Mediterranean Journal of Clinical Psychology

ISSN 2282-1619

MJCP

Volume 13, n 3, 2025

Articles

Benefits of animal-assisted services on the quality of life of children diagnosed with cancer: A bibliometric and citation network analysis

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Abstract

Background: Animal-assisted services (AAS) have emerged as a promising approach to complementing the care of pediatric cancer patients and improving their physical and psychosocial well-being. This approach is based on the therapeutic use of the human-animal bond. This study analyzed trends and changes in research examining the impact of AAS on the quality of life of children with cancer.

Methodology: We conducted a bibliometric analysis of scientific output and a citation network analysis using the Bibliometrix and Tree of Science platforms.

Results: Our findings underscore the emotional and physical advantages of AAS, such as alleviating symptoms of anxiety, pain, and depression, facilitating hospital adaptation, and promoting socialization among children. Three clusters reflecting research trends in canine cancer, emerging cancer therapies, and AAS in pediatric oncology were identified. The latter is the focus of this study.

Conclusions: We discuss the gaps in protocol standardization, limited hospital implementation, Conclusions. and lack of conclusive evidence in some studies. Overall, the study concludes that AAS is a complementary alternative for comprehensive psychosocial care in pediatric oncology, though more research is needed for its effective application.

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Keywords:
Animal Assisted Interventions; Cancer; Childhood; Clinical Psychology; Oncology; Quality of life.

Received: 13 July 2025
Accepted: 30 November 2025
Published: 24 December 2025

Citation: Correa Duque, M. C., Álvarez Marín, M. A., Castaño Velásquez, N., Giraldo Cano, A. S., Ortiz Hernández, M., Piedrahita Alfonso, K., & Gómez-Tabares, A. S. (2025). Citation *Mediterranean Journal of Clinical Psychology 13*(3). https://doi.org/10.13129/2282-1619/mjcp-4994

1. Introduction

Animal-Assisted Interventions (AAI) are structured, goal-oriented interventions designed to provide therapeutic benefits to humans through the incorporation of animals in various settings, including health, education, and social services (IAHAIO, 2022).

Currently, they have become a complementary option in clinical and hospital settings for the treatment of various pathologies in different population groups, especially children. The term AAI was recently redefined as Animal-Assisted Services (Binder et al., 2024), given that the terminology used until now did not allow for the expansion and diversification of programs in recent years, which will likely continue as the field evolves (Binder et al., 2024). For this reason, what was previously known as Animal-Assisted Interventions is now referred to as Animal-Assisted Services (AAS) (Binder et al., 2024).

These interventions fall into three categories: Animal-Assisted Therapy (AAT) has defined clinical objectives, Animal-Assisted Education (AAE) focuses on psychosocial learning, and Animal-Assisted Support Programs (AASP) provide companionship and emotional support (Fowler, 2024). Proper implementation of AAS requires safety protocols, exclusion criteria for vulnerable populations, and periodic animal welfare assessments. Only domesticated animals that have been socialized and trained with positive reinforcement should be used (IAHAIO, 2022). Since the nomenclature was recently modified for practical reasons, references to animal-assisted interventions (AAI) refer to animal-assisted services (AAS). Adopting a new general term and its categories aims to improve clarity for everyone involved in providing and receiving services, as well as for those studying their effects in various fields and contexts (Binder et al., 2024).

Epidemiological data provide insight into the scope of childhood cancer, with approximately 400,000 new cases diagnosed worldwide each year. This underscores the importance of studying complementary interventions that could improve the well-being of this population (World Health Organization [WHO], 2021). Available evidence shows that AAS have led to significant improvements in quality of life, mood, and satisfaction with therapy in the pediatric cancer population (Cotoc et al., 2019; Holder et al., 2020).

Theoretically, predictions justifying the therapeutic potential of AAS are based on biopsychosocial models and the theory of the human-animal bond (Julius et al., 2013). Interacting with animals can modulate neurophysiological processes, such as increasing oxytocin levels, stabilizing cortisol levels, and reducing sympathetic activation (Beetz et al., 2012; Odendaal & Meintjes, 2003). These processes can promote emotional regulation and decrease pain perception. This explains why these interventions can impact the well-being of pediatric cancer patients.

A systematic review with meta-analysis revealed that AAS, particularly AAT, had a statistically significant impact on pain and systolic and diastolic blood pressure in children and adolescents

with cancer, with small to moderate effect sizes. However, no significant effects were observed on anxiety or depression (Feng et al., 2021).

Additional studies have reported that AAT significantly reduces anxiety, fear, and stress while improving psychological well-being in pediatric cancer patients (Farrington et al., 2020; Silva & Osório, 2018). Different AASs have also been shown to positively impact the physical and psychological well-being of caregivers (Farrington et al., 2020; Mahoney et al., 2024). Furthermore, it has been demonstrated that dog-assisted therapy can reduce pain and analgesic use in patients with chronic pain (Pedrosa et al., 2016).

These effects could be explained by increased levels of well-being-associated substances, such as endorphins, oxytocin, and dopamine. Studies indicate that animal-assisted services (AAS), including AAT, influence perceptions of pain, anxiety, depression, and stress while improving quality of life (Diniz et al., 2021). However, these findings are highly heterogeneous due to methodological differences, small sample sizes, and the absence of standardized protocols. These limitations make robust comparisons between studies difficult and reinforce the need for a structured analysis of the field.

Several studies have explored the feasibility and safety of these services. These studies have confirmed that appropriate protocols can ensure the safe implementation of AAS with dogs in hospital settings, particularly with pediatric cancer patients (Chubak & Hawkes, 2016; Chubak 2017; Cotoc & Notaro, 2022; Feng et al., 2021; Steff et al., 2024). From this perspective, it is important to analyze the impact of AAS on the quality of life of children diagnosed with cancer.

Cancer treatment often involves invasive and painful procedures that negatively impact patients' physical and emotional well-being (Di Giuseppe & Conversano, 2022; Guerra et al., 2024; Jaramillo Valencia et al., 2025), particularly for pediatric patients. These procedures can cause fatigue, anxiety, demotivation, and significant changes in quality of life (Aliche & Idemudia, 2025; Diniz et al., 2021; Silva & Osorio, 2018). Psychologically, anticipatory anxiety, fear of recurrence, and coping mechanisms such as denial or emotional repression may manifest (Di Giuseppe et al., 2020; Kazak et al., 2010; Phipps & Srivastava, 1997). These conditions impact emotional stability and social adaptation, highlighting the importance of complementary interventions, such as AASs.

AASs has been proposed as an innovative complementary alternative to enhance quality of life by promoting the emotional and social well-being of children diagnosed with cancer. The aforementioned factors are significant sources of stress that hinder the full development of the life cycle. For this reason, psychological interventions aimed at strengthening coping mechanisms and motivation can be beneficial (Obando, 2020).

Despite advances in research and available clinical studies, literature on animal-assisted services (AAS) for children with cancer is fragmented.

It lacks conceptual articulation and analysis reflecting the field's main contributions and current trends. There are various terms, heterogeneous clinical approaches, and disparate results, which makes understanding the evolution of the field and its intellectual structure difficult. Therefore, a bibliometric analysis of scientific output is necessary to identify patterns, trends, and networks of scientific production related to AAS in childhood cancer, as well as research gaps.

Bibliometric studies provide a systematic framework for examining scientific output on AAS in pediatric oncology. These studies allow researchers to identify publication patterns, influential authors, thematic clusters, and knowledge gaps. These analyses include scientific mapping and citation networks, which visualize structures and dynamics within a field of study (Aria & Cuccurullo, 2017; Donthu et al., 2021; Zupic & Čater, 2015). Thus, they can identify network structures consisting of nodes and edges that reflect the evolution and emerging trends in AAS research. Citation network analyses visualize intellectual communities, reflecting research trends and identifying the most influential studies (Gómez Tabares, 2025). These analyses are widely used for bibliometric reviews (Donthu et al., 2021; Robledo et al., 2022, 2023, 2024; Zupic & Čater, 2015).

Consistent with this, the objective of this study is to analyze the evolution and research trends on the impact of AAS on the quality of life of children diagnosed with cancer, using a bibliometric approach of scientific mapping and citation network analysis. It is hypothesized that scientific production in this field has shown sustained growth in recent years and tends to be organized into specific thematic clusters. This leaves under-explored areas that can be identified through scientific mapping and citation network analysis.

2. Methods

A two-stage bibliometric analysis of the literature was conducted. First, a bibliometric mapping was carried out to identify the scientific output and contributions of the most relevant authors, journals, and countries in AAS research in children with cancer (Gaviria et al., 2019). The second stage involved a co-citation network analysis to identify trends and evolution in the field, allowing us to determine the most relevant documents on AAS in relation to pediatric oncology. Likewise, the most influential authors or research groups were determined (Duque et al., 2021).

The search was conducted in the Web of Science (WoS) and Scopus databases using the following Search Equation (SE) for each topic: ((“animal assisted interventions*” OR "animal-assisted therapy" OR "animal-assisted activities" OR "canine therapy" OR "animal-assisted services" OR "dog*" OR "canine*") AND Cancer AND Child*). The search was conducted in

February 2025. Given the recent nature of the research approach, no time range was established for the selection of articles. A total of 125 articles were found in Web of Science (WoS) and 514 articles were found in Scopus.

The Search Equation records were exported in .txt and. bibTex formats, respectively, to perform a bibliometric mapping of the scientific output. This analysis was performed using Bibliometrix, an R package designed for advanced bibliometric analysis and visualization of bibliographic information obtained from scientific databases (Aria & Cuccurullo, 2017).

Next, we conducted a review of scientific literature using the Tree of Science (ToS) methodology. This methodology maps a field of study to build a network of citations, identifying the evolution and trends of research in scientific output (Correa et al., 2024; Correa & Gómez Tabares, 2024; Robledo et al., 2022, 2024; Zuluaga et al., 2022). The results of this analysis reflect the evolution of the research field by categorizing studies such as (1) classic, (2) structural, or (3) recent, based on the tree of science metaphors (Zuluaga et al., 2022).

The ToS web platform uses the SAP algorithm (Valencia et al., 2020), which analyzes the results of each equation, and the references used. This dual review allows for a more accurate, contextualized evaluation of the information and mitigates the selection bias inherent in consulting specific databases because it considers the cited references, thereby expanding the bibliographic scope beyond the originally consulted databases. Additionally, the ToS platform uses Jaro-Winkler (Jaro, 1989) and Louvain (Blondel et al., 2008) similarity models to eliminate all records with a similarity greater than 95%. This prevents duplicate records from being included in the citation network analysis and removes duplicates or records that are not connected to the network.

Using scientific mapping in combination with the Tree of Science citation network approach allows us to capture the structure of scientific output and the intellectual communities that reflect the most influential contemporary research trends (Zuluaga et al., 2022). This is particularly useful for fragmented areas, such as the study of AAS in pediatric oncology

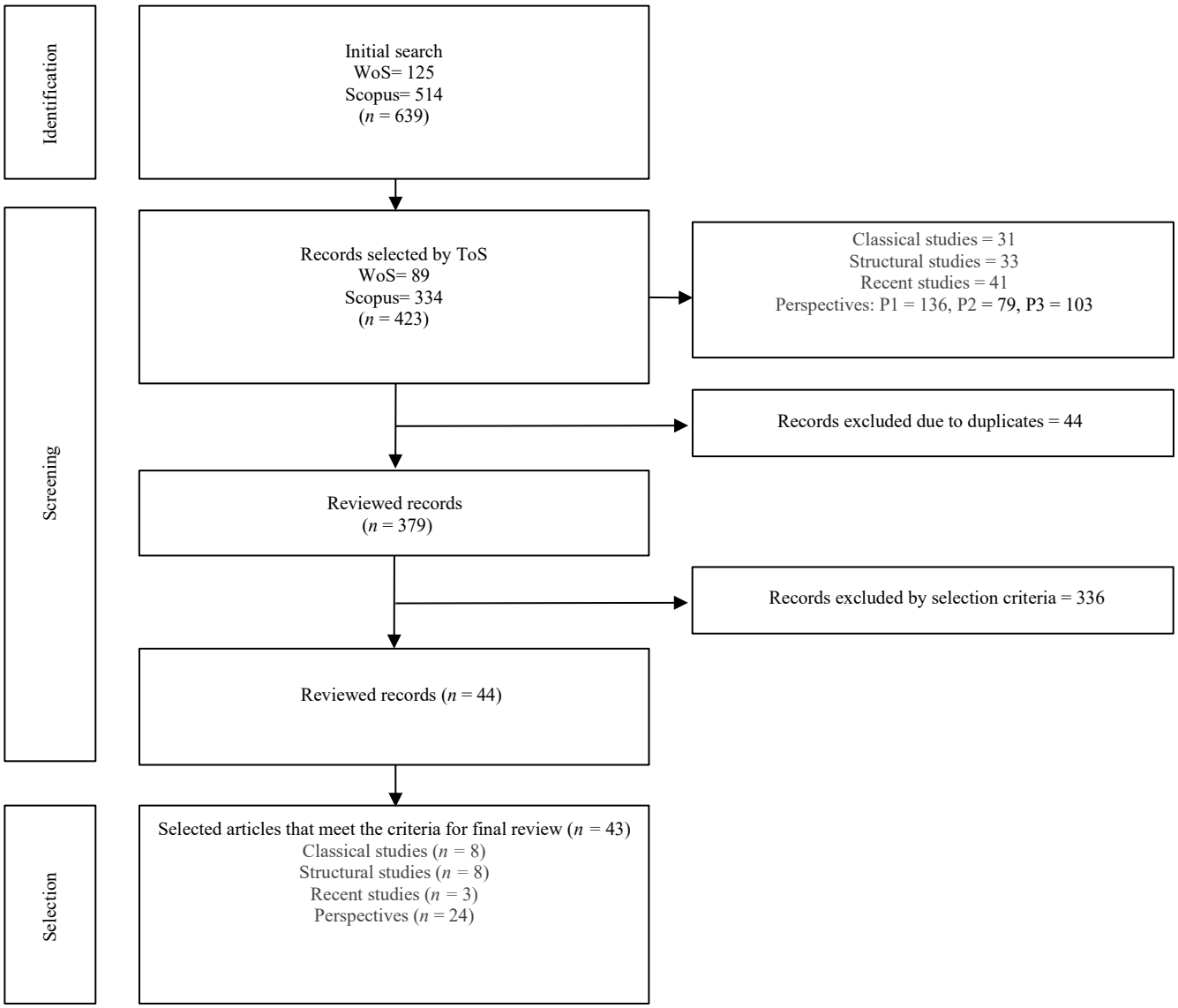
A total of 125 articles from Web of Science and 514 articles from Scopus were uploaded to the ToS platform, resulting in the design of two science trees. The algorithm then selected 89 articles from Web of Science and 334 articles from Scopus from this scientific repertoire. The two lists were then merged into a single database and segmented into classical studies (n = 31), structural studies (n = 33), recent studies (n = 41), and current perspectives (perspective 1: n = 136; perspective 2: n = 79; perspective 3: n = 103). Forty-four duplicates were identified. In order to enhance the transparency of the study selection process, a flowchart was developed. This flowchart was adapted from the PRISMA 2020 guidelines (Page et al., 2021). Thematic inclusion criteria were applied to the citation network: (1) animal-assisted interventions (AAI), (2)

pediatric cancer, and (3) quality of life. Three of Science (ToS) records were excluded because they did not meet the criteria. Ultimately, 45 articles were selected (see Figure 1).

Since this study is a scientometric review rather than a traditional systematic review, several recommendations from the PRISMA statement do not apply directly. However, we incorporated the relevant elements related to identifying, screening, and selecting records, following good methodological practices proposed for bibliometric reviews (Donthu et al., 2021; Zupic & Čater, 2015).

Figure 1

Article selection process



Note: P = Perspectives

3. Results

3.1 Scientific Mapping

Figure 2 illustrates the bibliometric analysis of the annual scientific output recorded in Web of Science (WoS) and Scopus regarding research on animal-assisted interventions in pediatric cancer care. The analysis reveals fluctuating behavior, with notable growth in both databases in 2018, followed by subsequent variations. This graph illustrates that this is a relatively new field of interest that continues to gain momentum.

Figure 2

Annual Evolution Trends in WoS and Scopus

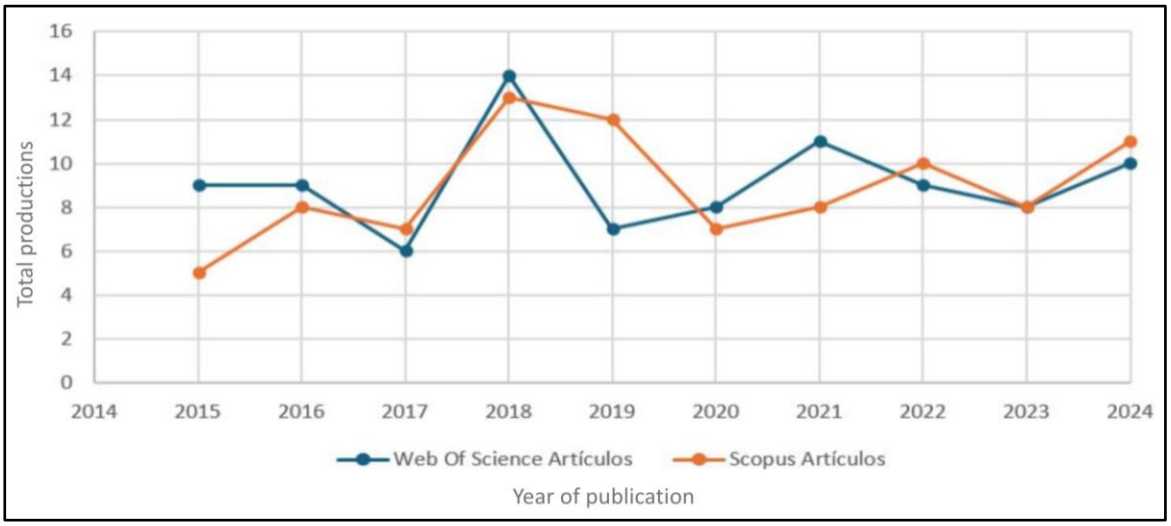


Table 1 shows the most productive authors in the field. In Web of Science, J.M. Fenger (Ohio State University) stands out with 363 citations in three publications, demonstrating high relevance. Gilmer and Mondiano balance productivity and impact, with H-indices of 4 and over 130 citations, respectively. In contrast, Cotoc (University of Minnesota) has the highest publication count (n = 12), yet receives low recognition (12 citations), suggesting that institutional visibility does not guarantee impact.

In Scopus, Breen (North Carolina State University) leads with an H-index of 5 and 253 citations. Mondiano maintains balance with an H-index of 4 and 152 citations. Conversely, Chubak and Abadie show moderate impact, with H-indices of 2 and fewer than 110 citations, respectively. These results suggest that academic recognition depends more on the quality than the quantity of publications.

Table 1

Most Productive Authors in the Field of Study

Web Of Science						Scopus					
Author	**H**	**TP**	**TC**	**Year**	**Institutional affiliation**	**Author**	**H**	**TP**	**TC**	**Year**	**Institutional affiliation**
Gilmer, M. J.	4	8	147	2016	Vanderbilt University	Breen, M.	5	253	253	2011	North Carolina State University
Modiano, J. F.	4	5	131	2015	University of Minnesota	Modiano, J. F	4	152	152	2012	University of Minnesota
Akard, T. F.	3	4	43	2016	Vanderbilt University	Abadie, J.	2	104	104	2011	Oniris, National Veterinary School of Nantes
Fenger, J. M.	3	3	363	2014	Ohio State University	Chubak, J.	2	71	71	2016	University of Washington
Bryan, J. N.	2	2	14	2021	University of Missouri	Cotoc, C.	2	16	16	2019	University of Minnesota
Cotoc, C.	2	12	12	2019	University of Minnesota	Dadachova, E.	2	36	36	2019	University of Saskatchewan, Canada

Note: H = H index, TP = Total publications, TC= total citations.

Table 2 shows the differences in the journal metrics between Web of Science and Scopus. Veterinary and Comparative Oncology has an h-index of 4 on Web of Science and 7 on Scopus, indicating a greater impact on the latter. Plos One has 158 citations in Web of Science and 191 in Scopus. Meanwhile, Clinical Cancer Research has a higher visibility in Web of Science with 232 citations compared to 112 in Scopus. Some journals are exclusive to one database or the other; for example, Veterinary Pathology is only in Scopus, while Canadian Journal of Veterinary Science is only in Web of Science. Overall, Scopus has more articles and citations, while Web of Science highlights journals with greater clinical impact.

Table 2

Most Relevant Journals

Web of Science				Scopus			
Journal	**H**	**TP**	**TC**	**Journal**	**H**	**TP**	**TC**
Plos One	6	6	158	Veterinary and Comparative Oncology	7	9	128
Veterinary and Comparative Oncology	4	5	55	Plos One	6	7	191
Journal of Pediatric Oncology Nursing	3	3	80	Journal of Pediatric Oncology Nursing	3	3	81

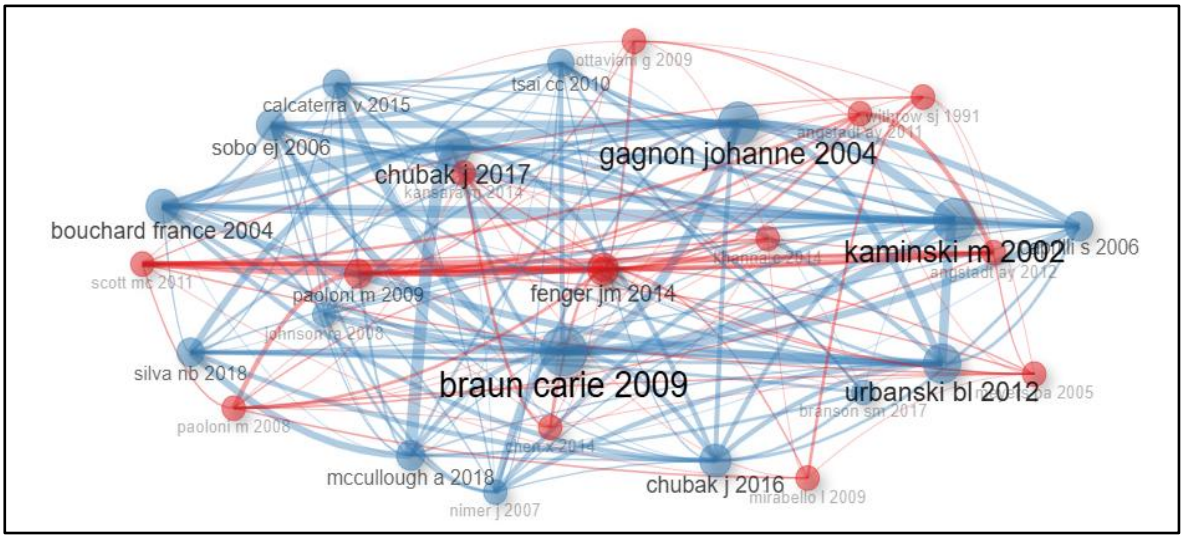
Journal of Veterinary Medical Science	3	3	36	Veterinary Pathology	3	3	118
Canadian Journal of Veterinary	2	2	44	Journal of the American Veterinary Medical Association	2	2	24
Clinical Cancer Research	2	2	232	Clinical Cancer Research	2	2	112

Figure 3 highlights influential authors such as Braun Carie and colleagues (2009) and Gagnon Johanne and colleagues (2004). Their larger nodes indicate a higher frequency of co-citation, positioning them as central figures in the field. The lines between nodes represent co-citation relationships, and their thickness reflects the strength of the link.

The blue and red colors suggest the existence of two clusters, indicating possible currents of thought. The blue group is the largest and densest, while the smaller red group maintains significant connections. Authors such as Chubak et al. (2017) and Fenger and colleagues (2014) act as bridges between the two groups, suggesting that their research links the two lines of study.

Figure 3

Network of co-citations of authors



The United States is at the forefront of the scientific collaboration network on the Web of Science, boasting the highest number of publications (n = 27) and numerous international connections. Europe and Oceania demonstrate moderate collaboration. Meanwhile, Belgium, Costa Rica, and Finland exhibit the least participation, with only one publication each. Brazil is the only Latin American country in this network, which suggests its development in research and international links (see Table 3). In Scopus, the US continues to lead, followed by Italy. Countries such as Argentina, Brazil, Canada, Denmark, and Guinea have a lower presence. Unlike WoS, Scopus includes more Latin American countries, such as Argentina and Brazil, which may be due to differences in indexing (see Table 3).

Table 3

Collaboration Network by Country

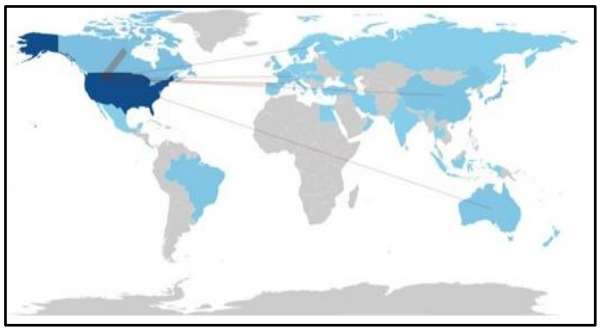
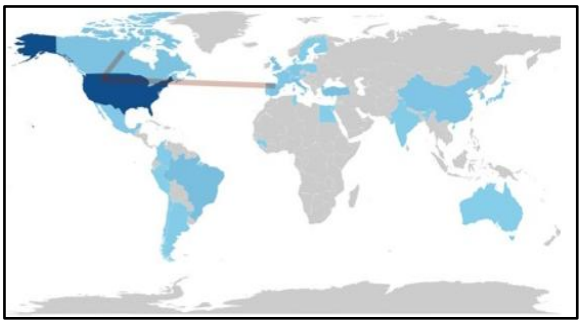
Web of Science		***Scopus***	
Country	***Collaborations***	Country	***Collaborations***
United States	27	United States	5
Australia	9	Italy	4
France	9	Spain	2
Canada	3	Equatorial Guinea	2
Brazil	2	France	2
Denmark	2	Argentina	2
			

Figure 4 shows conceptual networks that illustrate the relationships between scientific terms. The concepts are grouped into two color-coded categories: red, which is associated with humans (e.g., child, female, male, adolescent, and human); and blue, which is linked to animals, especially dogs (e.g., dog, dogs, animal, nonhuman, and dog disease).

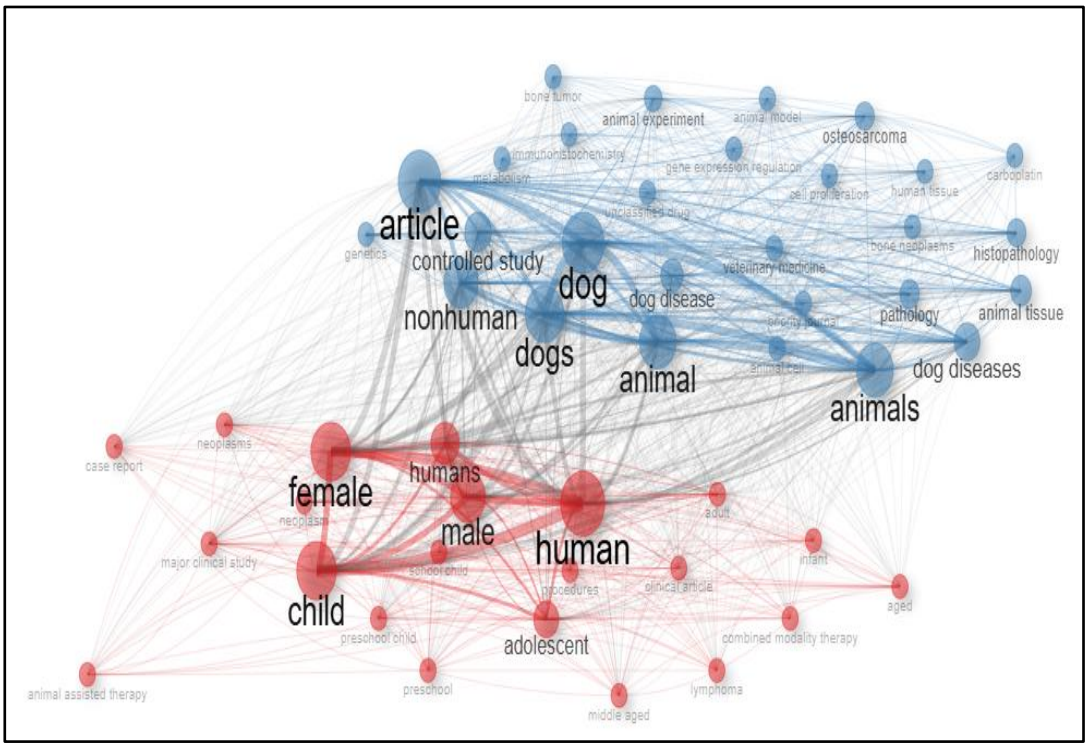
In the Web of Science Co-occurrence Network, the separation between the two groups is evident, with minimal connections between humans and animals. This suggests that they are typically studied separately. However, terms such as "article" and "controlled study" serve as links, indicating research that addresses both areas.

The Scopus co-occurrence network shows denser connections, reflecting greater integration between the two fields, possibly in studies on animal-assisted therapies or shared diseases. The terms "human" and "dog" stand out as the most relevant, suggesting that these categories are central to the analyzed field.

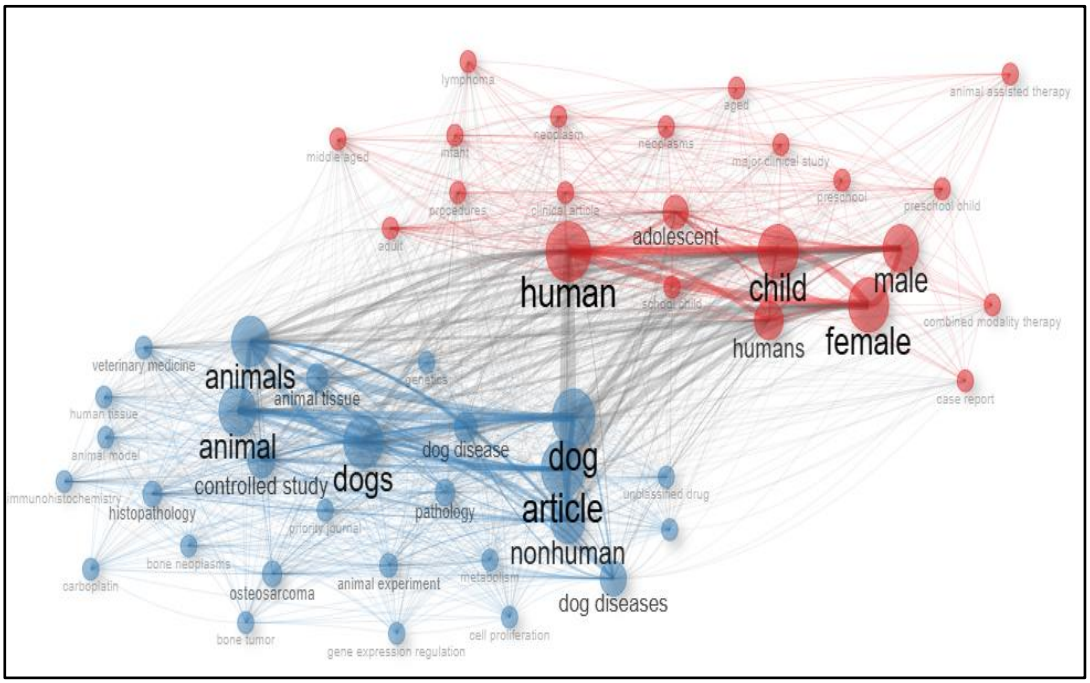
Figure 4

Concept co-occurrence network in Web of Science and Scopus

Web of Science



Scopus



3.2 Research Evolution and Perspectives

To address acute adrenal insufficiency (AAS) from a pediatric oncology perspective, research articles published in scientific journals were selected. The ToS tool guided the search for articles because it overcomes the typical biases of documentary reviews. Its analysis uses references from each record in the search equation and identifies nodes strongly connected to each cluster. Table 4 shows the synthesis of studies on animal-assisted services in pediatric oncology settings.

Table 4

Synthesis of Studies on Animal-Assisted Services in Pediatric Oncology Settings

Author (Year)	Design	Sample	Main Results
Chubak et al. (2017)	Pilot study with quasi-experimental design	19 hospitalized patients aged 7 to 17 years.	Significant reduction in pre-surgical anxiety after visits from therapy dogs.
Braun et al. (2009)	Quasi-experimental intervention study	57 immunocompetent children aged 3 to 17 years.	Improvements were observed in emotional well-being, a reduction in anxiety and stress levels, and an increase in children's motivation and willingness to undergo treatment. In addition, interaction with the dogs fostered a more relaxed and stimulating environment.
Bouchard et al. (2004)	Descriptive evaluation pilot project	Evaluation of an animal therapy program in a pediatric hospital.	There were a greater degree of independence and an increase in appetite, as well as compliance with treatments and motivation to continue hospitalization. Nurses were happier, more motivated, and more positive, mentioning that the program facilitates their work and lifts their spirits.
Kaminski et al. (2002)	Qualitative study	70 hospitalized children.	The child's mood was more positive after child life or pet therapy than before therapy. Pet therapy showed a more positive impact on heart rate, mood, and expression of positive affection in children.
Bouchard et al. (2004)	Intervention study with mixed methodology	Children diagnosed with cancer.	Emotional improvements in children, facilitating their adaptation to treatment. In addition, interaction with dogs promoted a more relaxed and stimulating environment, contributing to the strengthening of the participants' mood.
Urbanski & Lazenby (2012)	Systematic review	Research articles.	Decreased pain, fear, and emotional distress, changes in vital signs, provided distraction, and increased socialization and enjoyment in hospitalized pediatric patients.
Wu et al. (2002)	Evaluation study with an observational and qualitative approach	30 pediatric patients and their parents.	Seventy-three percent of patients reported that the main benefit was stress relief. There were no statistically significant changes in long-term vital signs.
Orlandi et al. (2007)	Mixed approach, combining qualitative and quantitative methodology	89 children diagnosed with cancer.	Dog-assisted therapy reduced anxiety and stress in children, improved their mood, motivation, and sociability, and contributed to a more welcoming hospital environment.
Gilmer et al. (2018)	Multicenter, randomized, parallel-group trial	106 newly diagnosed cancer patients, aged 3 to 17 years	The intervention reduced anxiety in children, improved communication and family cohesion, and decreased parental stress, effects not observed in parents in the control group.

Feng et al. (2021)	Systematic review	8 studies, including 4 randomized controlled trials (RCTs) and 4 quasi-experimental studies.	AAI significantly improved anxiety, depression, and loneliness in older adults, and also showed physiological benefits such as reduced blood pressure and heart rate.
Adler et al. (2024)	Randomized controlled trial, two arms and parallel groups	Cancer patients aged 5 to 17 years.	The intervention reduced parental anxiety, did not affect patient functioning, and did not increase microbial load, highlighting the importance of disinfection.
Chubak & Hawkes (2016)	Quasi-experimental (pre-post without control group).	90 hospitalized patients.	There was a reduction in anxiety, improvements in mood, high satisfaction among participants, and the intervention was safe and well tolerated.
Cowfer et al. (2021)	Qualitative cross-sectional design	9 children aged 5 to 17 years with relapsed or refractory cancer, and their parents (n = 12).	Visits with dogs improved the children's emotional well-being and motivation, reduced their anxiety, and generated high satisfaction, especially among those who did not have pets, and were valued as a significant help in the hospital environment.
Silva & Osório (2018)	Quasi-experimental (pre-post intervention, without control group)	24 pediatric cancer patients and their caregivers.	In children, there was a significant decrease in pain, irritation, and stress, and an improvement in depressive symptoms, with no relevant physiological changes. In caregivers, anxiety was reduced and mood improved.
Cotoc & Notaro (2022)	Systematic review	12 research articles.	The zoonotic risks in animal-assisted therapies for immunocompromised patients are underestimated, and racial inequality in access and the lack of bioethical protocols and informed consent in multicultural pediatric contexts are noted.
Cotoc et al. (2019)	Systematic review	28 research articles.	AAI improves mood, reduces anxiety and physiological stress in children with cancer, promotes parental well-being, and supports medical staff. Its use should be regulated by factors such as hygiene and allergies.
Branson et al. (2017)	Randomized controlled clinical trial	48 hospitalized children.	Improvements in positive affect and anxiety were observed in the AAA group, but without significant differences or changes in salivary biomarkers. Pre- and post-intervention anxiety was highly correlated.
Adlard et al. (2020)	Exploratory descriptive and longitudinal study with a quantitative approach	33 pediatric patients between the ages of 8 and 17.	51.5% of patients experienced pain, affecting their quality of life and increasing fatigue. Adolescents and women had worse emotional and fatigue scores, and patients with sarcoma showed a lower quality of life. The most common pain was in the head and neck, and the descriptors used were evaluative and temporal.
Anazodo et al. (2019)	Qualitative study with a phenomenological approach	30 participants with a cancer diagnosis (n=)	The study revealed that children with cancer experience intense emotions but show resilience. Family and medical support, along with factors such as play and spirituality, are key to their emotional well-being during treatment.
Linder & Hooke (2019)	Quantitative cross-sectional study	160 children and adolescents with cancer, aged between 10 and 18.	The study confirmed that the MSAS 10–18 questionnaire is a reliable tool for assessing symptoms in pediatric cancer patients, highlighting common symptoms such as fatigue, loss of appetite,

			pain, sadness, insomnia, and worry, and improving the accuracy of the instrument.
Steff et al. (2024)	Observational, non-randomized, uncontrolled pilot study	60 pediatric patients (29 females and 31 males).	The dog visit improved the hospital experience and reduced patient stress, with no infections or complications reported, and emotional benefits observed even after a single intervention.
Chubak et al. (2017)	Pilot study, observational, pre-post, without control group	19 with a cancer diagnosis.	Dog visits reduced worry, fatigue, fear, sadness, and pain in children with cancer. The experience was highly valued, with no related adverse events, and received support from healthcare staff.
Lindström et al. (2019)	Mixed methods, combining qualitative and quantitative data	50 hospitalized children between the ages of 3 and 18.	After the intervention, well-being and perception of hospitalization improved significantly. Ninety-three percent rated the interaction with the dog as "very good," highlighting joy, pain relief, and positive distraction.
Dalton et al. (2021)	Experimental design	45 children with an average age of 11.7.	Microbial exchange between children and dogs was observed in therapy sessions, especially with increased physical contact. Disinfection with chlorhexidine in dogs reduced this exchange, without eliminating it completely.
Chan & Tapia (2019)	Narrative review	18 clinical trials, including 5 phase III trials and 13 phase II trials.	There is no clear evidence that owning pets causes cancer, although there are zoonotic risks. Animal-assisted therapy improves quality of life, reduces anxiety and pain, and provides comfort, especially in palliative care.
Kaminski et al. (2002)	Quasi-experimental study	70 hospitalized children, selected for convenience.	Pet therapy improved children's mood more than recreational therapy, showing greater affection and interaction. Although there was an increase in heart rate, parents considered pet therapy to be more beneficial.
Braun (2009)	Quasi-experimental study	57 children aged between 3 and 17 years.	The AAT group experienced a significant reduction in pain, with a slight increase in respiratory rate, without adverse effects. Parents also noticed improvement in their children's pain.
Dalton (2020)	Systematic and narrative review	29 research articles.	Infection control policies in ICUs are inconsistent. Pathogens were found in therapy dogs, but there was no evidence of transmission to patients. The "One Health" approach is suggested to improve safety in future interventions.
Bardill & Hutchinson (1997)	Ethnographic approach	30 participants.	Adolescents perceived Graham, the dog, as multifunctional emotional support: he provided comfort, facilitated emotional expression, distracted from problems, and aided in learning, in addition to identifying the most vulnerable patients.
Chur-Hansen et al. (2014)	Critical review	9 research articles.	Studies showed emotional improvements in children, but with limited methodologies. The main limitations were the lack of control groups and small sample sizes, in addition to individual factors such as age and phobias.
Marcus et al. (2012)	Open quasi-experimental study	382 participants.	Significant improvement in patients' pain, mood, and emotional distress. Twenty-three percent experienced clinical pain relief, compared to 4% in the control group. There were also improvements in

			family members and clinical staff. The intervention was well accepted, and no negative effects were reported.
Moody et al. (2002)	Quantitative study, with pre-post design	224 surveys distributed before implementation (115 responses) and 195 surveys distributed 12 weeks after the start of the program (45 responses).	Improvements in the children's mood and the hospital environment were confirmed. The program was well received, with greater enthusiasm from non-clinical staff and therapists than from medical staff.
Caprilli & Messeri (2006)	Observational pilot study	138 hospitalized children, parents, and healthcare staff.	The evaluations showed an increase in pleasure and a reduction in negative emotions, especially those linked to contact with dogs. No increase in hospital infections was recorded during the year of implementation.
Dupuis et al. (2010)	Cross-sectional observational design	158 parents of children aged between 4 and 18.	The most common symptoms were emotional and social, highlighting the impact of isolation. The most distressing symptoms coincided with the most severe ones. The questionnaire was effective and clear for parents.
Cole et al. (2007)	Randomized clinical trial	76 hospitalized adults.	The group that interacted with the dog showed significant reductions in pulmonary blood pressure, epinephrine and norepinephrine levels, as well as decreased anxiety, during and after the intervention.
Johnson et al. (2008)	Quantitative experimental design	30 adult patients.	There were no statistical differences between groups, but those who interacted with dogs reported better health perception. All participants felt less anxiety and recommended the activities as useful support at the start of radiotherapy.
Moreira et al. (2016)	Qualitative observational participant	16 participants.	Dog therapy was perceived as emotionally beneficial by families and healthcare personnel, helping to reduce anxiety and facilitate communication. Although it was seen as a recreational activity, it was concluded that it is useful for humanizing pediatric oncology care.
Grant & Olsen (1999)	Seroepidemiological study and literature review	327 veterinarians and 322 doctors.	Veterinarians had greater exposure to zoonotic agents than the general population, especially Toxocara and Coxiella burnetii, due to risky professional practices. This data prompted preventive measures and positioned them as leaders in advising on zoonoses.
Barker et al. (2015)	Randomized experimental study	40 hospitalized children aged between 8 and 18.	There were no significant changes in pain or anxiety after the intervention, although children with secure attachment showed less anxiety. Emotional closeness to pets also had a positive influence on perceived well-being.
Johnson et al. (2003)	Randomized experimental pilot study	30 adult patients.	Patients who interacted with dogs rated the experience as more positive and therapeutic than other groups, showing greater emotional well-being and a desire to repeat it. Whether or not they had previous pets did not influence their response.

Tsai et al. (2010)	Quasi-experimental cross-sectional study	15 hospitalized children aged between 7 and 17.	AAT significantly reduced systolic blood pressure, indicating lower physiological stress, but showed no conclusive effects on anxiety or medical fear. Older children and girls reported less fear in general. A physical benefit is suggested, although no clear emotional benefit.
Mahoney et al. (2024)	Experimental and quasi-experimental	19 children and 21 parents.	Animal-assisted interventions promote mental health by reducing stress, anxiety, and depressive symptoms. They also promote social and emotional skills such as empathy and self-esteem and strengthen the therapeutic bond by facilitating emotional expression in clinical settings.
Hasanah et al. (2023)	Systematic review	21 research articles.	Psychological interventions improved well-being and some physical and immunological indicators, with relevant clinical benefits, although not always statistically significant.

3.3 Classical Studies

The research trend in classical studies of AAS focused on demonstrating their effectiveness in the clinical hospital setting. Analyses were conducted that demonstrate the positive effects on the physical and emotional well-being of those who benefited from the services, mainly hospitalized children (Braun et al., 2009; Kaminski et al., 2002; Urbanski & Lazenby, 2012). Some research is beginning to specify the cardiological population (Orlandi et al., 2007) and pediatric oncology (Bouchard et al., 2004; Chubak et al., 2017; Gagnon et al., 2004; Wu et al., 2002). Methodologically, the quasi-experimental approach predominates, with pilot studies and qualitative assessments that include interviews and surveys (Braun et al., 2009; Chubak et al., 2017; Johnson et al., 2003; Johnson et al., 2008; Kaminski et al., 2002).

Despite the variability in designs, the results of all studies agree on the benefits of AAS, especially for pain reduction, anxiety, and socialization (Bouchard et al., 2004; Chubak et al., 2017; Gagnon et al., 2004; Kaminski et al., 2002; Orlandi et al., 2007), while others highlight the impact on the emotional sphere of the participants (Braun et al., 2009; Urbanski & Lazenby, 2012). There is also agreement on the limitations proposed by the studies, including the small sample size and limited representativeness of the participants, which restricts the generalizability of the findings (Bouchard et al., 2004; Braun et al., 2009; Chubak et al., 2017; Gagnon et al., 2004; Orlandi et al., 2007).

3.4 Structural studies

The research trend of structural studies regarding AAAs, addresses these interventions as non-pharmacological complementary therapies (Cotoc et al., 2019; Silva & Osorio, 2018), applied in pediatric oncology patients (Adler et al., 2024; Chubak & Hawkes, 2016; Cotoc et al., 2019; Cotoc & Notaro, 2022; Cowfer et al., 2021; Gilmer et al., 2018; Silva & Osorio, 2018), older

adults (Feng et al., 2021), families and caregivers of participants (Adler et al., 2024; Cotoc et al., 2019; Cowfer et al., 2021; Gilmer et al., 2018; Silva & Osorio, 2018).

This research trend involved in-depth analysis of zoonotic risks in hospitals (Adler et al., 2024; Cotoc & Notaro, 2022; Cowfer et al., 2021). Various methodologies were employed, including systematic reviews (Cotoc & Notaro, 2022; Cotoc et al., 2019; Feng et al., 2021), quasi-experimental studies (Chubak & Hawkes, 2016; Silva & Osorio, 2018), randomized trials (Adler et al., 2024), qualitative designs (Cowfer et al., 2021), and multicenter studies (Gilmer et al., 2018).Additional studies have reported physical and emotional benefits, such as reduced pain, anxiety, and depression in patients (Cotoc et al., 2019; Cowfer et al., 2021; Feng et al., 2021; Gilmer et al., 2018), as well as reduced stress in caregivers (Adler et al., 2024; Silva & Osorio, 2018). While certain zoonotic risks remain underestimated, no microbial increase has been observed (Adler et al., 2024; Cotoc & Notaro, 2022; Cowfer et al., 2021; Grant & Olsen, 1999). However, standardization of health protocols for AAS is recommended.

The most frequent limitations include small sample sizes (Adler et al., 2024; Chubak & Hawkes, 2016; Feng et al., 2021; Silva & Osorio, 2018), methodological heterogeneity (Feng et al., 2021), and a lack of standardization (Cotoc et al., 2019; Gilmer et al., , 2018; Silva & Osorio, 2018), short-term evaluations (Silva & Osorio, 2018), and a lack of long-term follow-up (Chubak & Hawkes, 2016). Additional limitations include contextual factors, such as age when responding to interview questions (Cowfer et al., 2021), interruption by the pandemic (Cowfer et al., 2021), and hospital environment characteristics (Gilmer et al., 2018).

3.5 Recent studies

Recent studies confirm that AAS is a complementary strategy in the pediatric hospital setting. These studies have reported significant improvements in the emotional well-being of hospitalized children, with reductions in anxiety, stress, and depressive symptoms noted (Hasanah et al., 2023; Mahoney et al., 2024; Steff et al., 2024).

Some studies focused on subjective aspects, such as perception of well-being and reduction of emotional distress (Mahoney et al., 2024; Steff et al., 2024), while others incorporated objective measurements, such as cortisol levels and heart rate, to assess the physiological effects of the interventions (Hasanah et al., 2023).

The most common limitations among the studies were small sample sizes, variability in intervention duration and consistency, intervention type, and lack of protocol standardization (Hasanah et al., 2023; Mahoney et al., 2024; Steff et al., 2024). These limitations make it difficult to compare results and limit the generalizability of the findings.

3.6 Research Perspectives

Based on citation analysis, the algorithm identified three main clusters representing predominant trends in scientific research on the subject. The first cluster focuses on canine cancer, reflecting a well-established line of research in this area. The second cluster focuses on emerging cancer therapies, representing a parallel trend that explores the phenomenon from a different perspective. The third cluster comprises studies related to animal-assisted interventions in pediatric oncology.

Of these three clusters, only the third is specifically focused on AAS in pediatric cancer patients. The other two clusters are primarily related to veterinary medicine and cancer. While they will be mentioned to provide context for the overall research landscape, they are not prioritized in this report due to their limited relevance to the study's objective.

3.7 Studies on Canine Cancer

As previously mentioned, this perspective takes a comprehensive approach to osteosarcoma in dogs and is a notable model for translational oncology research (Fenger et al., 2014). The research covers clinical and therapeutic aspects, as well as molecular, genetic, and tumor microenvironment analyses (Chu et al., 2021; Nance et al., 2023).

In addition to osteosarcoma, the database includes research on other canine tumors (Hédan et al., 2011), establishing the dog as a valuable preclinical model for studying cancer in humans (Fenger et al., 2014). This database is notable for its value in developing new therapeutic strategies, prognostic biomarkers, and comparative approaches in oncology. However, as previously mentioned, this is not the focus of this work (Morello et al., 2011).

Studies in this field use spontaneous and in vivo canine models as well as molecular tools, such as genomic sequencing, gene expression analysis, and comparative cytogenetics (Chu et al., 2021; Nance et al., 2023). Additionally, clinical trials in dogs are employed to evaluate therapies with translational significance (Moore et al., 2007; Vail et al., 2002). Nevertheless, limitations of this research include small sample sizes, genetic variability among dogs, and challenges in extrapolating results to humans due to significant biological differences (Angstadt et al., 2012; Fenger et al., 2014).

3.8 Studies on Emerging Cancer Therapies

This perspective brings together studies on osteosarcoma in canine and mouse models, highlighting how these approaches help improve understanding of the disease and apply that knowledge to human oncology. It emphasizes the development of more advanced preclinical models, including those with genetic modifications that imitate certain human tumor subtypes

and provide clearer insight into how the disease originates (Berman et al., 2008; Walkley et al., 2008).

This line of research makes an important contribution to comparative oncology by offering tools to evaluate potential treatments and deepen the understanding of the biological processes involved in bone cancer in humans (Paoloni & Khanna, 2009; Simpson et al., 2017). However, although these studies are valuable within the scientific field, they do not align with the objectives of AAS, so their inclusion in the report is not prioritized.

Additionally, this work combines molecular information with observable characteristics of the disease through cross-species comparisons and genetic analyses (Gambera et al., 2021). Even so, relevant challenges remain, such as the limited representation of human clinical diversity, the difficulty of fully replicating the immune system, and the obstacles in translating preclinical findings into clinical outcomes, especially when relying on models that do not accurately reflect real-world conditions.

3.9 Studies on Animal-Assisted Interventions in Pediatric Oncology

This perspective highlights the growing research trend in pediatric psycho-oncology, emphasizing the improvement of quality of life, pain management, and emotional well-being for children with cancer (Adlard et al., 2020; Anazodo et al., 2019; Branson et al., 2017; De la Cruz et al., 2022; Linder & Hooke, 2019; Navarro et al., 2021; Quintero et al., 2020; Steff et al., 2024; Smucker et al., 2021). Significant clinical and psychosocial benefits have been reported, including a reduction in anxiety and pain levels during medical procedures after interacting with therapy dogs (Chubak et al., 2017). Other studies have shown that AAT reduces the perception of discomfort and promotes positive emotional states in children and their caregivers (Braun et al., 2009; Kaminski et al., 2002).

In terms of methodology, pilot and quasi-experimental studies with pre- and post-intervention analyses predominate. Various tools are used, primarily in pediatric clinical settings (Bouchard et al., 2004; Gagnon et al., 2004). However, these studies have limitations in common: small sample sizes and the use of non-standardized instruments. This restricts the generalization of results and requires more robust research (Braun et al., 2009; Chubak et al., 2017).

4. Discussion

The results of this study demonstrate significant progress in the use of AAI as a complementary intervention in pediatric oncology. Our bibliometric analysis reveals a consistent rise in scientific output, particularly since 2018, which corroborates the increasing interest in integrating these therapies into clinical settings. This trend coincides with reports by authors such as Braun et al. (2009) and Chubak et al. (2017), who documented the emotional, pain-relieving, and

socialization benefits of AAI for pediatric patients. You also emphasize the importance of the bond between humans and animals in establishing a therapeutic alliance with children (Mezza et al., 2022), thereby improving hospital care processes.

These findings are consistent with the theoretical assumptions of the biopsychosocial model and the proposed hypothesis, as they demonstrate sustained growth in scientific production and increasing interest in the emotional and physiological benefits of AAS. This increase was theoretically expected because the literature predicts that human-animal bonds reduce stress and improve hospital adaptation in children with chronic illnesses. However, the increase in publications could also be explained by other factors, such as advances in biosafety, increased institutional investment in complementary therapies, or media coverage of these interventions.

Among the most influential authors, Gilmer et al. (2018) and Modiano (2012, 2015) stand out for their collaboration. They approach AAIs from an integrative perspective that considers clinical benefits and zoonotic risks. This integrative view contrasts with more specialized work, such as that of Cotoc and Notaro (2022), which focuses on bioethical and health aspects. This creates tension between promoting these therapies and ensuring adequate healthcare. Nevertheless, despite these differing approaches, there is consensus on the necessity of standardized protocols and substantial evidence to justify their implementation. This pattern can be interpreted by considering the differences in safety protocols, availability of trained personnel, and perception of risk between countries and hospitals. In some contexts, concern about zoonotic diseases hinders implementation, while in others, the search for interventions that humanize care is more prevalent. These variations help explain the tension observed in literature.

The practical implications of these results are significant. First, recent research (Hasanah et al., 2023; Mahoney et al., 2024) confirms the potential of AAI to improve the psychosocial well-being of pediatric cancer patients. Integrating these therapies into palliative care and hospital support can humanize medical care, reduce stress, and promote treatment adherence. Conversely, the literature emphasizes the importance of training healthcare personnel and establishing clinical guidelines to minimize infection risk and ensure the suitability of therapy animals (Adler et al., 2024; Cowfer et al., 2021).

Beyond pediatric oncology, this study's findings suggest the potential usefulness of animal-assisted interventions for other chronic conditions with a strong emotional component, such as diabetes. There is a solid body of literature documenting the relationship between diabetes and mental health disorders in childhood cancer survivors (Bhandari et al., 2025; Friedman et al.,

2019), as well as the link between diabetes and an increased risk of developing cancer (Abudawood, 2019; Gordon-Dseagu et al., 2013; Suh & Kim, 2019).

Similarly, recent research on type 1 diabetes has reported elevated levels of alexithymia, emotional distress, and difficulty recognizing and regulating emotions (Merlo et al., 2025). These findings suggest that emotional functioning plays a central role in the adaptation and well-being of people with chronic diseases. Consequently, AAS could be a promising complementary strategy to promote emotional regulation, reduce psychological distress, and improve adherence in populations with chronic conditions beyond cancer. This broadens the potential application of AAI and opens new opportunities to investigate its therapeutic impact across a wider spectrum of chronic diseases.

Several topics of interest have been identified for future lines of research. First, the methodological design must be improved through controlled, longitudinal clinical trials that include comparison groups, prolonged follow-up, and objective measurements. Second, psychometric scales adapted to pediatric clinical contexts must be validated to allow for more accurate recording of emotional changes. Third, it is possible to expand the focus to include caregivers and healthcare personnel, considering previous evidence on stress reduction in these groups (Gilmer et al., 2018; Silva & Osorio, 2018).

Additionally, studies are needed to examine possible physiological mechanisms associated with AAS, such as stress biomarkers and cardiac variability. This will help us better understand how AAS affects more than just the emotional realm. It is also important to analyze factors that could influence the results, such as the type of animal, duration of interaction, and characteristics of the hospital environment. This will help explain why some studies report more significant benefits than others.

Similarly, comparing different AAS programs would help identify the most effective ones and standardize protocols. Finally, we recommend investigating the applicability of AAS in other chronic diseases besides pediatric cancer, especially conditions that present a high emotional burden, such as childhood diabetes, where emerging evidence suggests difficulties with emotional regulation.

5. Limitations and Strengths

One limitation of this study is that it was developed as descriptive research with a bibliometric approach, so a meta-analysis was not performed. This methodological decision limits the possibility of integrating and comparing results in greater depth. Therefore, future research is suggested to explore the evolution of the field through other approaches and analysis techniques

that complement and broaden understanding of the phenomenon from different methodological perspectives.

This study has other limitations that should be considered. First, the results depend on the selected databases (WoS and Scopus) and the search equations used, which may introduce bias in identifying available material. Second, although advanced bibliometric techniques were applied, the methodological quality of each included study was not evaluated, which limits the robustness of the conclusions. Additionally, the variability in study designs, samples, and procedures makes it difficult to establish consistent, comparable patterns. These conditions must be considered when interpreting the findings and projecting their applicability in clinical and research contexts.

However, the study also has significant strengths. Using scientific mapping and citation network analysis with Tree of Science provided a comprehensive, structured, and evolving view of the field. This approach offered an up-to-date overview of the field's theoretical core, influential authors, and knowledge gaps. Likewise, using multiple cleansing and segmentation algorithms improved the accuracy of the constructed network in detecting community's indicative of current research perspectives.

6. Conclusions

Animal-assisted services (AAS) are a complementary therapeutic strategy that takes a humanized approach and positively impacts the quality of life of pediatric cancer patients. The reviewed evidence indicates that these interventions contribute to reducing physical and emotional symptoms associated with cancer by offering an alternative to the conventional hospital environment. However, consolidating AAS as a validated clinical practice requires overcoming methodological limitations, such as small sample sizes and a lack of protocol standardization, which makes generalizing the results difficult. Future research should strengthen scientific rigor, broaden the contextual scope, and promote interdisciplinary consensus as necessary steps to effectively and safely integrate AAS into the comprehensive pediatric care model.

Data Availability Statement

Data may be made available upon reasonable request.

Conflict of interest statement

The authors declare that the study was conducted in absence of any conflict of interest.

Funding

Universidad Católica Luis Amigó, Colombia.

Authors' Contribution

MCCD: Conceptualization, Validation, Investigation, Writing - Original Draft, Writing - Review & Editing, Supervision; MAAM: Conceptualization, Methodology, Formal analysis, Investigation, Writing - Original Draft; NCV: Conceptualization, Methodology, Formal analysis, Investigation, Writing - Original Draft; ASGC: Conceptualization, Methodology, Formal analysis, Investigation, Writing - Original Draft; MOH: Conceptualization, Methodology, Formal analysis, Investigation, Writing - Original Draft; KPA: Conceptualization, Methodology, Formal analysis, Investigation, Writing - Original Draft; ASGT: Conceptualization, Methodology, Investigation, Writing - Original Draft, Writing - Review & Editing, Supervision, Project administration.

References

1. Abudawood, M. (2019). Diabetes and cancer: A comprehensive review. *Journal of Research in Medical Sciences: The Official Journal of Isfahan University of Medical Sciences*, *24*(1), 94. https://doi.org/10.4103/jrms.JRMS_242_19

2. Adlard, K., Bravo, L., Craig, A., Duran, J., Eufemia, J., Granados, R., Heidari, J., Secola, R., & Torres, V. (2020). Quality of life and pain experienced by children and adolescents with cancer at home following discharge from the hospital. *Journal of pediatric hematology/oncology, 42*(1), 46-52. https://doi.org/10.1097/MPH.0000000000001605

3. Adler, A., Bob, J., Chubak, J., Hawkes, R., Ludman, E., Pacobelli, G., Zerr, D., &., Ziebell, R. (2024). A randomized controlled trial of animal-assisted activities for pediatric oncology patients: psychosocial and microbial outcomes. *Journal of Pediatric Health Care*, *38*(3), 354-364. https://doi.org/10.1016/j.pedhc.2023.09.010

4. Aliche, C. J., & Idemudia, E. S. (2025). Impact of Posttraumatic stress disorder (PTSD) on Health-related quality of life of cancer patients: Role of experiential avoidance and psychological resilience. *Mediterranean Journal of Clinical Psychology, 13*(2), 1-20. https://doi.org/10.13129/2282-1619/mjcp-4859

5. Anazodo, A., Bowden, V., Kuntz, N., Morgan, H., & Sender, L. (2019). Pediatric cancer patients' treatment journey: Child, adolescent, and young adult cancer narratives. *Journal of pediatric nursing, 48*, 42-48. https://doi.org/10.1016/j.pedn.2019.06.003

6. Angstadt, A. Y., Thayanithy, V., Modiano, J. F., Breen, M., Subramanian, S., & Kisseberth, W. C. (2012). A genome-wide approach to comparative oncology: High-resolution oligonucleotide aCGH of canine and human osteosarcoma pinpoints shared microaberrations. *Cancer Genetics, 205*(11), 572–587. https://doi.org/10.1016/j.cancergen.2012.09.005

7. Aria, M., & Cuccurullo, C. (2017). Bibliometrix : An R-tool for comprehensive science mapping analysis. *Journal of Informetrics, 11*(4), 959–975. https://doi.org/10.1016/j.joi.2017.08.007

8. Bardill, N., & Hutchinson, S. (1997). Animal-Assisted Therapy With Hospitalized Adolescents. *Journal of Child and Adolescent Psychiatric Nursing, 10*(1), 17–24. https://doi.org/10.1111/j.1744-6171.1997.tb00208.x

9. Barker, S., Knisely, J. S., Schubert, C. M., Green, J. D., & Ameringer, S. (2015). The effect of an animal-assisted intervention on anxiety and pain in hospitalized children. *Anthrozoos, 28*(1), 101–112. https://doi.org/10.2752/089279315x14129350722091

10. Beetz, A., Uvnäs-Moberg, K., Julius, H., & Kotrschal, K. (2012). Psychosocial and psychophysiological effects of human–animal interactions: The possible role of oxytocin. *Frontiers in Psychology, 3,* 234. https://doi.org/10.3389/fpsyg.2012.00234

11. Bhandari, R., Liao, Y., & Ma, K. (2025). The role of body composition in the development of diabetes mellitus among childhood cancer survivors, and novel intervention strategies to mitigate diabetes risk. *Cancer*, *131*(14), e35977. https://doi.org/10.1002/cncr.35977

12. Berman, S. D., Calo, E., Landman, A. S., Danielian, P. S., Miller, E. S., West, J. C., & Lees, J. A. (2008). Metastatic osteosarcoma induced by inactivation of Rb and p53 in the osteoblast lineage. *Proceedings of the National Academy of Sciences, 105*(33), 11851–11856. https://doi.org/10.1073/pnas.0805462105

13. Binder, A., Parish-Plass, N., Kirby, M., Winkle, M., Skwerer, D., Ackerman, L., Brosig, C., Coombe, W., Delisle, E., Enders-Slegers, M., Fowler, J., Hey, L., Howell, T., Kaufmann, M., Kienast, M., Kinoshita, M., Ngai, D., & Wijnen, B. (2024). Recommendations for uniform terminology in animal-assisted services (AAS). *Human-Animal Interactions, 12*(1), 0003. https://doi.org/10.1079/hai.2024.0003

14. Blondel, V., Guillaume, J., Lambiotte, R., & Lefebvre, E. (2008). Fast unfolding of communities in large networks. *Journal of Statistical Mechanics: Theory and Experiment, 2008*(10), P10008. http://dx.doi.org/10.1088/1742-5468/2008/10/P10008

15. Bouchard, F., Landry, M., Belles-Isles, M., & Gagnon, J. (2004). A magical dream: a pilot project in animal-assisted therapy in pediatric oncology. *Canadian Oncology Nursing Journal, 14*(1), 14–17. https://doi.org/10.5737/1181912x1411417

16. Braun, C., Sangler, T., Narveson, J., Pettingell, S. (2009). Animal-assisted therapy as a pain relief intervention for children. *Complementary Therapies in Clinical Practice,15*(12), 105-109. https://doi.org/10.1016/j.ctcp.2009.02.008

17. Branson, S., Boss, L., Padhye, N., Trötscher, T., & Ward, A. (2017). Effects of animal-assisted activities on biobehavioral stress responses in hospitalized children: a randomized controlled study. *Journal of pediatric nursing, 36,* 84-91. https://doi.org/10.1016/j.pedn.2017.05.006

18. Caprilli, S., & Messeri, A. (2006). Animal-assisted activity at A. Meyer Children's Hospital: A pilot study. *Evidence-Based Complementary and Alternative Medicine, 3*(3), 379–383. https://doi.org/10.1093/ecam/nel029

19. Cole, K. M., Gawlinski, A., Steers, N., & Kotlerman, J. (2007). Animal-assisted therapy in patients hospitalized with heart failure. *American Journal of Critical Care, 16*(6), 575–585. https://doi.org/10.4037/ajcc2007.16.6.575

20. Correa, M., Posada, V., & Gómez Tabares, A. (2024). The anthropomorphization of the human-animal bond in family dynamics: A documentary review. *Pensamiento Americano*, *17*(33), 1.24. https://doi.org/10.21803/penamer.17.33.618

21. Correa, M. C., & Gómez Tabares, A. S. (2024). Evolución de la investigación de las Intervenciones Asistidas con Animales: Un estudio cienciométrico. *Universitas Psychologica*, *23*, 1–18. https://doi.org/10.11144/javeriana.upsy23.eiia

22. Cotoc, C., & Notaro, S. (2022). Race, zoonoses and animal assisted interventions in pediatric cancer. *International Journal of Environmental Research and Public Health, 19*(13), 7772. https://doi.org/10.3390/ijerph19137772

23. Cotoc, C., An, R., & Klonoff-Cohen, H. (2019). Pediatric oncology and animal-assisted interventions: A systematic review. *Holistic Nursing Practice*, *33*(2), 101–110. https://doi.org/10.1097/HNP.0000000000000313

24. Cowfer, B., Akard, T., & Gilmer, M. (2021). Animal-Assisted Interventions for Children with Advanced Cancer: Child and Parent Perceptions. *Palliative Medicine Reports*, *2*(1), 328–334. https://doi.org/10.1089/pmr.2021.0039

25. Chan, M., & Tapia, G. (2019). The "pet effect" in cancer patients: Risks and benefits of human-pet interaction. *Critical Reviews in Oncology/Hematology, 143*, 56–61. https://doi.org/10.1016/j.critrevonc.2019.08.004

26. Chu, S., Whelan, M., Kim, J. H., Zuckermann, R. N., Van Haute, D., & Lindblad-Toh, K. (2021). Unraveling the chaotic genomic landscape of primary and metastatic canine appendicular osteosarcoma with current sequencing technologies and bioinformatic approaches. *PLOS ONE, 16*(3), e0246443. https://doi.org/10.1371/journal.pone.0246443

27. Chubak, J., & Hawkes, R. (2016). Animal-Assisted activities. *Journal of Pediatric Oncology Nursing*, *33*(4), 289–296. https://doi.org/10.1177/1043454215614961

28. Chubak, J., Hawkes, R., Dudzik, C., Foose-Foster, J., Eaton, L., Johnson, R. H., & Macpherson, C. (2017). Pilot study of therapy dog visits for inpatient youth with cancer. *Journal of Pediatric Oncology Nursing, 34*(5), 331–341. https://doi.org/10.1177/1043454217712983

Chur-Hansen, A., McArthur, M., Winefield, H., Hanieh, E., & Hazel, S. (2014). Animal-assisted interventions in children's hospitals: A critical review of the literature. *Anthrozoös*, *27*(1), 5-18. https://doi.org/10.2752/175303714X13837396326251

29. Dalton, K. (2020). "*Perspectives on Infection Control for the Implementation of Animal-Assisted Intervention Programs in Hospitals: From Stakeholder Perspectives to Microbial Dynamics*." [Doctoral dissertation]. Johns Hopkins University. https://jscholarship.library.jhu.edu/server/api/core/bitstreams/1c72cc01-17a4-4c6d-b171-b83d5540ed94/content

30. Dalton, K., Rubl, K., Redding, L., Morris, D., Mueller, N., Thorpe, R., Agnwe, J., Carroll, K., Planet, P., Rubenstein, R., Chen, A., Grice, E., & Davis, M. (2021). Microbial Sharing between Pediatric Patients and Therapy Dogs during Hospital Animal-Assisted Intervention Programs. *Microorganisms, 9*(5), 1054. https://doi.org/10.3390/microorganisms9051054

31. Di Giuseppe, M., Miniati, M., Miccoli, M., Ciacchini, R., Orrù, R., Lo Sterzo, R., Di Silvestre, A., & Conversano, C. (2020). Defensive responses to stressful life events associated with cancer diagnosis. *Mediterranean Journal of Clinical Psychology, 8*(1). https://doi.org/10.6092/2282-1619/mjcp-2384

32. Di Giuseppe, M., & Conversano, C. (2022). Psychological components of chronic diseases: the link between defense mechanisms and alexithymia. *Mediterranean Journal of Clinical Psychology 10*(3). https://doi.org/10.13129/2282-1619/mjcp-3602

33. Diniz, K., Vieira, C., Benamor, M., & Fragoso, M. (2021). Animal assisted intervention for oncology and palliative care patients: A systematic review. *Complementary Therapies in Clinical Practice*, *43*, 101347. https://doi.org/10.1016/j.ctcp.2021.101347

34. Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research, 133*, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

35. Duque, P., Meza, O., Giraldo, D., & Barreto, K. (2021). Economía Social y Economía Solidaria: un análisis bibliométrico y revisión de literatura. *Revista de Estudios Cooperativos, 138,* e75566. https://doi.org/10.5209/reve.75566

36. Dupuis, L. L., Milne-Wren, C., Cassidy, M., Barrera, M., Portwine, C., Johnston, D. L., Pradier Silva, M., Sibbald, C., Leaker, M., Routh, S., & Sung, L. (2010). Symptom assessment in children receiving cancer therapy: the parents' perspective. *Supportive Care in Cancer, 18*(3), 281–299. https://doi.org/10.1007/s00520-009-0651-1

37. Farrington, J., Tallentire, C. W., Lenny, A., Singh, J., & Longworth, L. (2020). PIH21 A targeted review of studies on canine animal assisted therapy in paediatric oncology patients. *Value in Health: The Journal of the International Society for Pharmacoeconomics and Outcomes Research*, *23*, S542. https://doi.org/10.1016/j.jval.2020.08.820

38. Feng, Y., Lin, Y., Zhang, N., & Jiang, X. (2021). Effects of animal-assisted therapy on hospitalized children and teenagers: A systematic review and meta-analysis. *Journal of Pediatric Nursing, 60,* 11–23. https://doi.org/10.1016/j.pedn.2021.01.020

39. Fenger, J. M., London, C. A., & Kisseberth, W. C. (2014). Canine osteosarcoma: A naturally occurring disease to inform pediatric oncology. *ILAR Journal, 55*(1), 69–85. https://doi.org/10.1093/ilar/ilu009

40. Fowler, J. (2024). *Terminology update: Animal-Assisted Services (AAS)*. International Association of Human-Animal Interaction Organizations (IAHAIO). https://iahaio.org/2024/11/15/terminology-update-animal-assisted-services-aas/

41. Friedman, D. N., Tonorezos, E. S., Cohen, S., Winawer, J., & Zimmerman, E. (2019). Metabolic syndrome and diabetes mellitus in adult survivors of childhood cancer. *Cardiology*, 142(1), 1–8.

42. Gambera, S., Dell'Orso, S., Mazza, E. M. C., Carraro, E., Rosato, A., Di Virgilio, F., & Donadoni, C. (2021). RGB marking reveals clonal dynamics of tumor-initiating cells in the progression of mouse osteosarcoma. *Developmental Cell, 56*(14), 2042–2058.e9. https://doi.org/10.3390/cancers13092003

43. Gagnon, J., Bouchard, F., Landry, M., Belles-Isles, M., Fortier, M., & Fillion, L. (2004). Implementing a hospital-based animal therapy program for children with cancer: a descriptive study. *Canadian Oncology Nursing Journal], 14*(4), 217–222. https://doi.org/10.5737/1181912x144217222

44. Gaviria, M., Merigó, J., & Baier-Fuentes, H. (2019). Knowledge management: A global examination based on bibliometric analysis. *Technological Forecasting and Social Change*, *140,* 194-220. https://doi.org/10.1016/j.techfore.2018.07.006

45. Guerra, F., Cilli, E., Cogodi, E., & Ranieri, J. (2024). Emotional traits, self-care and emotional regulation in young early-stage breast cancer women: an observational study on survivorship psychological adaptation. *Mediterranean Journal of Clinical Psychology 12*(2). https://doi.org/10.13129/2282-1619/mjcp-4225

46. Grant, S., & Olsen, C. W. (1999). Preventing zoonotic diseases in immunocompromised persons: the role of physicians and veterinarians. *Emerging Infectious Diseases, 5*(1), 159–163. https://doi.org/10.3201/eid0501.990121

47. Gilmer, M., Grossman, N., Guérin, N., Hellman, C., Holley, L., Jenkins, M., Linder, D., McCullough, A., O'Haire, M., Olson, J., Pawar, A., Pichette, D., Ruehrdanz, A., & Sierra, S. (2018). Measuring the Effects of an Animal-Assisted Intervention for Pediatric Oncology Patients and Their Parents: A Multisite Randomized Controlled Trial. *Journal of Pediatric Hematology/Oncology Nursing, 35*(3), 159. https://doi.org/10.1177/1043454217748586

48. Gómez Tabares, A. S. (2025). Líneas de investigación en desconexión moral y su impacto en el comportamiento social. *Dilemas*, *18*(2), e60966. https://doi.org/10.4322/dilemas.v18.n2.60966

49. Gordon-Dseagu, V. L. Z., Shelton, N., & Mindell, J. S. (2013). Epidemiological evidence of a relationship between type-1 diabetes mellitus and cancer: a review of the existing literature. *International Journal of Cancer*, *132*(3), 501–508. https://doi.org/10.1002/ijc.27703

50. Hasanah, I., Nursalam, N., Krisnana, I., Ramdani, W., Haikal, Z., & Rohita, T. (2023). Psychoneuroimmunological Markers of Psychological Intervention in Pediatric Cancer: A Systematic Review and New Integrative Model. *Asian Nursing Research. 17*(3), 119-137. https://doi.org/10.1016/j.anr.2023.07.001

51. Hédan, B., Thomas, R., Motsinger-Reif, A., André, C., Galibert, F., & Breen, M. (2011). Molecular cytogenetic characterization of canine histiocytic sarcoma: A spontaneous model for human histiocytic cancer identifies deletion of tumor suppressor genes and highlights influence of genetic background on tumor behavior. *BMC Cancer, 11*, 201. https://doi.org/10.1186/1471-2407-11-201

52. Holder, T., Gruen, M., Roberts, D., Somers, T., & Bozkurt, A. (2020). A systematic literature review of animal-assisted interventions in oncology (part I): Methods and results. *Integrative Cancer Therapies*, *19*, e1534735420943278. https://doi.org/10.1177/1534735420943278

53. International Association of Human-Animal Interaction Organizations (IAHAIO). (2022). *White paper on animal-assisted interventions.* https://iahaio.org/best-practice/white-paper-on-animal-assisted-interventions/

54. Jaramillo Valencia, L. J., Badillo Silva, J., & Landínez Martínez, D. A. (2025). The Relationship between Executive Dysfunction and Depression in Adult Women with Breast Cancer: A Systematic Review. *Mediterranean Journal of Clinical Psychology, 13*(2). https://doi.org/10.13129/2282-1619/mjcp-4928

55. Jaro, M. (1989). Advances in record-linkage methodology as applied to matching the 1985 census of Tampa, Florida. *Journal of the American Statistical Association, 84*(406), 414-420. https://doi.org/10.2307/2289924

56. Johnson, R. A., Meadows, R. L., Haubner, J. S., & Sevedge, K. (2008). Animal-assisted activity among patients with cancer: effects on mood, fatigue, self-perceived health, and sense of coherence. *Oncology Nursing Forum, 35*(2), 225–232. https://doi.org/10.1188/08.ONF.225-232

57. Johnson, R. A., Meadows, R. L., Haubner, J. S., & Sevedge, K. (2003). Human-animal interaction: A complementary/alternative medical (CAM) intervention for cancer patients. *The American Behavioral Scientist, 47*(1), 55–69. https://doi.org/10.1177/000276420325521

58. Julius, H., Beetz, A., Kotrschal, K., Turner, D., & Uvnäs-Moberg, K. (2013*). Attachment to pets: An integrative view of human–animal relationships with implications for therapeutic practice*. Hogrefe Publishing.

59. Kazak, A. E., Derosa, B. W., Schwartz, L. A., Hobbie, W., Carlson, C., Ittenbach, R. F., & Ginsberg, J. (2010). Psychological outcomes and health beliefs in adolescent and young adult survivors of childhood cancer and controls. *Journal of Clinical Oncology, 28*(12), 2002–2007. https://doi.org/10.1200/JCO.2009.25.9564

60. Kaminski, M., Pellino, T., & Wish, J. (2002). Play and pets: The physical and emotional impact of child-life and pet therapy on hospitalized children. *Children's Health Care, 31*(4), 321–335. https://doi.org/10.1207/S15326888CHC3104_5

61. Linder, L., & Hooke, M. (2019). Symptoms in Children Receiving Treatment for Cancer2014; Part II: Pain, Sadness, and Symptom Clusters. *Journal of Pediatric Oncology Nursing, 36*(4), 262-279. https://doi.org/10.1177/1043454219849457

62. Lindström, M., Funkquist, E., Edner, A., & Engvall, G. (2019). Children report positive experiences of animal-assisted therapy in paediatric hospital care. *Acta Paediatrica, 108*(10), 1–8. https://doi.org/10.1111/apa.15047

63. Mahoney, A. B., Akard, T. F., Cowfer, B. A., Dietrich, M. S., Newton, J. L., & Gilmer, M. J. (2024). Impact of animal-assisted interaction on anxiety in children with advanced cancer and their caregivers. *Journal of Palliative Medicine, 27*(1), 75–82. https://doi.org/10.1089/jpm.2023.0091

64. Marcus, D., Bernstein, C., Constantin, J., Kunkel, F., Breuer, P., & Hanlon, R. (2012). Animal-Assisted Therapy at an Outpatient Pain Management Clinic. *Pain Medicine, 13*(1), 45–57. https://doi.org/10.1111/j.1526-4637.2011.01294.x

65. Merlo, E. M., Myles, L. A. M., Silvestro, O., Ruggeri, D., Russo, G. T., Squadrito, G., & Martino, G. (2025). Type 1 Diabetes Mellitus and Alexithymia: A Systematic Review. *Healthcare*, *13*(19), 2402. https://doi.org/10.3390/healthcare13192402

66. Mezza, F., Saturnino, C., Pizzo, R., Santaniello, A., Cristiano, S., Garzillo, S., Maldonato, N., Bochicchio, V., Menna, L., & Scandurra, C. (2022). Process Evaluation of Animal Assisted Therapies with Children: The Role of the Human-Animal Bond on the Therapeutic Alliance, Depth of Elaboration, and Smoothness of Sessions. *Mediterranean Journal of Clinical Psychology, 10*(2). https://doi.org/10.13129/2282-1619/mjcp-3433

67. Moody, W. J., King, R., & O'Rourke, S. (2002). Attitudes of paediatric medical ward staff to a dog visitation programme. *Journal of Clinical Nursing, 11*(4), 537–544. https://doi.org/10.1046/j.1365-2702.2002.00618.x

68. Moore, A. S., Dernell, W. S., Ogilvie, G. K., Elmslie, R. E., & Withrow, S. J. (2007). Doxorubicin and BAY 12-9566 for the treatment of osteosarcoma in dogs: A randomized, double-blind, placebo-controlled study. *Journal of Veterinary Internal Medicine, 21*(4), 783–790. 10.1892/0891-6640(2007)21[783:dabftt]2.0.co;2

69. Moreira, R., Gubert, F., Moraes, L., Benavides, J., Braga, M., Martins, M., & de Assis Brito, M. (2016). Terapia assistida com cães em pediatria oncológica: percepção de pais e enfermeiros. *Revista Brasileira de Enfermagem*, *69*(6), 1122–1128. https://doi.org/10.1590/0034-7167-2016-0243

70. Morello, E., Martano, M., & Buracco, P. (2011). Biology, diagnosis and treatment of canine appendicular osteosarcoma: Similarities and differences with human osteosarcoma. *The Veterinary Journal, 189*(3), 268–277. https://doi.org/10.1016/j.tvjl.2010.08.014

71. Nance, R. L., Suttle, L. E., Rutter, E. A., Tomczak, J. A., & Modiano, J. F. (2023). Single-nuclei multiome (ATAC + gene expression) sequencing of a primary canine osteosarcoma elucidates intra-tumoral heterogeneity and characterizes the tumor microenvironment. *International Journal of Molecular Sciences, 24*(4), 3922. 10.3390/ijms242216365

72. Obando, L. (Ed.). (2020). *Aportes de la psicología en el ámbito hospitalario: La humanización en los servicios de salud como objetivo prioritario*. Editorial Universidad Santiago de Cali. https://doi.org/10.35985/9789585147164

73. Odendaal, J. S., & Meintjes, R. A. (2003). Neurophysiological correlates of affiliative behaviour between humans and dogs. *Veterinary Journal, 165*, 296–301. https://doi.org/10.1016/S1090-0233(02)00237-X

74. Orlandi, M., Trangeled, K., Mambrini, A., Tagliani, M., Ferrarini, A., Zanetti, L., Tartarini, R., Pacetti, P., & Cantore, M. (2007). Pet therapy effects on oncological day hospital patients undergoing chemotherapy treatment. *Anticancer research, 27*(6C), 4301–4303.

75. Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hrobjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S.,…Moher, D., ... & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *Journal of Clinical Epidemiology, 134*, 103–112. https://doi.org/10.1016/j.jclinepi.2021.03.001

76. Paoloni, M., & Khanna, C. (2009). Translation of new cancer treatments from pet dogs to humans. *Nature Reviews Cancer, 8*(2), 147–156. https://doi.org/10.1038/nrc2273

77. Pedrosa, S., Aguado, D., Canfrán, S.,Torres, J., & Miró, J. (2016). La terapia asistida con perros en el tratamiento de las personas con dolor crónico: una revisión sistemática. *Revista de la Sociedad Española del Dolor*. https://doi.org/10.20986/resed.2016.3461/2016

78. Phipps, S., & Srivastava, D. (1997). Repressive adaptation in children with cancer. *Health Psychology, 16*(6), 521–528. https://doi.org/10.1037/0278-6133.16.6.521

79. Robledo, S., Zuluaga, M., Valencia-Hernandez, L.-A., Arbelaez-Echeverri, O. A.-E., Duque, P., & Alzate-Cardona, J.-D. (2022). Tree of Science with Scopus: A Shiny application. *Issues in Science and Technology Librarianship*, *100*. https://doi.org/10.29173/istl2698

80. Robledo, S., Figueroa-Camargo, J. G., Zuluaga-Rojas, M. V., Vélez-Escobar, S. B., & Duque-Hurtado, P. L. (2023). Mapping, evolution, and application trends in co-citation analysis: a scientometric approach. *Revista de Investigación, Desarrollo e Innovación, 13* (1), 201-214. https://doi.org/10.19053/20278306.v13.n1.2023.16070

81. Robledo, S., Valencia, L., Zuluaga, M., Echeverri, O. A., & Valencia, J. W. A. (2024). tosr: Create the Tree of Science from WoS and Scopus. *Journal of Scientometric Research*, *13*(2), 459–465. https://doi.org/10.5530/jscires.13.2.36

82. Silva, N., & Osório, F. (2018). Impact of an animal-assisted therapy programme on physiological and psychosocial variables of paediatric oncology patients. *PLoS ONE*, *13*(4), e0194731. https://doi.org/10.1371/journal.pone.0194731

83. Simpson, S., Dunning, M., de Brot, S., Grau-Roma, L., Mongan, N. P., & Rutland, C. S. (2017). Comparative oncology – New insights into an old disease. *Veterinary Journal, 224*, 44–51. https://doi.org/10.1016/j.isci.2020.101373

84. Steff, K., Grasemann, M., Ostermann, K., Goretzki, S., Rath, P., Reinhardt, D., & Schündeln, M. (2024). Feasibility, efficacy, and safety of animal-assisted activities with visiting dogs in hospital pediatric oncology. *World Journal of Pediatrics, 20*(9), 915–924. https://doi.org/10.1007/s12519-024-00829-8

85. Suh, S., & Kim, K. W. (2019). Diabetes and cancer: Cancer should be screened in routine diabetes assessment. *Diabetes & Metabolism Journal*, *43*(6), 733–743. https://doi.org/10.4093/dmj.2019.0177

86. Tsai, C., Friedmann, E., & Thomas, S. A. (2010). The effect of animal-assisted therapy on stress responses in hospitalized children. *Anthrozoös, 23*(3), 245–258. https://doi.org/10.2752/175303710X12750451258977

87. Urbanski, B. L., & Lazenby, M. (2012). Distress among hospitalized pediatric cancer patients modified by pet-therapy intervention to improve quality of life. *Journal of Pediatric Hematology/Oncology Nursing, 29*(5), 272–282. https://doi.org/10.1177/1043454212455697

88. Vail, D. M., Thamm, D. H., & Liptak, J. M. (2002). Stealth liposome-encapsulated cisplatin (SPI-77) versus carboplatin as adjuvant therapy for spontaneously arising osteosarcoma (OSA) in the dog: A randomized multicenter clinical trial. *Cancer Chemotherapy and Pharmacology, 50*(2), 131–136. https://doi.org/10.1007/s00280-002-0469-8

89. Valencia, D., Restrepo, G., Tejada, J., Castaño, A., & Duque, J. (2020). SAP algorithm for citation analysis: An improvement to tree of Science. *Ingeniería e Investigación, 40*(1), 45–49. https://doi.org/10.15446/ing.investig.v40n1.77718

90. Walkley, C. R., Qudsi, R., Sankaran, V. G., Perry, J. A., Gostissa, M., Roth, S. I., & Orkin, S. H. (2008). Conditional mouse osteosarcoma, dependent on p53 loss and potentiated by Rb loss. *Nature Genetics, 40*(5), 648–653. https://doi.org/10.1101/gad.1656808

91. World Health Organization (WHO). (2021). *El cáncer infantil.* https://www.who.int/es/news-room/fact-sheets/detail/cancer-in-children#:~:text=La%20probabilidad%20de%20que%20un,%25%20%5B2%2C3%5D.

92. Wu, A., Niedra, R., Pendergast, L., & McCrindle, B. (2002). Acceptability and impact of pet visitation on a pediatric cardiology inpatient unit. *Journal of Pediatric Nursing, 17*(5), 354–362. https://doi.org/10.1053/jpdn.2002.127173

93. Zuluaga, M., Robledo, S., Arbelaez-Echeverri, O., Osorio-Zuluaga, G., & Duque-Méndez, N. (2022). Tree of Science - ToS: A Web-Based Tool for Scientific Literature Recommendation. Search Less, Research More!. *Issues in Science and Technology Librarianship, (100)*, e2696. https://doi.org/10.29173/istl2696

94. Zupic, I., & Čater, T. (2015). Bibliometric methods in management and organization. *Organizational Research Methods, 18*(3), 429–472. https://doi.org/10.1177/1094428114562629

DOI: 10.13129/2282-1619/mjcp-4994