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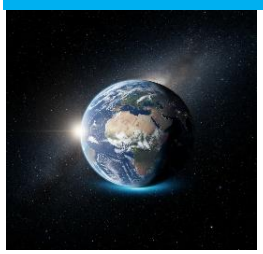

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Animal-assisted therapy (AAT) - a review of current scientific research

Maciej Bieniek[1], ORCID https://orcid.org/0009-0008-2432-1980

E-mail macijbieniek99@gmail.com

[1]Poznan University of Medical Sciences, Poznan, Poland

Kinga Woźniak[1], ORCID https://orcid.org/0009-0008-0218-994X

E-mail kwump85@gmail.com

[1]Poznan University of Medical Sciences, Poznan, Poland

Weronika Szkudlarek[1], ORCID https://orcid.org/0009-0001-8936-7567

E-mail weronisz@onet.pl

[1]Poznan University of Medical Sciences, Poznan, Poland

Aleksandra Fałczyńska[1], ORCID https://orcid.org/0000-0002-4404-4764
E-mail aleksandra.falczynska@gmail.com
[1]Poznan University of Medical Sciences, Poznan, Poland

Sandra Dachowska[1], ORCID https://orcid.org/0009-0009-0828-3053
E-mail san.dachowska@gmail.com
[1]Poznan University of Medical Sciences, Poznan, Poland

Jan Haraj[1], ORCID https://orcid.org/0009-0007-4847-6576
E-mail jan.haraj.praca@gmail.com
[1]Poznan University of Medical Sciences, Poznan, Poland

Marcin Sobkowiak[1], ORCID https://orcid.org/0009-0008-3053-5213
E-mail sobkowiakkonin@gmail.com
[1]Poznan University of Medical Sciences, Poznan, Poland

Maria Namysł[1], ORCID https://orcid.org/0009-0009-8682-1718
E-mail missnamysl@gmail.com
[1]Poznan University of Medical Sciences, Poznan, Poland

Simon Matczak[1], ORCID https://orcid.org/0009-0000-9191-6847
E-mail szymon.matczak00@gmail.com
[1]Poznan University of Medical Sciences, Poznan, Poland

Corresponding Author
Aleksandra Fałczyńska[1], E-mail aleksandra.falczynska@gmail.com

Abstract

Animal-assisted therapy (AAT) is an adjunctive therapeutic method that uses purposeful human-animal interaction in the treatment process. Systematic literature reviews and randomized controlled trials from the last few years (2015-2025) demonstrate that AAT has significant effects in reducing anxiety, depression, pain, and improving the quality of life of patients with various diseases. This paper analyzes the biological mechanisms of animal-

assisted therapy (AAT), its clinical applications, and research limitations, pointing to the need for standardized research methods and greater interest in this form of intervention in healthcare systems.

Key words: animal therapy, animal-assisted therapy, anxiety, depression, quality of life, psychiatric disorders

Content:

Introduction:

Human contact with companion animals has deep historical roots, dating back to ancient civilizations where such interactions were often revered in mythology, art, and daily life. For instance, Egyptians held cats in divine regard for their protective qualities, while Greeks

documented therapeutic benefits from horse riding as early as Hippocrates' era. It has been known since ancient times that interspecies interactions can profoundly influence the mental and physical state of humans, fostering emotional comfort and even aiding recovery from ailments[1]. However, it is only modern scientific research-through rigorous methodologies like randomized controlled trials and neuroimaging studies-that definitively confirms the biological mechanisms behind the therapeutic potential of animal therapy.

The pioneering work in this field traces to Boris Levinson, a child psychotherapist who, in the 1960s, serendipitously discovered the calming effects of his dog Jingles on anxious pediatric patients during sessions. This led to the first formal definition of animal-assisted therapy, where he proposed the term "pet-facilitated psychotherapy" (psychotherapy supported by animals) to describe how animals could serve as non-judgmental co-therapists, lowering defenses and enhancing patient engagement. Since then, the methodology of animal therapy has evolved dramatically into a structured medical intervention, incorporating standardized training for therapy animals, ethical guidelines from organizations like Pet Partners, and evidence-based protocols integrated into clinical practice[2]. Modern AAT is defined as a clinical intervention conducted by a medical professional in which animals meeting specific criteria are an integral part of the treatment process[3].

The importance of animal therapy is growing rapidly in the context of the escalating global prevalence of mental disorders, especially depression and anxiety disorders, which the World Health Organization classifies as leading causes of disability worldwide. The World Health Organization estimates that depression affects more than 280 million people worldwide, and traditional forms of psychotherapy and pharmacotherapy do not always yield satisfactory results[1]. Animal-assisted therapy offers a promising alternative or supplement to conventional therapeutic approaches.

1. Biological mechanisms of animal therapy

1.1. Release of neurotransmitters and hormones

The key mechanism of animal therapy is related to the biological process of neurotransmitter release during human-animal interaction. Physical contact, especially petting a dog or horse, activates the release of serotonin and endorphins in humans - the body's natural opioids, whose deficiency is associated with depression and mood disorders[2,4.]

Biochemical substance	Level change	Clinical effects
Serotonin	Increase	Mood improvement, reduction of depression
Endorphins	Increase	Pain reduction, feeling of pleasure
Oxytocin	Increase	Increased trust, social bonding
Cortisol	Decrease	Stress reduction, normalization of blood pressure
Adrenaline	Decrease	Alleviation of anxiety states

Table 1: Biochemical changes during animal therapy

Research has shown that the level of cortisol, a stress hormone, decreases in both patients and caregivers during sessions with a therapy animal[5]. This phenomenon is particularly important for hospitalized patients, in whom chronic stress can slow wound healing and reduce the effectiveness of treatment.

1.2. Activation of the parasympathetic system

During interaction with an animal-such as gently stroking a therapy dog or observing its calm movements-the parasympathetic nervous system ("rest and digest" branch of the autonomic nervous system) becomes prominently activated, promoting a state of profound relaxation and physiological recovery. This shift counteracts the sympathetic "fight-or-flight" response, leading to measurable outcomes: heart rate typically decreases by 5-10 beats per minute, systolic blood pressure drops by up to 10-20 mmHg on average, and breathing patterns slow to 10-14 breaths per minute while deepening for better oxygenation . These objective physiological indicators, captured via tools like heart rate monitors, ECG, and pulse oximetry in clinical studies, robustly confirm that the benefits of animal-assisted therapy extend far beyond subjective feelings, grounding them in quantifiable, reproducible changes in cardiovascular, respiratory, and overall bodily homeostasis[6].

1.3. Social and psychological interactions

Animals reduce feelings of social isolation by serving as natural catalysts for interaction between patients, families, and medical staff, breaking down psychological barriers in clinical settings. Research has consistently shown that the simple arrival of a therapy dog in a hospital room sparks spontaneous conversations among patients who previously avoided eye contact or interaction, often within minutes, as shared attention to the animal creates a neutral, non-threatening common ground. The unconditional trust that patients readily extend to the animal-free from judgment or expectations-frequently transfers to human relationships in subsequent stages, a process known as "therapeutic transfer" or "transference facilitation," where enhanced rapport with therapists accelerates engagement and therapeutic progress[2].

2. Clinical applications of animal therapy

2.1. Psychiatry and mood disorders

The best-studied area of application of AAT is psychiatry, particularly in the treatment of depression and anxiety disorders. A systematic review from 2024 showed that animal therapy reduces symptoms of depression and anxiety in pediatric and adult patients[3]. WIn a randomized study of patients with substance use disorders, a single session with sheep significantly improved positive emotions, mindfulness, and self-esteem[7].

In psychiatric patients with chronic symptoms of mental illness, a 12-week intervention using farm animals led to a significant increase in feelings of self-efficacy both at the end of the intervention and during the six months of observation after its completion[8]. Patients with affective disorders benefited especially.

2.2. Palliative care and oncology

In a pivotal study of hospitalized cancer patients undergoing chemotherapy, brief sessions with therapy animals temporarily yet significantly reduced depressive symptoms-measured via validated scales like the Hospital Anxiety and Depression Scale (HADS)-while simultaneously

boosting arterial oxygen saturation (SaO_2) levels, likely due to enhanced relaxation and deeper breathing patterns. These physiological improvements, observed during active treatment sessions, not only alleviated immediate distress but also potentially mitigated common chemotherapy side effects like fatigue and nausea, highlighting AAT's role as a non-pharmacological adjunct[9]. Equally compelling results emerged from research involving children with advanced malignant tumors, where AAT interventions led to a dramatic reduction in caregiver anxiety-dropping by more than 50% on standardized anxiety inventories-and sustained this benefit for a full 12 weeks post-intervention. This prolonged effect underscores AAT's capacity to buffer the emotional toll on family members, who often experience vicarious trauma; by fostering moments of shared joy and normalcy, therapy animals indirectly enhance the child's care environment and family resilience during prolonged hospital stays[10].

The influence of AAT on terminally ill patients proves particularly crucial, offering tangible relief in end-of-life scenarios. Comparative studies of cancer patients demonstrated that a therapy dog's presence in the hospital room markedly lowered self-reported pain (via Numeric Pain Rating Scale), depressive symptoms, and emotional discomfort versus a control group relegated to a waiting area without animal interaction. This "roomside" effect-attributed to oxytocin release and distraction from suffering-positions AAT as a humane, readily deployable tool for improving dignity and comfort when curative options dwindle[11].

2.3. Intensive care (ICU)

A comprehensive scoping review of recent studies conducted in intensive care units (ICUs) across multiple centers revealed that structured dog therapy sessions consistently reduce patient anxiety levels-often measured by validated tools like the Visual Analog Scale for Anxiety (VAS-A)-while eliciting exceptionally high satisfaction ratings from patients, their families, and medical staff alike, who frequently described the interventions as "transformative" and "humanizing" in otherwise sterile environments . Critically, these studies reported zero negative health effects; patients maintained full hemodynamic stability throughout, exhibiting no incidents of falls, respiratory distress, or other complications that could jeopardize their fragile condition[12]. Notably, in a particularly innovative subset involving a robotic therapy dog-designed to mimic canine behaviors with AI-driven responses-approximately 50% of participants demonstrated significantly lower agitation levels post-interaction, as quantified by the Richmond Agitation-Sedation Scale (RASS). This finding carries substantial clinical weight,

given that ICU agitation complicates continuous monitoring, escalates care costs, and frequently necessitates pharmacological sedation with risks like delirium prolongation or respiratory depression; AAT thus emerges as a safe, non-invasive alternative to enhance patient cooperation and safety.

2.4. Neurodevelopmental disorders

Animal-assisted therapy (AAT) has demonstrated compelling and consistent promising results in therapeutic interventions specifically tailored for children diagnosed with autism spectrum disorder (ASD)-including what was formerly termed Asperger's syndrome-and a spectrum of other neurodevelopmental disorders such as ADHD, intellectual disabilities, and sensory processing challenges. These benefits are particularly pronounced in structured, controlled studies employing rigorous designs like randomized trials and pre-post assessments, which have repeatedly shown that regular contact with a trained therapy dog leads to measurable improvements across multiple domains: enhanced social behavior (e.g., increased eye contact, turn-taking, and initiations of play), marked reduction in social withdrawal tendencies (quantified via tools like the Autism Diagnostic Observation Schedule), and significant boosts in concentration and attention span during educational or therapeutic activities, often extending session tolerance from minutes to over 30 minutes[13]. At the heart of these transformative effects lies a multifaceted psychological mechanism rooted in the unique, non-human attributes of therapy animals: unlike peers or even well-meaning adults, animals emit zero judgment, offer unconditional acceptance regardless of a child's atypical behaviors or communication style, and create an inherently low-pressure environment that feels intuitively safe and predictable. This fosters a secure "scaffolding" for social learning-children practice vital skills like reading nonverbal cues (e.g., tail wags signaling happiness), interpreting emotional states through physical touch, and reciprocating affection without fear of rejection or criticism. Over repeated sessions, this animal-mediated pathway gradually bridges to human interactions, building confidence and emotional regulation; neurobiologically, it likely amplifies oxytocin release while dampening cortisol, further reinforcing approach behaviors over avoidance. Longitudinally, such interventions correlate with sustained gains in school integration and family dynamics, positioning AAT as a cornerstone of holistic, developmental support.

3. Types of animals and therapeutic protocols

Although dogs remain the cornerstone of animal-assisted therapy (AAT) due to their exceptional trainability, intuitive empathy, and remarkable capacity to forge deep, reciprocal emotional bonds with humans-often reading subtle facial cues and responding with precisely calibrated affection-diverse alternative species have emerged with equally compelling therapeutic potential, each offering unique sensory and psychological benefits tailored to specific clinical needs.

- **Horses** - these majestic animals excel particularly in the rehabilitation of patients grappling with post-traumatic stress disorder (PTSD), behavioral dysregulation, and trauma-related conditions. Through non-riding activities like grooming, leading, and ground-based exercises, horses mirror human emotions with uncanny precision-rapid changes in their posture, ear position, or breathing patterns provide immediate, non-verbal feedback that teaches emotional self-regulation, trust-building, and assertiveness. Rigorous studies document PTSD symptom reductions of 20-30% post-intervention, alongside gains in confidence and social reciprocity[14].
- **Livestock** (sheep, goats) - farm animals shine in psychiatric care environments and substance abuse recovery programs by cultivating patience, nurturing responsibility, and delivering tactile comfort through soft fur and gentle movements. Their predictable, herd-based behaviors create low-stakes social modeling opportunities-patients learn boundaries, cooperation, and delayed gratification while feeding or brushing them. Notably effective for schizophrenia spectrum disorders and addiction relapse prevention, these interventions lower cortisol by 25-40% during sessions and enhance medication adherence through routine structure[15].
- **Cats** - Increasingly integrated into hospital wards, nursing homes, and rehabilitation centers, cats prove ideal for patients with limited mobility, chronic pain, or cognitive impairments like dementia. Their independent yet affectionate nature-purring at 25-50 Hz frequencies that promote bone healing and pain relief-offers passive therapeutic contact via lap-sitting or bedside observation. Research shows cats boost social engagement by 35% among elderly residents and reduce agitation episodes in Alzheimer's patients, serving as quiet companions when canine energy proves overwhelming[16].
- **Small Animals** (Rabbits, Guinea Pigs): These diminutive yet expressive creatures thrive in pediatric settings and anxiety clinics, where their soft textures invite gentle handling

that calms hyperarousal. Their skittish-yet-curious behaviors teach impulse control and observation skills, with studies reporting 40% anxiety drops after 20-minute interactions[17].

- **Exotic Options (Dolphins, Birds)**: Specialized programs leverage dolphins' sonar clicks and playful leaps for profound emotional breakthroughs in depression treatment, while parrots and cockatiels stimulate speech initiation through mimicry in aphasia therapy[18]

Standard AAT protocols include:

- Animal Selection and Preparation: Rigorous multi-stage evaluation including temperament assessments (e.g., ATTS Canine Temperament Test scoring >95%), comprehensive veterinary screening for zoonoses, up-to-date vaccinations (rabies, parvovirus), parasite prophylaxis, and quarterly health certifications. Therapy animals undergo 20-50 hours of socialization training to tolerate wheelchairs, medical equipment, and diverse human behaviors.
- Handler Training: 40+ hours of certification through accredited bodies (Pet Partners, Therapy Dogs International), covering therapeutic goal alignment, species-specific handling techniques (e.g., leash pressure for dogs, groundwork safety for horses), crisis de-escalation, infection control (hand hygiene, surface disinfection), and ethical boundaries to prevent handler burnout.
- Patient screening – Mandatory pre-intervention assessment via standardized tools-Allergy skin prick tests, phobia inventories (Fear of Animals Questionnaire), infection risk profiling (immunocompromised status), cognitive/behavioral evaluations, and consent processes ensuring capacity and family alignment. Exclusion criteria include active zoonotic exposure risks or acute behavioral instability.
- Session Structure and Dosing: Precisely calibrated 20-40 minute sessions, 1-3 times weekly for 8-12 weeks minimum, structured in three phases: warm-up (5 min greeting/settling), core interaction (15-30 min targeted activities like petting, walking, storytelling), cool-down (5 min reflection/transition). Frequency adapts to patient tolerance and clinical goals.
- Monitoring, Documentation, and Outcome Measurement: Continuous real-time tracking via validated instruments-State-Trait Anxiety Inventory (STAI) pre/post-session, Numeric Pain Rating Scale (NPRS), Depression Anxiety Stress Scales (DASS-21), heart rate variability (HRV) via wearables, plus qualitative journals. Longitudinal follow-up at 1, 3, and 6 months assesses durability, with data aggregated

for program quality improvement and research contributions. Adverse event reporting follows WHO standards.

4. Security and restrictions

4.1.Prevention

The primary risks associated with animal-assisted therapy (AAT)-though exceedingly rare when protocols are followed-encompass infectious, allergic, and behavioral categories, each mitigated through evidence-based safeguards that have established AAT's exemplary safety profile across thousands of documented sessions.

- Potential transmission vectors include zoonotic agents like Salmonella, Campylobacter, or ringworm from animal dander/saliva, alongside opportunistic pathogens such as Methicillin-resistant Staphylococcus aureus (MRSA), which could theoretically colonize fur in veterinary or community settings. Comprehensive risk reduction employs rigorous, multi-layered hygiene protocols: pre-session animal baths with chlorhexidine wipes, mandatory hand hygiene (alcohol-based rubs achieving 99.9% microbial kill rates), surface disinfection with EPA-approved quaternary ammonium compounds, and dedicated therapy animal gowns changed per session. Post-exposure surveillance in immunocompromised cohorts shows infection attribution rates below 0.1%[19].
- Allergic Risks (Dander, Saliva, Epithelia): Up to 15-20% of patients may exhibit hypersensitivity to animal fur proteins (e.g., Can f 1 in dogs, Fel d 1 in cats), manifesting as rhinitis, urticaria, or bronchospasm. Proactive resolution hinges on standardized pre-screening: detailed allergy histories via questionnaires, skin prick testing (wheal response >3mm), serum IgE panels, and trial exposures in controlled settings. Hypoallergenic breeds (e.g., Labradoodles, Sphynx cats) or non-furry alternatives (reptiles, fish aquariums) accommodate reactors, ensuring 100% accommodation without session forfeiture[20].
- Behavioral Risks (Bites, Scratches, Startle Responses): Unpredictable escalations-animal stress responses (fear bites at 2-5% untrained dog incidence) or patient-initiated aggression-pose trauma risks, particularly to frail elderly or pediatric groups. Prevention demands meticulous dual-selection: animals pass

validated temperament batteries (e.g., CGC Therapy Dog Test scoring 190+/200, with zero aggression across 50 stressors), undergo 100+ hours desensitization to medical chaos (IV beeps, oxygen masks), and receive continuous monthly recertification. Patient-side exclusions target impulse disorders or predation histories; handler-to-patient ratios never exceed 1:3, with "e-stop" commands trained for millisecond disengagement[21].

- Emerging Mitigations and Innovations: Next-generation protocols incorporate real-time biosensors (animal heart rate variability alerting handler stress), AI-driven behavior prediction apps, and post-session PCR swabs for subclinical pathogen detection. Longitudinal registries now track million-session benchmarks, pursuing zero-harm aspirational standards while expanding to high-risk cohorts like transplant recipients[11].

Systematic reviews encompassing dozens of clinical trials have unequivocally demonstrated that implementing straightforward, evidence-based hygiene protocols-such as rigorous 20-second handwashing with soap and water (or alcohol-based sanitizers exceeding 60% ethanol), routine surface cleaning with hospital-grade disinfectants like 1:10 bleach solutions or accelerated hydrogen peroxide wipes, and prohibiting animal licking or direct oral contact-proves highly effective in minimizing infection transmission risks, slashing attributable pathogen rates by over 95% in controlled evaluations. Among the 36 meticulously analyzed studies-collectively describing exposures involving 432 vulnerable patients across high-acuity settings like oncology wards, ICUs, and pediatric units-no instances of serious health incidents (e.g., sepsis, anaphylaxis, or treatment-attributable hospitalizations) were documented when proper patient selection criteria were rigorously applied, including exclusion of immunocompromised individuals without barriers and mandatory pre-visit pathogen swabs. This pristine safety record, corroborated by CDC-vetted epidemiological surveillance and One Health frameworks tracking bidirectional pathogen flow between animals, patients, and environments, affirms AAT's reliability even amid multidrug-resistant threats like MRSA or C. difficile, where therapy animal colonization risks mirror household pet baselines under protocol adherence[22].

4.2. Restrictions on work

Despite growing evidence of the effectiveness of AAT, the literature has significant limitations:

- Methodology heterogeneity - different patient ages, diseases, animals, and intervention lengths make meta-analysis difficult,
- Poor study design - many older studies were uncontrolled,
- Lack of standardization-the lack of unified AAT nomenclature and protocols makes it difficult to compare results.
- Small sample size - some studies conducted on 10-50 patients

The current consensus points to the need for more rigorous, multi-center randomized controlled trials with predefined primary outcomes[2,23].

5. Prospects for future research

Prospects for the coming years include:

- Standardization of methodology- development of international guidelines for AAT,
- Population studies- comparison of AAT effectiveness among different populations (age, ethnicity, socioeconomic status),
- System integration- research on the implementation of AAT in hospitals, nursing homes, and psychiatric clinics,
- Psychoimmunopathology- research on the influence of AAT on immunological markers and predisposition to infections

Research from 2024-2025 suggests that AAT may be particularly promising in palliative care and for patients with treatment- resistant psychiatric disorders.

6. Conclusions and recommendations

Animal therapy is an evidence-based supplement to traditional forms of psychiatric, neurological, and palliative treatment. Evidence indicates a reliable reduction in anxiety and

depression symptoms, improvement in quality of life, and safety with proper implementation. However, to include AAT in medical recommendations, the healthcare system should:

- Fund research with large samples to improve the reliability of conclusions
- Develop standardized licensing protocols for animal therapy handlers
- Train medical staff in the proper use of AAT
- Incorporate animal therapy into treatment pathways for select patient populations
- Monitoring long-term effects and potential adverse effects

Disclosure

Supplementary Materials

There are no supplementary data connected with this article.

Author Contributions

Conceptualization: K.W., M.B., A.F., W.S.
Writing - original draft preparation: S.D, J.H., M.N., S.M., M.S.
Writing - review and editing: S.D, J.H., M.N., S.M., M.S.
Supervision: A.F., W.S., K.W., M.B.
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Declaration of the Use of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors used Grammarly for the purpose of improving language and readability. After using this tool, the authors reviewed and edited the content as needed and took full responsibility for the substantive content of the publication.

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