

REAL VS. ROBOTIC THERAPY DOGS PROS AND CONS

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Abstract

This study is inspired by Eszter Loványi's 2022 publication (Can an Assistance Dog Supported by Technology Defeat the Robot?), which explores the dilemma between choosing assistance dogs or robots in therapeutic contexts. The issue has also been previously addressed in Isaac Asimov's science fiction story (A Boy's Best Friend). Given the increasing role of artificial intelligence in daily life and its potential application in special education, this paper aims not to resolve the debate but to present a balanced comparison of the benefits and limitations associated with both real and robotic therapy dogs.

Keywords: animal-assisted therapy, robotic therapy dogs, artificial intelligence, special education, emotional support

Discipline: pedagogy

Absztrakt

VALÓDI VS. ROBOT TERÁPLÁS KUTYÁK ELŐNYEI ÉS HÁTRÁNYAI

A tanulmány megírását Loványi Eszter „Legyőzheti-e technológiával támogatott segítőkutya a robotot? Kísérlet a „segítőkutya vagy segítőrobot” típusú dilemmák feloldására” című 2022-es tanulmánya inspirálta. Ezt az érdekes kérdést tárja az olvasó elé Isaac Asimov 1975-ös regénye is „Egy fiú legjobb barátja” címmel. Az tény, hogy a mesterséges intelligencia egyre nagyobb teret hódít a mindennapi életünkben, így a gyógypedagógiában is lehet létjogosultsága. Jelen tanulmány szerzője nem kíván állást foglalni egyik oldalon sem, inkább csak arra vállalkozik, hogy ismertesse a hagyományos, valamint a robot kutyákkal végzett gyógypedagógiai segítségnyújtás előnyeit és hátrányait.

Kulcsszavak: hagyományos kutyaterápia, robot kutyák, mesterséges intelligencia, gyógypedagógia, érzelmi támogatás

Diszciplína: neveléstudomány

The question of emotional attachment between humans and technology has long been a subject of both scientific inquiry and literary exploration. Isaac Asimov’s short story „*A Boy’s Best Friend*” (Asimov, 1975) offers an early and compelling narrative that anticipates key psychological and ethical issues raised by contemporary research into robot-assisted therapy and social robotics.

In the story, a young boy named Jimmy lives on the Moon, where his closest companion is a robotic dog. When his father brings him a real, biological dog from Earth, Jimmy is not thrilled; instead, he feels a deep loyalty to his robot dog, with whom he has built a shared history and emotional bond. For Jimmy, the

robot is not a substitute but his “real” friend, regardless of its artificial nature. This narrative foregrounds a central question in human-robot interaction research: is the ontological status of a companion (biological vs. artificial) as important as the subjective emotional reality perceived by the user?

Asimov’s depiction resonates with findings in recent studies on robotic animals used in therapeutic contexts. Not only robot dogs but also various types of social robots are playing a greater role in supporting vulnerable groups of people. Let’s first examine the relevance of robot dogs and other social robots in the field of special education and explore the different areas of application.

Application Areas of Robot Dogs and Other Social Robots

Social robots are increasingly applied in therapeutic settings where human interaction may be limited or where consistent engagement is needed Moerman et al. (2018). In special education, robots like NAO have shown promise in developing social, cognitive, and language skills in children with autism spectrum disorder (Silvia et al., 2017; Mező & Szabóné Burik, 2021). Sivia et al. (2019) found that, both children and adults exhibited a greater frequency of appropriate social behaviours during the dog and robot conditions compared to the no-stimulus condition. Among children, the real dog proved more effective than the robotic dog in promoting social communication. In adults, no significant difference was observed between the dog and robot conditions. Notably, only the real dog positively influenced cardiac autonomic regulation, as indicated by increased heart rate variability (HRV) and a buffering of parasympathetic activity decline typically associated with social interaction. Barber et al. (2021) found that behavioural observations focusing on social interaction, initiation, and response behaviours revealed that the children spent a comparable amount of time engaging in positive social touch with both the robot and the dog, though they interacted overall for a longer duration with the robot. This might be attributed to the robot's heightened responsiveness to the children's initiation cues. Despite this, self-report data showed a clear preference for the session involving the live dog. Nevertheless,

the children reported high levels of enjoyment across both sessions, with more positive emotions noted after interacting with the robot. Burr et al. (2023) explores the perspectives of animal-assisted intervention (AAI) professionals regarding traditional Animal-Assisted Therapy (AAT) and Robotic Animal-Assisted Therapy (RAAT). It highlights AAT's benefits – such as improving motor, social, and emotional functioning – while also noting concerns around animal welfare, safety, and inconsistent standards. The majority of surveyed professionals supported RAAT as a viable alternative or preparatory tool, especially in cases where live animal interaction is impractical or unsafe. The authors conclude that RAAT has promising therapeutic potential, particularly for individuals with developmental disabilities or in settings with medical constraints. More research is recommended to support RAAT's clinical integration.

In elderly care, social robots such as PARO and ElliQ promote emotional well-being by providing companionship and reducing feelings of loneliness. Studies report decreased agitation and improved mood among individuals with dementia using these robotic companions (Wada et al., 2005). Social robots can also remind users to take medications or stay hydrated, supporting independent living. Vercelli et al. (2018) conclude that while robotics can significantly reshape healthcare delivery and elder care, careful attention must be given to ethical design, user autonomy, and maintaining human dignity. With appropriate

safeguards, robots could enhance elder well-being and reduce caregiver burden.

In mental health therapy, robots offer scalable and stigma-free interactions that may be particularly helpful for individuals reluctant to engage with human therapists. They have been tested for applications in anxiety reduction, depression screening, and motivation enhancement, though their use remains complementary rather than substitutive. The article by Szondy and Fazekas (2024) discuss the role of attachment in human-robot interactions within mental health contexts, arguing that the therapeutic potential of social robots depends heavily on the type and strength of attachment formed between user and robot. The authors draw from attachment theory and categorize robot roles based on the level of emotional connection they require. They categorize six robot roles in mental health:

- **Diagnostic Tools:** Used briefly for behavioural assessments; minimal or no attachment required.
- **Interview Mediators:** Reduce anxiety during interviews; slightly more interaction and potential for emotional bonding.
- **Promoters of Social Connections:** Help clients interact with others; moderate attachment may form.
- **Coaches:** Provide personalized guidance (e.g., fitness or psychological coaching); require sustained interaction and some attachment.
- **Social Companions:** Alleviate loneliness; involve intrinsic emotional connections and higher levels of attachment.

- **Therapists:** Aim for deep psychological impact, including reflective functioning and self-awareness; require the highest level of attachment.

In most studies, they are primarily used to support therapeutic interventions, whether in special education or hospital care settings. However, it is important to note that comparative studies between real and robotic therapy dogs are limited but growing. Robinson et al. (2021) found that while both types offer short-term mood improvements, real therapy dogs elicit deeper emotional engagement and physiological responses. Meyer et al. (2020) noted a significantly higher oxytocin release in interactions with real dogs compared to robotic counterparts. Nonetheless, robotic therapy dogs provide distinct advantages in accessibility, consistency, and hygiene. Their use is particularly relevant in dementia care, intensive care units, and during public health crises where real animals are impractical.

After thoroughly outlining the areas of application for robotic dogs and other social robots, it is important to address the ethical aspects of their use. We will explore the ethical questions with the help of, and in parallel with, Asimov's novel.

Ethical Issues of Application of Robotic Dogs and Social Robots:

Research has shown that responsive, anthropomorphic robotic pets – such as the PARO seal or tombot dogs – can elicit emotional responses comparable to those

evoked by real animals, particularly among children, the elderly, and individuals with cognitive impairments (see: Shibata, 2012; Broadbent et al. 2009). The emotional bond formed between humans and such robots often hinges not on their biological authenticity, but on their behaviour, consistency, and capacity to respond in ways that mimic social companionship.

This raises both ethical and therapeutic considerations: if a robotic animal is capable of providing emotional support, companionship, and therapeutic benefit, its artificiality may not diminish its value. As Asimov subtly suggests through Jimmy's preference, what matters most is not the nature of the companion, but the quality of the emotional connection it enables. From this perspective, robotic therapy animals are not merely inferior substitutes for real ones, but legitimate tools for fostering emotional well-being, especially in environments where live animals may not be suitable or safe. *"For Jimmy, it did not matter whether his dog was living or artificial – what mattered was that it had been by his side for years, had always understood him, and had always been there when he needed it. In his eyes, that is what made it real."*

This quote effectively illustrates the concept of emotional attachment in therapeutic contexts as well – especially when one of the companions is a robotic animal. We placed the Asimov quote at the very end of the ethics section to prompt the reader to reflect on the question raised by the short story, as well as by the cited studies. After discussing the ethical aspects of robot-assisted animal

therapy, it is important to address the factors that may hinder its usability. These factors will be outlined briefly in the following subsection of the study.

Limitations of Application of Robotic Dogs and Social Robots

Battery Life & Performance. Limited runtime ~2-4 hours: Guide-dog-style quadrupeds often last only 2–4 hours on a single charge; payloads (sensors, tethering) can reduce this further.

Aggressive terrain $\neq$ endurance spot. For example, runs ~90 min before recharging; swapping batteries frequently required even during a half-marathon robot run.

Navigation & Terrain. Obstacle handling is hard: Detection of overhead obstacles and uneven terrain remains a challenge; sophisticated sensors (LIDAR, stereo vision) are required to mitigate risks.

Dynamic re-planning essential: Advanced heuristic control is needed to navigate real-world surfaces like stairs and loose terrain required even during a half-marathon robot run.

Payload Capacity. Lower compared to military-grade bots: Many quadrupeds struggle with heavy payloads; some research platforms (e.g., CENTAURO) can handle only modest loads (~15 % of robot's mass)

Commercial alternatives fare no better: Small-scale 'guide-dog' bots optimized for humans must balance payload with battery and chassis limitations.

Weather Resistance. Not inherently weather-proof: While some tracked/UAV robots are weather-sealed, most quadrupeds use chassis and electronics that aren't ruggedized for rain, cold, or dust.

Cost. High hardware and development cost: Specialized quadrupeds with autonomy and robustness typically cost tens to hundreds of thousands USD, pricing out individuals and small organizations.

Hygiene & Infection Control. Shared use risks: In contexts like hospitals or aged care, ensuring decontamination between users is non-trivial and often overlooked in current designs.

Privacy Concerns. Potential misuse: Robotic dogs with audio/video sensors have provoked discussions among privacy advocates, though focused research remains limited.

Lack of Emotional Connection. No genuine empathy: Social robotics literature indicates short interactions strain meaningful bonds; recharge interruptions break continuity, undermining emotional engagement.

These findings highlight that while robotic dogs and other social robots demonstrate promise, significant technical, ethical, and practical challenges remain – particularly around endurance, robustness, and human-centered design.

Let us now turn from the world of robotic dogs to their real, four-legged counterparts, and examine how they provide support to individuals in need. These sub-chapters will discuss the advantages and inhibitions of real dog therapy as well.

Introduction to Animal-Assisted Interventions (AAI)

Animal-assisted interventions (AAI), particularly those involving therapy dogs, are more and more integrated into healthcare, education, and social support settings. Real therapy dogs are recognized for their ability to reduce stress, anxiety, and depression while fostering emotional well-being and communication (Beetz et al., 2012). Another study by Tóth et al. (2023) investigates the impact of dog ownership on the physical activity, mental health, and quality of life of dog owners. Conducted via an online questionnaire completed by 220 Hungarian dog owners, the research aimed to explore the human-dog relationship, with a focus on how dogs influence their owners' well-being, daily routines, and emotional states. Key findings were the following:

- 77.3% of respondents walk their dogs regularly.
- The Mental Health Test revealed average to above-average mental well-being in respondents, with happiness scores averaging 4.58 out of 6.
- 51.8% play with their dogs daily.

Tóth et al. (2023) could confirm that dogs contribute positively to owners' physical and mental health, promote active lifestyles, and help alleviate stress and loneliness. These findings align with public health goals to encourage more physically and emotionally enriching lifestyles through dog ownership. These effects are often attributed to the human-animal bond and the activation of

oxytocin and dopamine pathways during interaction (Fine, 2019).

A comparison of real and robotic dog therapies

Benefits of Real Therapy Dogs. Real therapy dogs contribute to psychological and physiological improvements in various populations. For instance, studies demonstrate their effectiveness in reducing loneliness, promoting positive emotional states, and the development of creativity (Mező, 2024), particularly among elderly individuals and children with autism spectrum disorder. Physiological benefits include lower-ed blood pressure, heart rate, and cortisol levels following interaction with dogs.

Additionally, therapy dogs act as social facilitators, enhancing patient interaction and engagement in therapeutic (Arnskötter et al. 2022; Gutman et al. 2022; Mittly et al. 2024) and educational environments Their presence encourages communication and decreases perceived social isolation and anxiety (Bird et al. 2023; Wu, and Wei 2023).

Limitations of Real Therapy Dogs. Despite their advantages, real therapy dogs pose several challenges. Allergies, dog phobias (Mező, 2023), and the need for constant supervision and care limit their accessibility in certain clinical environments. Ethical concerns about animal welfare, overwork, and training standards have also been raised (Serpell et al. 2017).

Advantages and Disadvantages of Real vs. Robotic Therapy Dogs. Table 1 includes the following aspects of comparison real and robotic dog therapies:

- Emotional connection,
- Physiological benefits,
- Social facilitation,
- Versatility in settings,
- Authentic interaction,
- Accessibility and logistics,
- Allergies and fears,
- Ethical concerns,
- Consistency and availability,
- Hygiene,
- Cost,
- Cultural acceptance,
- Specific applications,
- Future potential.

Conclusion

The literature reveals strong evidence for the therapeutic value of real therapy dogs, but we must also take into consideration the value and potential of robotic dogs as well. Robotic therapy dogs offer a valuable, hygienic, and scalable alternative, particularly for fragile or high-risk populations. However, they do not yet fully replicate the psychological depth of interactions with real animals.

The author of this study strongly believes that future research should focus on gathering more cooperative data on the application of

Table 1. A comparison of real and robotic dog therapies. Source: the Author.

Aspect	Real Therapy Dogs	Robotic Therapy Dogs
Emotional connection	Strong emotional bond, authentic affection	Simulated affection; anthropomorphized comfort
Physiological benefits	Reduces cortisol, blood pressure, heart rate; increases oxytocin	Mild stress reduction; some evidence of reduced agitation in dementia
Social facilitation	Encourages communication, engagement, and interaction	Can support communication in ASD and dementia care
Versatility in settings	Useful in schools, hospitals, therapy rooms (where appropriate)	Ideal for sterile, high-risk, or restricted-access environments
Authentic interaction	Natural responsiveness promotes emotional and cognitive stimulation	Predictable, safe interaction, particularly valuable for autism or elderly care
Accessibility and logistics	Requires supervision, rest periods, and proper care	Easily deployable; consistent availability
Allergies and fears*	May cause allergic reactions or fear in some individuals	Non-allergenic and non-threatening appearance
Ethical concerns	Risk of overwork, welfare, and treatment issues	Risk of emotional deception and anthropomorphism
Consistency and availability	Subject to fatigue, mood, and availability	Always responsive; 24/7 availability possible
Hygiene	Requires physical handling and may pose hygiene risks	Easily sanitized; safer in clinical settings
Cost	Costs include training, food, and veterinary care	High initial cost; long-term savings through durability and reuse
Cultural acceptance	Widely embraced in therapy and educational communities	Variable acceptance; influenced by cultural attitudes toward AI and robotics
Specific applications	Excellent for personalized, emotionally rich therapeutic sessions	Well-suited for dementia care, autism support, and high-risk environments
Future potential	Limited by natural lifespan and training capabilities	High potential with improvements in AI, autonomy, and battery technology

* Note: Mező (2023) shows on possible goals of animal-assisted therapies in connection with the prevention/intervention of anxieties about animals. Mező (2021) summarizes the possible role of Asimov's novels in the attitudes forming about artificial intelligence (AI).

real and robotic therapy dogs. Furthermore, longitudinal effects of robotic companionship and finally mixed-method studies integrating physiological and narrative data.

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