudes, and influences from the physical environment and educational exposures. Crucially, the review establishes that no single factor operates in isolation; rather, children's attitudes develop through dynamic synergies between direct animal interactions, socially transmitted values, and structured educational interventions. These findings collectively underscore the necessity of addressing all five thematic dimensions when designing effective animal welfare education programs for young learners.

This systematic review successfully identified key determinants and effective strategies for fostering positive attitudes toward animals through rigorous analysis of 27 empirical studies. The findings robustly demonstrate that affective engagement and direct experiential learning constitute critical pathways for attitude formation, as evidenced by multiple intervention studies. Notably, integrated approaches that pair scientific education about animals with opportunities for emotional connection are substantially more impactful than purely knowledge-based methods are. This dual emphasis on the cognitive and affective dimensions emerges as a consistent predictor of successful outcomes across diverse educational contexts.

Hence, this study emphasizes several novel contributions to the literature on children's attitudes. It first addresses understudied theoretical gaps by proposing the moderating role of psychological factors such as emotion regulation and empathy. Second, it highlights critical methodological limitations in current research, particularly the scarcity of longitudinal designs and cross-cultural validation studies. Finally, the research establishes the essential role of sustained, context-sensitive educational approaches by demonstrating how program duration and emotional depth jointly determine the longevity of attitude change. Collectively, these insights provide a roadmap for advancing both research and practice in animal welfare education, requiring for more nuanced investigations of developmental processes, standardized measurements of affective outcomes, and culturally adapted intervention designs that account for local human-animal relationships.

While providing valuable insights, this systematic review is subject to several constraints that warrant acknowledgment. A primary limitation stems from the predominance of quantitative studies within the analyzed literature (27 articles), in which, while offering broad trends, may constrain the depth of psychological understanding. This is compounded by three specific challenges, including uneven geographical representation that disproportionately reflects WEIRD populations, a reliance on child self-report measures that are vulnerable to social desirability biases, and an inconsistent application of foundational theories from attitude psychology and moral development within intervention designs. Collectively, these limitations delineate

critical avenues for future research, underscoring the necessity for greater methodological diversity through the incorporation of qualitative inquiries, intentional cross-cultural sampling strategies, and a stronger theoretical grounding in established frameworks such as the Theory of Planned Behavior or Social Cognitive Theory to more effectively guide program development and evaluation.

This review consequently highlights several critical avenues for future investigation. To address current methodological and theoretical gaps, subsequent research should prioritize experimental and mixed-methods studies designed to examine interactions between key variables such as pet ownership, gender, and age through rigorous protocols. Furthermore, a stronger theoretical grounding of interventions in established frameworks from attitudes and developmental psychology is essential. As such, the field would also greatly benefit from longitudinal and cross-cultural studies to assess the long-term stability and generalizability of attitude changes, as well as a more systematic evaluation of socialization agents, including teachers, families, and media, in cultivating animal empathy. Accordingly, pursuing these priorities is paramount for enhancing the ecological validity of findings across diverse populations and settings.

Overall, this systematic review makes a significant contribution to understanding how to cultivate positive attitudes toward animals during childhood, demonstrating that early interventions combining affective, cognitive, and experiential components can effectively shape lifelong humane values. The family unit, through the practice of eco-parenting, functions as a critical agent in instilling environmental care values from an early age (Dharmastuti et al., 2015). Within a cultural context, the values of local wisdom, which view humanity and nature as a unified whole, further reinforce ecological behavior (Rahmawati, 2015). This perspective gains increased relevance when integrated with modern psychological approaches, wherein attitude, subjective norms, and perceived behavioral control have been established as significant predictors of pro-environmental behavior(Rahmawati et al., 2024). In addition to fostering individual compassion, these educational approaches hold transformative potential for society by nurturing ecologically conscious generations who recognize the intrinsic value of animals and their critical role in environmental sustainability. Complementing this familial and cultural foundation, the school also serves a vital role. Through character building and the cultivation of a positive school climate, educational institutions foster empathy and reduce aggression, thereby strengthening children's prosocial attitudes toward animals(Maisyaroh et al., 2021; Mardianto et al., 2020; Wiyono et al., 2021). Thus, the findings emphasize that humane education is not merely about kindness to animals but rather a foundational element in developing ethical reasoning and ecological stewardship that benefits both biodiversity and human communities.

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References

Ajzen, L., & Fishbein, M. (2005). The influence of attitudes on behavior. In D. Albarracín, B. T. Johnson, M. P. Zanna, & N. J. L. Mahwah (Eds.), *The handbook of attitudes* (pp. 173–221). Lawrence Erlbaum Associates Publishers.

Alfoldi, Z., & Alfoldi, P. (2019). Environmental attitudes of Hungarian students and the prospects for environmental education. *Ecocycles, 5*(1), 19–25. https://doi.org/10.19040/ecocycles.v5i1.134

Almeida, A., García Fernández, B., & Silva, T. (2017). Changing negative perceptions of animals through teaching practice: A research in primary education. *Journal of Baltic Science Education, 16*(4), 446–458. https://doi.org/10.33225/jbse/17.16.446

Almeida, A., Vasconcelos, C., & Strecht-Ribeiro, O. (2014). Attitudes toward animals: A study of Portuguese children. *Anthrozoos, 27*(2), 173–190. https://doi.org/10.2752/175303714X13903827487403

Arkow, P. (2006). "Old wine in a new bottle": New strategies for humane education. In A. H. Fine (Ed.), *Handbook on animal-assisted therapy: Theoretical foundations and guidelines for practice* (2nd ed., pp. 425–451). Elsevier/Academic Press. https://doi.org/10.1016/B978-012369484-3/50026-8

Ascione, F. R., & Weber, C. V. (1996). Children's attitudes about the humane treatment of animals and empathy: One-year follow-up of a school-based intervention. *Anthrozoos, 9*(4), 188–195. https://doi.org/10.2752/089279396787001455

Ballouard, J. M., Brischoux, F., & Bonnet, X. (2011). Children prioritize virtual exotic biodiversity over local biodiversity. *PLoS ONE, 6*(8), 1–8. https://doi.org/10.1371/journal.pone.0023152

Ballouard, J. M., Conord, M., Johany, A., Jardé, N., Caron, S., Deleuze, S., & Bonnet, X. (2020). Is popularity a double-edged sword? Children want to protect but also harvest tortoises. *Journal of Environmental Education, 51*(5), 347–360. https://doi.org/10.1080/00958964.2019.1693329

Ballouard, J. M., Provost, G., Barr, D., & Bonnet, X. (2012). Influence of a field trip on the attitude of schoolchildren toward unpopular organisms: An experience with snakes. *Journal of Herpetology, 46*(3), 423–428. https://doi.org/10.1670/11-118

Banach, N., & Stel, M. (2024). Reducing speciesism: An intervention to change people's attitudes and behavioral intentions. *Anthrozoos, 37*(5), 925–938. https://doi.org/10.1080/08927936.2024.2345472

Batt, S. (2009). Human attitudes towards animals in relation to species similarity to humans: A multivariate approach. *Bioscience Horizons, 2*(2), 180–190. https://doi.org/10.1093/biohorizons/hzp021

Beatson, R., Loughnan, S., & Halloran, M. (2009). Attitudes toward animals: The effect of priming thoughts of human-animal similarities and mortality salience on the evaluation of companion animals. *Society and Animals, 17*(1), 72–89. https://doi.org/10.1163/156853009X393774

Bègue, L., & Laine, P. J. (2017). Moral utilitarianism and attitudes toward animals. *Ethics and Behavior, 27*(3), 173–178. https://doi.org/10.1080/10508422.2016.1162720

Bexell, S. M., Jarrett, O. S., & Ping, X. (2013). The effects of a summer camp program in China on children's knowledge, attitudes, and behaviors toward animals: A model for conservation education. *Visitor Studies, 16*(1), 59–81. https://doi.org/10.1080/10645578.2013.768072

Bexell, S. M., Jarrett, O. S., Xu, P., & Feng Rui, X. (2009). Fostering humane attitudes toward animals: An educational camp experience in China. *Encounter: Education for Meaning and Social Justice, 25*(4), 25–27.

Binngießer, J., & Randler, C. (2015). Association of the environmental attitudes "Preservation" and "Utilization" with pro-animal attitudes. *International Journal of Environmental and Science Education, 10*(3), 477–492. https://doi.org/10.12973/ijese.2015.255a

Binngießer, J., Wilhelm, C., & Randler, C. (2013). Attitudes toward animals among German children and adolescents. *Anthrozoos, 26*(3), 325–339. https://doi.org/10.2752/175303713X13697429463475

Bowie, A., Walker, K., Bunnell, G., Morel, D., Minesi, F., Belais, R., & Hare, B. (2021). Assessing conservation attitudes and behaviors of Congolese children neighboring the world's first bonobo (*Pan paniscus*) release site. *American Journal of Primatology, 83*(1), 1–8. https://doi.org/10.1002/ajp.23217

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. In *Qualitative research in psychology* (3(2), 77–101). https://doi.org/10.1191/1478088706qp063oa

Breuer, G. B., Schlegel, J., Kauf, P., & Rupf, R. (2015). The importance of being colorful and able to fly: Interpretation and implications of children's statements on selected insects and other invertebrates. *International Journal of Science Education, 37*(16), 2664–2687. https://doi.org/10.1080/09500693.2015.1099171

Bruder, J., Burakowski, L. M., Park, T., Al-Haddad, R., Al-Hemaidi, S., Al-Korbi, A., & Al-Naimi, A. (2022). Cross-cultural awareness and attitudes toward threatened animal species. *Frontiers in Psychology, 13*(898503), 1–17. https://doi.org/10.3389/fpsyg.2022.898503

Burich, L., & Williams, J. M. (2020). Children's welfare knowledge of and empathy with farm animals: A qualitative study. *Anthrozoos, 33*(2), 301–315. https://doi.org/10.1080/08927936.2020.1719769

Comaskey, E., & Eith, C. (2023). Creating an environment for social cohesion in early childhood through humane education. *Early Childhood Education Journal, 51*(6), 1107–1113. https://doi.org/10.1007/s10643-022-01407-1

Corbacho-Cuello, I., Núñez-Flores, A., Hernández-Barco, M. A., & Muñoz-Losa, A. (2024). Bridging generations: How primary school students and primary school prospective teachers view animals. *Environmental Education Research, 31*(4), 1–19. https://doi.org/10.1080/13504622.2024.2432997

Dharmastuti, A., Hamid, N., Sa'id, M., & Armalid, I. I. (2015). Eco parenting orang tua di Jawa Timur berdasarkan perspektif teori perilaku terencana. *Jurnal Penelitian Psikologi, 16*(1), 1–10. https://doi.org/10.29080/jpp.v16i1.1396

Ellsworth, L. M., Keen, H. A., Mills, P. E., Newman, J., Martin, F., Coffey, T., & Newberry, R. C. (2017). Role of 4-H dog programs in life skills development. *Anthrozoos, 30*(1), 91–108. https://doi.org/10.1080/08927936.2017.1270596

Fančovičová, J., & Prokop, P. (2018). Effects of hands-on activities on conservation, disgust and knowledge of woodlice. *Eurasia Journal of Mathematics, Science and Technology Education, 14*(3), 721–729. https://doi.org/10.12973/ejmste/80817

Fonseca, M. J., Franco, N. H., Brosseron, F., Tavares, F., Olsson, I. A. S., & Borlido-Santos, J. (2011). Children's attitudes towards animals: Evidence from the RODENTIA project. *Journal of Biological Education, 45*(3), 121–128. https://doi.org/10.1080/00219266.2011.576259

Härtel, T., Randler, C., & Baur, A. (2023). Using species knowledge to promote pro-environmental attitudes? The association among species knowledge, environmental system knowledge and attitude towards the environment in secondary school students. *Animals, 13*(6), 1–18. https://doi.org/10.3390/ani13060972

Hawkins, R. D., & Williams, J. M. (2016). Children's beliefs about animal minds (Child-BAM): Associations with positive and negative child–animal interactions. *Anthrozoos, 29*(3), 503–519. https://doi.org/10.1080/08927936.2016.1189749

Hawkins, R. D., & Williams, J. M. (2017). Assessing effectiveness of a nonhuman animal welfare education program for primary school children. *Journal of Applied Animal Welfare Science, 20*(3), 240–256. https://doi.org/10.1080/10888705.2017.1305272

Heise, H., Kemper, N., & Theuvsen, L. (2016). The attitude of German veterinarians towards farm animal welfare: Results of a cluster analysis. *Berliner und Munchener Tierarztliche Wochenschrift, 129*(5–6), 225–233.

Henseler Kozachenko, H., & Piazza, J. (2021). How children and adults value different animal lives. *Journal of Experimental Child Psychology, 210*, 105204. https://doi.org/10.1016/j.jecp.2021.105204

Herbert, S., & Lynch, J. (2017). Classroom animals provide more than just science education. *Science & Education, 26*(1–2), 107–123. https://doi.org/10.1007/s11191-017-9874-6

Herzog, H., Rowan, A., & Kossow, D. (2001). Social attitudes and animals. In *The state of the animals* (pp. 55–70). Humane Society Press.

Iqbal, U., Williams, J. M., & Knoll, M. A. (2024). An evaluation of a canine welfare education intervention for primary school children. *Anthrozoos, 37*(2), 303–322. https://doi.org/10.1080/08927936.2023.2268978

Jerger, A. D., Acker, M., Gibson, S., & Young, A. M. (2022). Impact of animal programming on children's attitudes toward local wildlife. *Zoo Biology, 41*(5), 469–478. https://doi.org/10.1002/zoo.21702

Kellert, S. R. (1985a). American attitudes toward and knowledge of animals: An update. *Advances in Animal Welfare Science 1984, 85*, 177–213. https://doi.org/10.1007/978-94-009-4998-0_11

Kellert, S. R. (1985b). Attitudes toward animals: Age-related development. *Journal of Environmental Education, 16*(3), 29–39. https://doi.org/10.1080/00958964.1985.9942709

Kidd, A. H., & Kidd, R. M. (1990). Factors in children's attitudes toward pets. *Psychological Reports, 66*(3 I), 775–786. https://doi.org/10.2466/pr0.1990.66.3.775

Leeds, A., Lukas, K. E., Kendall, C. J., Slavin, M. A., Ross, E. A., Robbins, M. M., van Weeghel, D., & Bergl, R. A. (2017). Evaluating the effect of a year-long film-focused environmental education program on Ugandan student knowledge of and attitudes toward great apes. *American Journal of Primatology, 79*(8), 1–9. https://doi.org/10.1002/ajp.22673

Maisyaroh, B. W., Hardika, Valdez, A. V., Mangorsi, S. B., & Canapi, S. P. T. (2021). The implementation of instructional supervision in Indonesia and the Philippines, and its effect on the variation of teacher learning models and materials. *Cogent Education, 8*(1), 46–51. https://doi.org/10.1080/2331186X.2021.1962232

Marchini, S., & Macdonald, D. W. (2020). Can school children influence adults' behavior toward jaguars? Evidence of intergenerational learning in education for conservation. *Ambio, 49*(4), 912–925. https://doi.org/10.1007/s13280-019-01230-w

Mardianto, Hanurawan, F., Chusniyah, T., & Rahmawati, H. (2020). Developing a positive school climate to reduce aggression and cyber aggression of students in social media. In *Proceedings of the 1st Progress in Social Science, Humanities and Education Research Symposium (PSSHERS 2019)* (Vol. 464, pp. 538–544). https://doi.org/10.2991/assehr.k.200824.127

Mariti, C., Papi, F., Mengoli, M., Moretti, G., Martelli, F., & Gazzano, A. (2011). Improvement in children's humaneness toward nonhuman animals through a project of educational anthrozoology. *Journal of Veterinary Behavior: Clinical Applications and Research, 6*(1), 12–20. https://doi.org/10.1016/j.jveb.2010.07.003

Menor-Campos, D. J., Hawkins, R., & Williams, J. M. (2019). Attitudes toward animals among Spanish primary school children. *Anthrozoos, 32*(6), 797–812. https://doi.org/10.1080/08927936.2019.1673055

Neldner, K., & Wilks, M. (2022). How do children value animals? A developmental review. *Psychology of Human-Animal Intergroup Relations, 1*, 1–22. https://doi.org/10.5964/phair.9907

Nicoll, K., Trifone, C., & Ellery Samuels, W. (2008). An in-class, humane education program can improve young students' attitudes toward animals. *Society and Animals, 16*(1), 45–60. https://doi.org/10.1163/156853008X269881

Pagani, C. (2011). The psychology of the human-animal bond. In *The psychology of the human-animal bond* (pp. 289–305). https://doi.org/10.1007/978-1-4419-9761-6

Percy, W. H., Kostere, K., & Kostere, S. (2015). Generic qualitative research in psychology. *The Qualitative Report, 20*(2), 76–85. https://doi.org/10.46743/2160-3715/2015.2097

Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology, 90*(5), 751–783. https://doi.org/10.1037/0022-3514.90.5.751

Prokop, P., & Tunnicliffe, S. D. (2008). "Disgusting" animals: Primary school children's attitudes and myths of bats and spiders. *Eurasia Journal of Mathematics, Science and Technology Education, 4*(2), 87–97. https://doi.org/10.12973/ejmste/75309

Prokop, P., & Tunnicliffe, S. D. (2010). Effects of having pets at home on children's attitudes toward popular and unpopular animals. *Anthrozoos, 23*(1), 21–35. https://doi.org/10.2752/175303710X12627079939107

Rahmawati, H. (2015). Local wisdom dan perilaku ekologis masyarakat Dayak Benuaq. *Jurnal Indigenous, 13*(1), 72–78.

Rahmawati, H., Hutagalung, F. D., Harsono, Y. T., & Qoyyimah, N. R. H. (2024). Pro-environmental behavior model among university students. *Psympathic: Jurnal Ilmiah Psikologi, 11*(1), 9–16. https://doi.org/10.15575/psy.v11i1.32182

Samuels, W. E. (2018). Nurturing kindness naturally: A humane education program's effect on the prosocial behavior of first and second graders across China. *International Journal of Educational Research, 91*, 49–64. https://doi.org/10.1016/j.ijer.2018.08.001

Samuels, W. E., Meers, L. L., & Normando, S. (2016). Improving upper elementary students' humane attitudes and prosocial behaviors through an in-class humane education program. *Anthrozoos, 29*(4), 597–610. https://doi.org/10.1080/08927936.2016.1228751

Schlegel, J., Breuer, G., & Rupf, R. (2015). Local insects as flagship species to promote nature conservation? A survey among primary school children on their attitudes toward invertebrates. *Anthrozoos, 28*(2), 229–245. https://doi.org/10.1080/08927936.2015.11435399

Schonfelder, M. L., & Bogner, F. X. (2017). Individual perception of bees: Between perceived danger and willingness to protect. *PLoS ONE, 12*(6), 1–16. https://doi.org/10.1371/journal.pone.0180168

Schuttler, S. G., Stevenson, K., Kays, R., & Dunn, R. R. (2019). Children's attitudes towards animals are similar across suburban, exurban, and rural areas. *PeerJ, 2019*(7), 1–18. https://doi.org/10.7717/peerj.7328

Serpell, J. A. (2004). Factors influencing human attitudes to animals and their welfare. *Animal Welfare, 13*(S1), S145–S151. https://doi.org/10.1017/s0962728600014500

Siard, N., & Jordan, D. (2018). Slovenian students' knowledge and opinions about wild boar (*Sus scrofa* L.). *Anthrozoos, 31*(6), 741–760. https://doi.org/10.1080/08927936.2018.1529357

Spanjol, K., & Zucca, P. (2023). Biophilia, one health, and humane education: Mitigating global risk through embracing humanity's interconnection with the natural world. In *Socio-Political Risk Management: Assessing and Managing Global Insecurity* (pp. 109–130). https://doi.org/10.1515/9783110731217-007

Stanisstreet, M., Spofforth, N., & Williams, T. (1993). Attitudes of children to the uses of animals. *International Journal of Science Education, 15*(4), 411–425. https://doi.org/10.1080/0950069930150405

Taylor, N., & Signal, T. D. (2005). Empathy and attitudes to animals. *Anthrozoos, 18*(1), 18–27. https://doi.org/10.2752/089279305785594342

Tsai, Y. F., & Kaufman, D. (2014). Interacting with a computer-simulated pet: Factors influencing children's humane attitudes and empathy. *Journal of Educational Computing Research, 51*(2), 145–161. https://doi.org/10.2190/EC.51.2.a

Unti, B., & DeRosa, B. (2003). Humane education past, present, and future. In D. J. Salem & A. N. Rowan (Eds.), *The state of the animals II: 2003* (pp. 27–50). Humane Society Press.

Vollum, S., Buffington-Vollum, J., & Longmire, D. R. (2004). Moral disengagement and attitudes about violence toward animals. *Society and Animals, 12*(3), 209–235. https://doi.org/10.1163/1568530042880668

Wilks, M., Caviola, L., Kahane, G., & Bloom, P. (2021). Children prioritize humans over animals less than adults do. *Psychological Science, 32*(1), 27–38. https://doi.org/10.1177/0956797620960398

Williams, J. M., Cardoso, M. P., Zumaglini, S., Finney, A. L., & Knoll, M. A. (2022). “Rabbit rescuers”: A school-based animal welfare education intervention for young children. *Anthrozoos, 35*(1), 55–73. https://doi.org/10.1080/08927936.2021.1944561

Wiyono, B. B., Supriyanto, A., Maisyaroh, M., & Indreswari, H. (2021). The diagnostic feedback supervision model based on information technology as the new strategy to improve the professional competence of academic personnel in school organization. In *Proceedings of 2021 2nd International Conference on Intelligent Engineering and Management (ICIEM 2021)* (pp. 46–51). https://doi.org/10.1109/ICIEM51511.2021.9445370

Yanco, E., Batavia, C., & Ramp, D. (2021). Compassion and moral inclusion as cornerstones for conservation education and coexistence. *Biological Conservation, 261*, 109253. https://doi.org/10.1016/j.biocon.2021.109253

Zhbanova, K. S., Leffler, J. L., & Rule, A. C. (2020). Attitude analysis of child-constructed scenes depicting human interactions with unpopular nonhuman animals. *Society and Animals, 15*(6), 1–24. https://doi.org/10.1163/15685306-bja10003