



Dogs and children: Exploring the impact of canine interaction on socio-cognitive development in humans

Gillet, Laura^{1,2} – Kubinyi, Enikő^{1,2,3}

¹*Department of Ethology, ELTE Eötvös Loránd University; Hungary*

²*MTA-ELTE Lendület “Momentum” Companion Animal Research Group*

³*ELTE NAP Canine Brain Research Group, Budapest*

Abstract

Dogs are popular pets among families with children. From the parents' point of view, dog ownership can help children to become more mature and responsible. Children can develop a close relationship with the family dogs, becoming involved in their care and participating in daily activities together. Children can also meet dogs outside their homes, for example, as part of educational programmes. The aim of our study is to review how rich behavioural interactions with dogs (e.g., playing, petting, talking to the dog) can have an effect on typical children's socio-cognitive development and the psychological and physiological mechanisms behind these effects. Positive effects include increased social competence, improved reading skills and higher motivation to learn, which may be explained by the child's attachment to the pet and the effect of social buffering. In addition to the potential benefits, we also mention the costs of dog ownership in relation to child-dog interactions. Dog bites and allergies represent a significant risk, and in the case of problem behaviour or financial problems, the presence of a dog can lead to stress in the family, and the focus of the parents' attention may be diverted from the child. We also review the main methodological limitations of studies on human-animal interactions, such as small sample sizes, small effect sizes, lack of control for confounding effects, self-report bias, lack of longitudinal studies, variability in dog behaviour and husbandry habits, and different study methods. We conclude that a large proportion of the studies on this topic are correlational, which does not allow causality to be established. Although dog ownership may be associated with certain developmental benefits, this does not necessarily mean that the presence of a dog directly causes these outcomes. Other factors, such as family environment, socioeconomic status and parental involvement, may also play a significant role, but these have rarely been examined in previous research.

Keywords: child development, child-dog interactions, pet attachment, dog ownership, animal-assisted interventions



The role of companion dogs in the lives of children and families

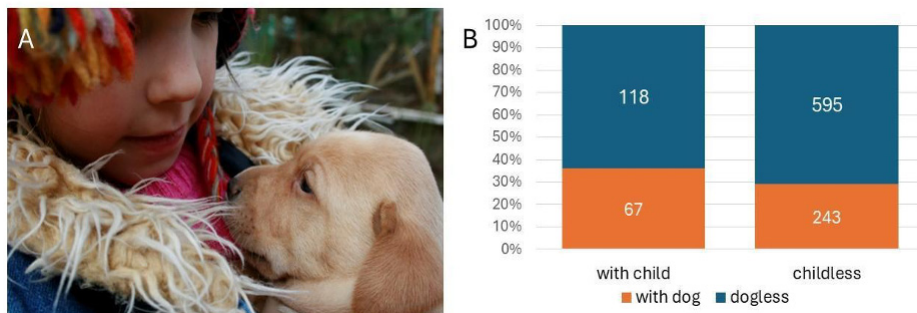
Alongside cats, dogs are the most commonly kept companion animals in many countries, including Hungary. The majority of these companion dogs are regarded as integral family members, and many live in homes with children under the age of 18 and their parents (Giraudet et al., 2022; Kubinyi & Varga, 2023; Melson & Fine, 2015). More specifically, in a recent nationally representative sample in Hungary, 22% of respondents who shared the household with a dog also lived together with a child or children under the age of 18. Families with children more often keep dogs than families without children (Kubinyi & Varga 2023; Fig. 1). Interestingly, families raising children aged between six and ten were more likely to own a dog than families with children belonging to other age groups (Giraudet et al., 2022). The motives behind dog ownership are diverse and depend on many factors. Firstly, large families usually have a bigger home and therefore more room for a dog. In the case of families with young children, parents often choose to acquire a dog in response to their children's wish to have a dog (Kerry-Moran & Barker, 2018), but also in the hope that their children will benefit from its presence. Many parents believe that caring for a dog will teach their children respect for others and responsibility (Jalongo, 2018; Melson & Fine, 2015). Early experiences with dogs are an important factor in dog acquisition as well. Many parents might choose to acquire a family dog because they had a dog at home as a child themselves (Kerry-Moran & Barker, 2018).

At home, children usually contribute to the dog's daily care. For example, they feed, bath, and groom the dog, and go for walks together. Play is also a common interaction observed between dogs and children, although the prevalence of pet play decreases as children age (Giraudet et al., 2022). In fact, within the household, exercise is one of the tasks that children participate the most in (Kerry-Moran & Barker, 2018). For children, physical activity related to dog ownership includes dog walking and dog play (e.g., playing fetch and running around) (Boisvert & Harrell, 2021). Care plays an important role in forming an emotional bond between the dog and the child, which could ultimately enhance the well-being of both parties (Hawkins et al., 2017; Jalongo, 2018a). When such a bond forms, children tend to perceive their dog as a nice, forever friend (Jalongo & Ross, 2018).

Figure 1

Families with children more often keep dogs than families without children (A). A recent nationally representative survey found that in Hungary, 36% of households with children had a dog, compared to 29% of households without children (Kubinyi & Varga, 2023). In the columns, the sample sizes are shown (B).

Photo: Kubinyi



For those children who do not grow up with a dog at home, there are other situations in which they have the possibility to interact with dogs. Several countries offer educational programs to promote interactions between children and pets. These animals can either be kept by schools or occasionally visit classrooms, libraries, and healthcare institutions with their handler (Jalongo, 2018a). In such situations, children can be encouraged to pet the dog, ask the dog to perform commands or read a text to the dog (Gee et al., 2017). In this regard, it is also interesting to note the cultural differences between these educational programs (Nakajima, 2017). While Western countries, like the United States, employ animal-assisted education and reading-to-dogs programs in which animals assist and support children during learning, Japanese schools present a different approach by using animal rearing as an educational tool; that is, they teach children how to care for school pets. Due to the popularity of dog keeping, children are also likely to encounter dogs when playing outside, walking in the neighbourhood, or meeting friends and families. Finally, media constitute additional sources of exposure to dogs. Young children are exposed to dog images in picture books, TV cartoons, and traditional tales, while older children can read educational books and look for information about dogs on the Internet (Melson & Fine, 2015). Of course, the context in which a child interacts with a dog likely influences their interactions and the nature of their relationship. Children growing up in a dog-owning household have more opportunities to develop a closer, more intimate bond with a specific dog than children who interact with dogs only occasionally. The more time children spend with their dogs, the more attached they become (Charmaraman et al., 2020). Additionally, at home, the dog is often integrated into the family's daily activities (e.g.,

feeding, playing, going to the park), in which the child may choose to participate or not. On the other hand, children's interactions with dogs in a therapeutic or educational setting are usually more structured and goal-oriented (e.g., learning, psychotherapy). For these reasons, dog ownership and dog-assisted interventions might involve different mechanisms and result in different outcomes for children.

Is dog exposure (e.g., child-dog interactions, dog presence) in both the context of dog ownership and dog-assisted educational programs beneficial to children, and if so, why? The goal of this review is to provide an overview of the outcomes of dog exposure on child development, as identified in the scientific literature. We will focus on non-social and social cognitive skills, as well as emotional and mental health. Then, we will highlight some of the principal mechanisms thought to underlie these effects. Finally, the costs associated with dog ownership and the risks inherent in child-dog interactions, as well as methodological limitations, will be discussed.

Why grow up with a dog? Positive effects of dog ownership and child-dog interactions on child development

Development of children's cognitive skills, reading skills, and language skills

The first set of studies focuses on the association between dog exposure and non-social cognitive outcomes in children. In most settings, children are placed in the presence of an unfamiliar dog (e.g., a therapy dog), rather than their own dog. Alfrey (2021) reviewed nine experimental studies investigating the effects of dogs on children's cognitive performance, including attention, memory, language, and executive functions. In these studies, children (aged 3 to 14 years) were tested on various motor tasks and psychometric tests, such as the Wechsler Intelligence Scale for Children (WISC), in the presence (vs. absence) of a dog. Out of these nine articles, six reported better task performance (e.g., fewer irrelevant choices in a match-to-sample categorisation task and faster task completion) in the dog condition. Moreover, none of them concluded a detrimental effect of the dog's presence. Besides increased performance, authors discussed additional benefits of the presence of the dog in classrooms, such as more positive attitudes towards school and learning, increased task engagement as well as better attention to task demands, contradicting the common belief that an animal presence would distract children (Alfrey, 2021; Brelsford et al., 2017; Gee et al., 2017).

Likewise, Hall and colleagues (2016) reviewed 48 papers focusing on the reading skills of children (aged 5 to 13 years, but mostly conducted on children of reading age, i.e., between 6 and 9 years), participating in dog-assisted reading

programs. These programs typically take place in school or library settings, last for at least several weeks, and are quite popular in the United States and in Australia (Hall et al., 2016; Giraudet et al., 2022). Findings in favour of the positive effects of such interventions on children's reading skills have been reported. For instance, when reading to a dog, 6–7-year-old children have been found to show better word recognition, recognition of punctuation marks, and use of line breaks than when reading to a human alone. Other studies reported by Hall and colleagues revealed an increase in oral reading, reading accuracy, reading fluency, and reading comprehension. However, it has to be noted that many studies investigating this question provided low levels of evidence, as they, for instance, did not include a control group in their experimental design, or did not specify whether experimenters were blind to the study's expected outcomes, which introduces bias in the results' interpretation and limits the generalisation of findings (Hall et al., 2016). Additionally, two other studies, this time employing experimental designs with control groups, reported more equivocal results (Connell et al., 2019; Le Roux et al., 2014). Nevertheless, after conducting a four-week-long program on children aged 6–8 years, Connell et al. (2019) concluded that the passive presence of the dog (i.e., the dog is present in the classroom, but only minimal interaction with the dog is permitted, and children have no prolonged physical contact with the dog) might be enough to observe positive effects on reading skills. On the other hand, detrimental or non-existent effects of such interventions may be explained by differences in children's willingness to connect and interact with the animal, some of whom may be frightened or highly distracted by its presence. The length of the intervention and the duration of each session, which are not consistent across studies (e.g., interventions ranged from five days to one year), may also have an impact on the results.

Studies focusing on the effects of dog exposure on the cognitive development of infants are scarcer, although promising. For instance, a longitudinal study conducted in Japan revealed positive effects of dog ownership on early child development (Minatoya et al., 2021). The authors tested 78,941 infants with the Ages & Stages Questionnaires (ASQ-3) at the ages of six months, one year, and three years. Each version of the ASQ-3 was adapted to the age of the child and comprised 21 questions about the infant's behaviour in daily life contexts (e.g., does the baby crawl, repeat sounds, act differently around strangers). In contrast to infants living without a dog, infants living with a dog showed decreased risks of developmental delay in the gross motor, problem-solving, communication, and personal-social domains. Interestingly, the authors did not find similar results in the case of cat owners (Minatoya et al., 2020). In young children, the positive effects of companion animals on cognitive development, and more specifically on language skills, might be explained by the fact that pets can function as both a receiver for the child's babble and as a source of environmental stimulation eliciting pet-directed communication (Endenburg & van Lith, 2011).

Socio-emotional development: effects of dogs on children's social competence, social interactions and psychological well-being

The effects of dogs on children's socio-emotional development have also received particular attention. Unlike most studies described in the previous section, these typically compare pet owners to non-pet owners, sometimes including all types of pets (e.g., dogs, cats, rodents, birds, fish). In the present article, socio-emotional development comprises the development of social competence as well as mental and emotional health.

Most studies conclude that growing up with a family dog at home increases social competence in children (Endenburg & van Lith, 2011). Social competence encompasses diverse socio-cognitive skills and behaviours, such as the ability to act appropriately in social situations and to recognise other people's intentions and emotions (Dodge et al., 1986). Dog ownership might make children better at decoding non-verbal signals. Additionally, it may promote empathy and prosocial behaviour. Svensson (2014), who conducted a qualitative study in a Swedish preschool, reported that children aged 4-5 years developed empathy for their pets, describing how careful and gentle they were when interacting with them. Children also explained how they enjoyed teaching their dogs and cats new exercises, which, according to the author, might help them to become more self-confident and imaginative. Likewise, using the Strengths and Difficulties Questionnaire (SDQ), Wenden and colleagues (2021) found that, compared to non-dog ownership, dog ownership was associated with lower conduct problems, lower peer problems, and higher prosocial behaviours in children aged 2-5 years. In this study, conduct problems referred to oppositional behaviours like fighting with other children, being disobedient, and throwing tantrums; peer problems to the quality of the relationships the child had with their peers; and prosociality to how considerate, helpful, and kind the child was perceived. Similar conclusions were drawn by Vidović and colleagues (1999), who found, in a sample of 826 children aged 10–15 years, that children living with dogs scored higher on the Child Empathy Scale and Child Prosocial Orientation Scale than children living without dogs.

Consequently, frequent interactions with dogs might benefit children's social lives. A review by Giraudet and colleagues (2022) highlights that, for children, living with a dog can contribute to better social integration, facilitate social interactions, stimulate conversations with peers, and decrease the fear of social rejection. For instance, Dueñas and colleagues found that children (aged 3–5.5 years) living with a dog for more than a year, compared to children who do not live with a pet, scored higher on all subdomains of the Battelle Developmental Inventory's personal-social domain, which assess the quality and frequency of interactions of the child with adults and peers, the child's ability to express feelings and to cooperate, and the child's perception of his/her own self and of others' social roles. In classrooms, the presence of

a friendly dog reduced aggressive behaviours among children aged 6–7 years (Beetz et al., 2012). Additionally, a study by Paul and Serpell (1996) found that, in the first month following the dog's acquisition, dog-owning children were visited by friends more often than non-owners.

According to a review conducted by Purewal and colleagues (2017), several studies have also concluded in favour of the positive influence of pet dogs on the psychological well-being of children (referring here to all age ranges from early childhood to adolescence), including separation anxiety, social anxiety, and depression. Pet ownership was also found to be negatively correlated with loneliness in older children and adolescents (Black, 2012). Reviews on the topic also highlight the positive influence of pet ownership on self-esteem and self-concept, although this effect is moderated by the age of the child and their home environment (Endenburg & van Lith, 2011; Purewal et al., 2017). Taken together, these findings suggest that older children, as they approach adolescence, might benefit more from the presence of pets.

However, it is important to stress that these findings in favour of the beneficial effects of dog ownership are not systematically replicated. One hypothesis is that it is not so much owning a dog that is important here but the relationship the child has with the dog (Hawkins et al., 2017; Purewal et al., 2017; Paul & Serpell, 1996).

Exploring the mechanisms underlying positive effects of dogs on child development

Several authors have proposed integrative models in order to explain the observed links between dog exposure (whether at home or through educational programs) and socio-cognitive outcomes in children (e.g., see Alfrey, 2021; Gee et al., 2017; Purewal et al., 2017). All of them include two main mechanisms: child attachment to the pet and stress reduction.

Pets can provide comfort and reassurance to their adult owners, also known as the safe-haven and secure-base features of attachment (Zilcha-Mano et al., 2012). Several authors have suggested that children, too, can form a secure attachment with their companion animals, in some ways analogous to that with their parents or primary caregivers. However, it is unlikely that pets substitute human attachment figures (Hawkins et al., 2017). Instead, pets might help insecurely attached children to develop secure internal working models (Wedl et al., 2015), which could, in turn, promote the re-establishment of secure relationships with human adults (Hawkins et al., 2017).

As implied earlier, the quality of the dog-child attachment has often been found to moderate the relationship between dog exposure and socio-cognitive development in children. In their review, Endenburg and van Lith (2011) reported several findings showing that children strongly attached to their pets display higher empathy and prosocial behaviours compared to less

attached children. Likewise, Maruyama (2010) found moderating effects of pet attachment on social cognitive development and humane attitudes towards humans and animals in children aged 10–14 years, a finding supported by other authors, including Hawkins and colleagues (2017), who argued that children attached to their pets might be more compassionate towards animals and show better interpretation of animal behaviour and facial expressions. Lastly, Purewal and colleagues revealed that social network size was positively related to pet attachment (Purewal et al., 2017). Interestingly, dogs have been found to be the pet species for which the child-pet attachment is the strongest (Hawkins et al., 2017). It should be noted, however, that attachment to the dog decreases as children age (Muldoon et al., 2019).

Family environment is an important factor to consider when studying the role of attachment in the child-dog relationship. Indeed, pet attachment in children has been shown to be stronger in one-parent families compared to two-parent families (Endenburg & van Lith, 2011). As for children growing up without siblings, some authors have suggested that pets might fill a sibling-like role, promoting social interactions at home and ultimately enhancing the social skills of these children (Christian et al., 2020).

Research also supports the idea that dogs are good stress buffers. Because they are not fully cognitively mature yet, it is difficult for young children to self-regulate their emotions. Therefore, social buffering, described as “a phenomenon in which the presence and availability of one or more social partners during times of threat reduce the activity of stress-mediating physiological systems [...]” (Gunnar, 2017, p. 1), is crucial to child socio-emotional development. Kertes and colleagues (2017), using the Trier’s Social Stress Test for Children (TSST-C) on 101 children aged 7–12 years, found a buffering effect of dogs on children’s perceived stress, which was not the case in their two other experimental conditions (i.e., child alone and parent present). Additionally, the more children petted the dog during the test, the lower their cortisol response was. These findings suggest that children might turn to dogs to regulate their emotions. Additional results in favour of lower cortisol levels in the presence of dogs during cognitive testing have been described by Alfrey (2021).

Logically, connections can be made between the attachment theory and the physiological effects of dogs’ presence. Situations perceived as threatening by children typically activate their attachment system, which translates into proximity and contact-seeking behaviours. In the case of dog-child interactions, petting a dog in stressful situations might be an efficient way to calm down and feel reassured. Yet, it has to be noted that, according to some authors, proximity to the dog might be enough to observe an effect (Gee et al., 2015). All in all, this phenomenon is assumed to explain, at least partly, why cognitive performance increases in the presence of a dog. Indeed, anxiety and high stress levels can impair cognitive functioning,

including working memory and attention span. By buffering the effects of stress generated by certain daily life situations of children (e.g., school tests), dogs can improve children's attention levels, motivation and engagement in learning, as described earlier.

Moreover, dogs can be considered a unique type of social support. By nature, they are incapable of evaluating children's task performance or formulating feedback about what was correct or incorrect. For these reasons, they could sometimes be better protectors against stress than humans (Hawkins et al., 2017). Children enjoy reading stories to their pets and confiding in them. Dogs are perceived as always available, non-judgmental listeners, and unable to repeat secrets, which makes them trusted friends in the eyes of children (McNicholas & Collis, 2001, Melson & Fine, 2015; Svensson, 2014). Thus, Sato and colleagues (2019) suggest that interacting with a dog might also promote the expression and recognition of emotions in toddlers (3.5 years), which could contribute to greater emotional expressiveness later in childhood (5.5 years).

In addition to the above-presented mechanisms that could explain the positive effects of dogs on child development, it is possible that dog ownership has positive effects on parents, too. Even though studies on the topic are scarce and mostly focus on parents of children diagnosed with autistic disorders or cancer, some authors suggest that dogs can reduce stress levels of primary caregivers as well and provide them with social support. For these reasons, dog ownership might improve parenting skills, which in turn could favour the development of the child (Minatoya et al., 2021). Another study by Reider and colleagues (2023) suggests that the presence of the dog encourages parents to have conversations on emotions and mental states with their children, ultimately promoting prosociality and empathy in children. Lastly, it is also possible that parents who choose to keep dogs raise their children differently or pass on different traits genetically.

Costs of dog ownership and child-dog interaction risks

Despite its alleged benefits, dog ownership comes with costs, too, and some of them might seriously jeopardise the human-dog relationship. For many dog owners, including non-parents, the ideal dog should be safe with children before anything else (Diverio et al., 2016; King et al., 2009), but also "good with kids", trustworthy, gentle, loyal, and obedient (Kerry-Moran & Barker, 2018). If the family dog exhibits behaviours that compromise the safety of their children, parents may choose to rehome the dog or, in extreme cases, have it euthanised. This was reported, for instance, by Kerry-Moran and Barker (2018), who asked parents what would be the main reasons to getting rid of a family dog. Biting a family member (once or repeatedly) or a non-family member were considered "extremely" or "very" good reasons by 47%–78.4% of them for relinquishing a dog.

In fact, behavioural problems are relatively frequent in the canine population, and aggressivity is usually among the most prevalent categories (Dinwoodie et al., 2019). Of course, dogs exhibiting abnormal levels of aggressivity towards humans require experienced owners and should not be adopted by families with children. Biting is one of the behavioural manifestations of aggressivity in dogs and can occur in uncomfortable situations for the dog. If the behavioural signals of discomfort displayed by the dog (e.g., lip licking, yawning, head turning away) are ignored, behaviour can escalate and end in biting the person perceived by the dog as the source of the threat. It is important to highlight that even well-socialised, tolerant dogs can bite. Child-dog interactions at risk are, for instance, disturbing the dog while eating or sleeping, grabbing the dog's toy, and close physical contact (e.g., squeezing and hugging the dog). According to a review by Giraudet and colleagues (2022), dog bite incidents are more dangerous for children (especially the youngest ones) than for adults because of their smaller body size. For example, in a study in Austria, the annual incidence of dog bites was 0.5 per 1000 children between 0 and 16 years of age, and the incidence was highest in 1-year-old patients. Eighty-two percent of the biting dogs were familiar to the children (Schalamon et al., 2006). Children are more prone to getting bitten because of their more unpredictable, excited behaviour in the presence of dogs (e.g. screaming, chasing the dog) (Jalongo, 2018b). Besides being potentially life-threatening for children (e.g., in case of severe bites in the head, face and neck areas), dog attacks can also be traumatising and result in dog phobia. Dogs, especially larger or more energetic individuals, can also cause injuries, such as accidentally pushing younger children against furniture. For these reasons, safety rules, such as the adult supervision of child-dog interactions, must be promoted and observed in dog-owning families in order to prevent incidents (Jalongo, 2018b), no matter how well-trained and safe the dog is perceived to be. Finally, certain canine behaviours, such as excessive barking and destructive behaviour, can also cause stress for family members.

Other health risks related to dog exposure reported in the literature (Giraudet et al., 2022) include zoonoses, that is, pathogens which can be transmitted from dogs to children through dog bites, physical contact with the dog or canine faeces and saliva. A positive association was also found between living with a family dog and childhood asthma. This relationship is likely due to the repeated exposure of children to dog allergens and the development of pet-related allergies in children, which affect their respiratory system. Several authors have pointed out the need for prevention and educational programs in this regard, too (Giraudet et al., 2022).

Emotional costs can also arise in the course of dog ownership. As we described earlier, it is common for children to develop strong emotional connections with their dog friends. However, dogs can get ill or die during the childhood of their human companions. Whether the dog had to be euthanised or was the victim of an accident, its death can be as difficult to overcome as the death of a human

member of the family (Giraudet et al., 2022). Additionally, it often is the first loss children experience in their lives. Appropriate support and guidance from adults can help children to process such events, and their anger, guilt or sadness should not be minimized nor overlooked. On the other hand, as described by Bowman (2018), the death of a pet can help children understand the concepts of the natural life cycle, death and grief. Another potential emotional cost is stress. Owning a dog comes with responsibilities, such as feeding, walking, and veterinary care, which might be burdensome and/or costly for some families and can become a source of stress if the workload is too high or if the child is not ready for such responsibilities. Finally, having a dog can limit family activities or travel, reducing the opportunity for novel experiences and may distract parents from the child, who then receives less parental support.

Methodological limitations

Studies on the effects of dog exposure and dog ownership on human health and cognition are facing several methodological limitations, which have been pointed out in different reviews on the topic. Purewal and colleagues (2017) have alerted to the inconsistency of reported findings, which may be explained by the variety of study designs employed by the researchers. Among the issues identified were small sample sizes, small effect sizes, low statistical power, and the lack of control for confounding variables in these studies. When comparing the effects of the dog's presence on children's performance, experimental designs vary in terms of control groups as well. For instance, the "no dog" condition can either be a condition when a human is present instead of a dog, the child is alone, or the dog is replaced by a toy. McNicholas and Collis (2001) also pointed out the necessity of using methodologies and instruments adapted to the children's age, as self-reported questionnaires are difficult or impossible to use with young children. It is clear that research on human-dog interactions and dogs' effects on human development would benefit from more replication studies, as well as longitudinal designs (Giraudet et al., 2022; Purewal et al., 2017). Indeed, cross-sectional designs do not give researchers the possibility to establish causality links between variables. Therefore, it is, for example, impossible to conclude whether parents acquire dogs for children because they think their children demonstrate the skills and qualities to care for a dog or if the social competence of dog-owning children increases because of the dog's presence (Endenburg & van Lith, 2011; Purewal et al., 2017).

As mentioned by Giraudet and colleagues (2022), additional aspects should be considered when investigating these questions. One of them is culture, as cultural backgrounds and social norms shape people's attitudes towards animals. Human-animal interaction research often relies on self-reported data from parents, which can introduce perceptual bias. Respondents might have preconceived notions about the benefits of pet ownership, affecting their

responses. More objective measures, e.g., behavioural and/or physiological studies, could be highly beneficial to the research field. It also seems important to bear in mind that pet owners are not a homogenous group of people, and it is very likely that socio-demographic factors play a role in explaining the effects of dog exposure on children. For instance, the gender of the child has been found to influence attachment to pets and pet-directed care behaviour (Giraudet et al., 2022; Hawkins et al., 2017). Similarly, dogs are not homogenous either. The social behaviour and personality of the dog itself can significantly influence interaction with the child and, consequently, the developmental outcomes. Not all dogs may provide the same level of engagement or support, and negative experiences can potentially have adverse effects. Moreover, it should be noted that defining pet ownership might not be as straightforward as it seems. In that regard, Purewal and colleagues (2017) note that families whose pets passed away not long before participating in the study can potentially be classified as “non-owners”, although children from these families certainly have more dog experience than families who never had a dog. In addition, it would be beneficial for studies on this topic to consider a wider variety of pet species in a more systematic way, as caring for animals other than just dogs and cats may also impact children’s attitudes towards animals. Lastly, research on human-animal interactions in general might undergo a publication bias, that is, the positive effects of animals on human well-being might be more easily published than inconclusive or negative results.

Conclusion

A growing body of evidence in the literature indicates that dog exposure and dog-child interactions might be beneficial to child development, even from a very early age. Table 1 summarises the main findings discussed in the present review. Of course, the mechanisms behind such effects of dogs are probably more complex than what current models describe (Purewal et al., 2017). It is also important to highlight that child-dog interactions can have detrimental effects, too, for both the child and the dog. Further research is needed to disentangle the processes at play in child-dog interactions, especially in light of the attachment theory. However, reviews frequently alert on the methodological limitations encountered in this research field. Therefore, experts such as Chur-Hansen and colleagues (2010) have made several propositions to improve the quality of evidence of future human-animal interactions (HAI) studies. For instance, although participants and experimenters cannot be blind to the treatment condition (as being in the dog vs. no dog condition is rather obvious), they should not be aware of the research’s hypotheses. Randomised controlled intervention trials and long-term (6–12 months) longitudinal studies are also lacking. Regarding the effects of dog ownership on child development, it is important to take into account the potential impact of confounding variables, such as the parents’ income, cultural background and education level. More

generally, appropriate definitions and measurements of the concepts used in research (e.g., attachment, emotional health) are needed, along with detailed method descriptions, to enable replication studies.

Table 1

Developmental periods and main characteristics of the dog-child relationship and its effects on the child's development, based on our literature review.

Infancy and toddlerhood (0–3 years)	Preschool (3–5 years)	Middle childhood (6–11 years)	Adolescence (12–18 years)
<ul style="list-style-type: none"> The dog is a source of environmental stimulation and elicits verbal communication from the child. 	<ul style="list-style-type: none"> Development of social competence (e.g., empathy, prosociality) through adult-supervised dog care. Promotes the expression, the recognition and the regulation of emotions. 	<ul style="list-style-type: none"> The dog is a playmate, a confident and a friend. The dog can be a source of comfort when the child is scared or ill; protector role. High attachment to pets. In school settings, the dog is a motivation for learning (e.g., greater engagement in learning). 	<ul style="list-style-type: none"> When entering adolescence, the dog plays a (new) role for the child: source of unconditional and non-judgmental social and emotional support, develops self-esteem, social stress buffer. Decreasing interest in playing and walking with the dog. As adolescents age, they become less attached to their pet.

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Gillet, L & Kubinyi, E.**Kutyák és gyermekek: A gyermek-kutya interakció hatása a gyermek szociokognitív fejlődésére**

A kutyák népszerű háziállatok a gyermekes családok körében. A szülők szempontjából tekintve a kutyatartás hozzájárulhat, hogy a gyermekek érettebbé és felelősségteljesebbé váljanak. A gyermekek szoros kapcsolatot alakíthatnak ki a családi kutyákkal, ha bekapcsolódnak a gondozásukba és közösen vesznek részt a mindennapi tevékenységekben. A gyermekek otthonukon kívül is találkozhatnak kutyákkal, például oktatási programok részeként. Tanulmányunk célja annak áttekintése, hogy a kutyákkal való gazdag viselkedési interakciók (például játék, simogatás, beszélgetés a kutyával) hogyan befolyásolhatják a tipikusan fejlődő gyermekek szociokognitív fejlődését, valamint az ezek mögött álló pszichológiai és élettani mechanizmusokat. A pozitív hatások közé tartozik a megnövekedett szociális kompetencia, a javuló olvasási készség és a magasabb tanulási motiváció, ami jól magyarázható a gyermek kötődésével a háziállathoz és egyfajta szociális védőhatással. A lehetséges előnyök mellett a gyermek-kutya interakciókkal kapcsolatban megemlíthjük a kutyatartás költségeit is. A kutyaharapások és allergiák jelentős kockázatot jelentenek, valamint problémás viselkedés, anyagi gondok esetén a kutya jelenléte stresszhez vezethet a családban és a figyelem fókusza is elterelődhet a gyermekről. Áttekintjük az ember-állat interakciókkal kapcsolatos vizsgálatok főbb módszertani korlátait is, mint például a kis mintanagyság, a kis hatásméret, a zavaró hatások kontrolljának hiánya, az önbevallás torzítása, a longitudinális vizsgálatok hiánya, a kutyák viselkedésének és tartási szokásainak változékonysága, valamint az eltérő vizsgálati módszerek. Következtetéseink szerint a témával kapcsolatos tanulmányok jelentős része korrelációs jellegű, ami nem teszi lehetővé az ok-okozati összefüggések megállapítását. Bár a kutyatartás összefüggésbe hozható bizonyos fejlődési előnyökkel, ez nem feltétlenül jelenti azt, hogy a kutya jelenléte közvetlenül okozza ezeket az eredményeket. Más tényezők, például a családi környezet, a társadalmi-gazdasági státusz és a szülői részvétel szintén jelentős szerepet játszhatnak, de ezeket a korábbi kutatások ritkán vizsgálták.

Kulcsszavak: gyermekfejlődés, gyermek-kutya interakciók, kisállatokhoz való kötődés, kutyatartás, állatasszisztált intervenció

Gillet Laura: <https://orcid.org/0009-0000-2914-4620>

Kubinyi Enikő: <https://orcid.org/0000-0002-4468-9845>