

**RESEARCH ARTICLE**  
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# Use of Animal-Assisted Interventions and Children's Field: A Bibliometric Analysis

## Hayvan Destekli Müdahaleler ve Çocuk Alanında Kullanımı: Bibliyometrik Bir Analiz

### ABSTRACT

#### Aim

This study aimed to present a world panorama of published articles on animal-assisted interventions in children and to highlight the characteristics of studies on animal-assisted interventions in children.

#### Method

In this study, a bibliometric analysis of the studies was conducted to analyze the trends of publications in the fields of "Animal Assisted Interventions" and "Child". The articles analyzed in this study were obtained from the Web of Science Core Collection (WoS) database with search keywords. Inclusion criteria included English-language articles in journals published in the Science Citation Index Expanded or Social Science Citation Index.

#### Results

It has been determined that the trends of research on "Animal Assisted Interventions" and "Child" increased between 2020-2023. It has been determined that 80% of the research on "Animal Assisted Interventions" consists of research articles. It was determined that the most cited article (n=213) in studies related to "Animal Assisted Interventions" and "Child" was "Animal Assisted Intervention for Autism Spectrum disorder A Systematic Literature Review" and was published in the Journal of Autism and Developmental Disorders.

#### Conclusions

The results of this bibliometric analysis showed that there has been a growing interest in the topic of animal-assisted interventions in the children's field over the last 10 years. This study thought that the results of this study would contribute to the evaluation of the status of studies on animal-assisted intervention and guide future research in this field.

#### Keywords

Animal-assisted interventions, child, bibliometric analysis

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## ÖZET

### Amaç

Bu çalışmanın amacı çocuklarda hayvan destekli müdahalelere ilişkin yayınlanmış makalelerin dünya panoramasını sunmak ve çocuklarda hayvan destekli müdahalelere ilişkin yapılan çalışmaların özelliklerini vurgulamaktır.

### Yöntem

Bu çalışmada, "Hayvan Destekli Müdahaleler" ve "Çocuk" alanında yapılan yayınların eğilimlerini analiz etmek amacıyla araştırmaların bibliyometrik analizi yapılmıştır. Bu çalışmada analiz edilen makaleler, arama anahtar kelimeleri ile Web of Science Core Collection (WoS) veri tabanından elde edilmiştir. Dahil etme kriterleri, Science Citation Index Expanded veya Social Science Citation Index'te yayımlanan dergilerdeki İngilizce makaleleri içerir.

### Bulgular

"Hayvan Destekli Müdahaleler" ve "Çocuk" ile ilgili araştırmaların eğilimlerinin 2020-2023 yılları arasında artış gösterdiği saptanmıştır. "Hayvan Destekli Müdahaleler" ile ilgili yapılan araştırmaların %80'ini araştırma makalelerinin oluşturduğu saptanmıştır. "Hayvan Destekli Müdahaleler" ve "Çocuk" ile ilgili çalışmaların en çok alıntı yapılan (n=213) makalenin "Otizm Spektrum Bozukluğu için Hayvan Destekli Müdahale: Sistemik Bir Literatür Taraması" olduğu ve Journal of Autism and Developmental Disorders'da yayımlandığı tespit edilmiştir.

### Sonuçlar

Bu bibliyometrik analizin sonuçları, çocuk alanında son 10 yılda hayvan destekli müdahaleler konusuna artan bir ilgi olduğunu göstermiştir. Bu çalışmanın sonuçlarının, hayvan destekli müdahalelere ilişkin çalışmaların mevcut durumunun değerlendirilmesi ve bu alanda yapılacak araştırmalara rehberlik etmesiyle katkı sağlayacağı düşünülmektedir.

### Anahtar Kelimeler

Hayvan destekli müdahaleler, çocuk, bibliyometrik analiz

### What is known about the field

- Since animals have been interacting with humans for centuries, it is known that they are used to protect and improve children's health and overcome many physical and mental problems.

### Contribution of the article to the field

- It is thought that this bibliometric analysis will reflect the existing evidence by analyzing the bibliometric characteristics of the articles published on animal-assisted interventions in the field of pediatrics.
- Allowing researchers and health professionals to obtain information about the structure of their field.
- Understanding the research gaps and contributing to the development of innovative ideas for future studies on animal-assisted interventions.

## INTRODUCTION

Animal-assisted interventions (AAI) are targeted and structured interventions that intensively involve or co-opt animals for therapeutic benefit in humans, in health, education, and social services. Animal Assisted Interventions bring together human-animal teams for Animal Assisted Therapy, Animal Assisted Education, or Animal Assisted Activity in specific circumstances, in public institutions and humanitarian services, including Animal Assisted Coaching (1). Animal-assisted interventions increase the individual's development in psychologically related areas such as self-efficacy, self-esteem, and social support (2). As a result of the study conducted by Serpell and Kruger (2010), it is stated that during AAI, the individual's self-efficacy perception increases through direct practice by observing, learning from, and imitating animals (3). In addition, the reduction of anxiety and timidity can help the individual get away from pain or mental problems and create a sense of control. Thus, AAI can increase self-esteem, self-efficacy, and self-perception along with coping ability (4). Animal-assisted interventions are known to be beneficial throughout life and in all areas (5). It is also used in special populations such as people with mental health disorders, chronic pain, prisoners, individuals with autism, or multiple sclerosis (6-9). AAI is frequently used to promote and develop different skills in children with and without disabilities (10). Research on the use of AAI in children has shown that interacting with animals has psychological, emotional, social and physical benefits (11-13). Studies in this field have focused on hyperactivity and attention deficit, autism, speech and learning disabilities, cerebral palsy, cardiological problems, pain, psychiatric

problems, developmental delay and cancer (14-18). While AAI is widely used United States of America (USA), Australia, Italy, its use in Türkiye and its reflection on study results are limited (19-23). Despite the significant impact of animal-assisted interventions in pediatric studies, there is a gap in the literature. Animal-assisted interventions are a growing and developing field (24). This situation makes it difficult for researchers to access current studies and follow their results. In this direction, the need for identifying trends in the use of animal-assisted intervention in pediatrics, mapping recent developments and identifying research gaps is increasing. Bibliometric analysis is to visualize the intellectual, conceptual and social structure reflecting the scientific communication in the field of study by using mathematical and statistical methods (algorithms, package programs, etc.) with the help of "mapping" techniques (24). In terms of these stated purposes of use, bibliometric analysis is accepted as a literature review tool. Based on all these, bibliometric analysis provides a visual mapping of the most cited studies related to a researcher's research topic and the most productive purposes, bibliometric analysis provides a visual mapping of the literature and influential authors, journals, institutions, countries and the relationship/collaboration between them (25). Thus, bibliometric analysis is an important method in identifying emerging trends, obtaining important information about gaps in the field, and providing a better understanding of future trends. As far as it is known in the literature, there is no bibliometric analysis of studies on the use of AAI in pediatrics. This study was conducted to examine the bibliometric analysis of published articles on animal-assisted interventions in children.

## METHOD

### Study Design

A descriptive bibliometric analysis was conducted to explore literature focused on research studies using animal-assisted interventions. Bibliometrics is a detailed quantitative analysis of a growing body of literature (8). Bibliometric analysis is a quantitative method used to examine the specific characteristics, structure and evolution of publications in a particular field (26). With this analysis, the current status (number of publications per year, top contributing institutions, keywords, etc.) and trends are determined by analyzing publications (27). The initial step in completing the bibliometric analysis was compiling a comprehensive list (28) of the eligible articles to include in our sample. The analysis procedure is described as follows.

### Search strategy and article selection

In the first stage of this research, the database used for the study is the WoS database, which is one of the most complete and widely used databases for bibliometric analyses or literature reviews. WoS is the most

common multidisciplinary database in bibliometric methods that provides bibliometric and citation data of international study (29). In addition, WoS has a low variety of data extensions and a lower rate of restrictions in the database extensions it offered than Scopus (30). For this reason, the WoS database was preferred for bibliometric analysis in this study. In the second stage the literature review was conducted using keywords: ("animal assisted therapy" OR "pet therapy" OR "animal therapy" OR "therapy dog" OR "animal-assisted activities" OR "animal-assisted intervention" OR "animal-assisted interventions" OR "animal-assisted therapy" OR "canine-assisted therapy" OR "dog-assisted therapy" OR "therapy dogs" OR "dog therapy") AND ("Child" OR "Children") "all fields" were selected. In the third stage, a total of 464 results were obtained, including articles, review articles, etc. published between 01.01.2013 and 11.10.2023. In the last stage, year restrictions were made for all articles published in the search and those with English as the language of publication were selected (3, 31).

Thus, a total of 448 articles were selected. The articles were merged into a single file, and where necessary, abstracts or full texts were read and evaluated to determine whether they fit the research theme.

Inclusion criteria;

- Animal-assisted interventions, child-related research between 2013-2023,
- Original article and review article,
- These are studies published in English.

The exclusion criteria of the study are;

- Meeting abstract, book chapters, proceeding paper, editorial material, early access, letter, book review, book, news item, correction
- They are non-English research.

### Data Analysis

In this study was analyzed using the Bibliometrix R package has been opened via RStudio. Studies published in the WoS database in the field of animal assisted interventions were analyzed using bibliometric analysis technique. Thus, concept analysis of 448 publications obtained was performed with the RStudio Bibliometrix program (32). In the study, the year, country, citation, keyword dynamics, authors and countries of the publications were downloaded in "Plain text" format and their features were examined (33).

### Study Ethics

This study did not require ethical approval since it was conducted without any human or animal subjects, and the data were obtained from a publicly available database.

## RESULTS

Within the scope of this study, 448 publications were analyzed between 2013 and 2023. While the annual growth rate of publications is 14.51%, the rate of growth of international co-authorship is 15.85%. The number of authors of these publications is 1556 and the number of single-author studies is 32. Of the 448 studies published on this topic, 358 were articles and 90 were review articles. Table 1 shows that distribution and trend of the number of publications and citations of publications on animal-assisted interventions by year. The number of articles on animal-assisted interventions increased continuously from 2013 to 2019 but decreased in 2019 (Figure 1). The number of publications peaked in 2023 (62 articles), accounting for 13.8% of all publications (Table 1).

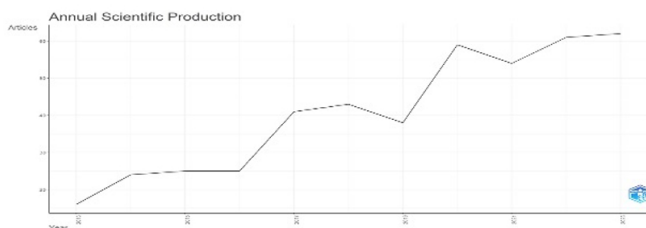


Figure 1. Distribution of studies by years

Table 1. Dynamics and trends in publications

Year	Number of publications	Average total citations per article	Average total citations per year
2013	16	41.44	3.77
2014	24	29.50	2.95
2015	25	34.48	3.83
2016	25	18.56	2.32
2017	41	19.10	2.73
2018	43	16.40	2.73
2019	38	9.66	1.93
2020	59	8.49	2.12
2021	54	5.72	1.91
2022	61	1.87	0.94
2023	62	0.58	0.58

## Top 10 Most Cited Studies

The ten most cited studies on animal-assisted interventions and the child were published between 2013 and 2017 (Table 2).

Table 2. Top ten cited 'Animal-Assisted Interventions' studies in children in the WoS database (October 2023)

Article	Author(s)	Year	Journal	Citation Number	Average Citation Number
Animal-Assisted Intervention for Autism Spectrum Disorder: A Systematic Literature Review	O'Haire, M. E.	2013	Journal of Autism and Developmental Disorders	213	19.36
Baby Schema in Human and Animal Faces Induces Cuteness Perception and Gaze Allocation in Children	Borgi, M., Cogliati-Dezza, I., Brelsford, V., Meints, K., & Cirulli, F.	2014	Frontiers in Psychology	108	10.80
Animal-Assisted Intervention for trauma: A systematic literature review	O'haire, M. E., Guérin, N. A., & Kirkham, A. C.	2015	Frontiers in Psychology	103	11.44
Current Perspectives on Therapy Dog Welfare in Animal-Assisted Interventions	Glenk, L. M.	2017	Animals	96	13.71
Effectiveness of a Standardized Equine-Assisted Therapy Program for Children with Autism Spectrum Disorder	Borgi, M., Loliva, D., Cerino, S., Chiarotti, F., Venerosi, A., Bramini, M., Nonnis, E., Marcelli, M., Vinti, C., De Santis, C., Bisacco, F., Fagerlie, M., Frascarelli, M., & Cirulli, F.	2016	Journal of Autism and Developmental Disorders	88	11.00
Animal Assisted Intervention: A Systematic Review of Benefits and Risks	Bert, F., Gualano, M. R., Camussi, E., Pieve, G., Voglino, G., & Siliquini, R.	2016	European Journal of Integrative Medicine	84	10.50
A Systematic Review of Randomized Controlled Trials of Animal-Assisted Therapy on Psychosocial Outcomes	Maujean, A., Pepping, C. A., & Kendall, E.	2015	Anthrozoös	81	9.00
Use of Assistance and Therapy Dogs for Children with Autism Spectrum Disorders: A Critical Review of the Current Evidence	Berry, A., Borgi, M., Francia, N., Alleva, E., & Cirulli, F.	2013	The Journal of Alternative and Complementary Medicine	78	7.09
The Association Between Therapeutic Horseback Riding and the Social Communication and Sensory Reactions of Children with Autism	Ward, S. C., Whalon, K., Rusnak, K., Wendell, K., & Paschall, N.	2013	Journal of Autism and Developmental Disorders	76	6.91
Patient benefit of dog-assisted interventions in health care: a systematic review	Lundqvist, M., Carlsson, P., Sjö Dahl, R., Theodorsson, E., & Levin, L. Å.	2017	BMC Complementary Medicine and Therapies	71	10.14



These studies have article citations in WoS ranging from 71 to 213 citations. The most cited article was written by O'Haire (2013) with 213 citations and published in the Journal of Autism and Developmental Disorders. The second most cited article was written by Borgi et al. (2014) with 108 citations and published in Frontiers in Psychology. Finally, the third most cited article was written by O'haire et al. (2015) with 103 citations and published in Frontiers in Psychology. The last article in the top 10 most cited articles was written by Lundqvist et al. (2017) and published in BMC Complementary Medicine and Therapies with 71 citations. Bradford's Law is a distribution law that is frequently used in examining how many journals the literature is distributed over, determining the distribution of citations to journals, and ranking periodicals in the selected literature according to their degree of productivity (34). Anthrozoos, Animals, International Journal of Environmental Research and Public Health, Frontiers in Veterinary Science, Complementary Therapies in Clinical Practice, Journal of Autism and Developmental Disorders, Early Childhood Education Journal, Frontiers in Psychology, Plos One, Review Journal of Autism and Developmental Disorders are the most productive core journals (Figure 2).

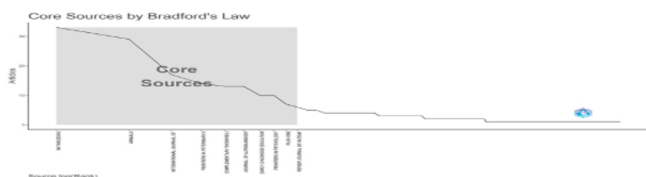


Figure 2. Journal published through Bradford law

These 10 core journals contributed 448 articles, approximately 1/3 (152) of all articles in the collection. Therefore, it can be said that these core journals are highly productive journals related to animal-assisted interventions and children.

### Through Lotka Law Author Productivity

When the authors conducting research on animal-assisted interventions and children are evaluated, the top three authors are O'haire ME (n=16), Enders-Slegers MJ (n=9), and Santaniello A (n=8), respectively. In Table 3, it is seen that 1345 of the 1556 authors contributed to the research topic with only one article, while 22 of them contributed to the related field with five or more articles.

Table 3. Author productivity through Lotka's law

Number of Documents	Number of Authors	Ratio of Authors
1	1345	0.864
2	132	0.085
3	41	0.026
4	16	0.010
5	6	0.004
6	7	0.004
7	6	0.004
8	1	0.001
9	1	0.001
16	1	0.001

In addition, the three countries that produced the highest number of articles on animal-assisted interventions and children are USA (n = 460), Australia (n = 112), and Italy (n = 109), and Türkiye (n = 9) ranks 20th. Figure 3 shows the collaboration network of the countries. The pink color on the map in Figure 3 indicates international research collaborations. The three countries with the highest number of collaborations on the research topic are USA -United Kingdom (n=9), Germany- Austria (n=6), and Netherlands-Switzerland (n=5).

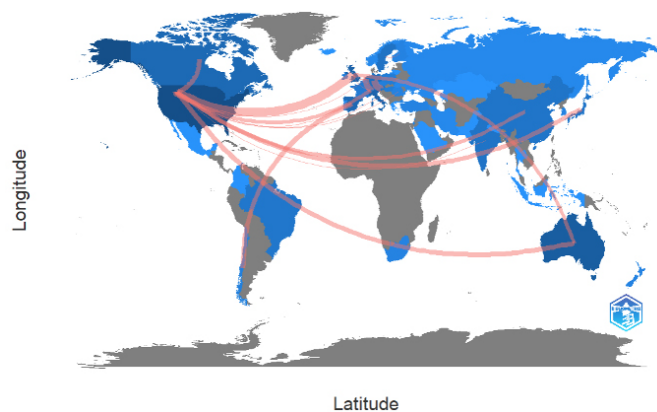


Figure 3. Countries' collaboration world map

Table 4 shows that in terms of total number of articles in the field of animal-assisted interventions and children, the top three countries in terms of authors are the USA (n=161), Australia (n=54) and Italy (n=33). The USA (n = 147), Australia (n = 48) and Italy (n = 28) are the leading single-country authors, while the USA (n = 14), United Kingdom (UK) (n = 7) and Switzerland (n = 7) are the leading multi-country authors. Türkiye ranks 20th in the list with 4 single country publications and 4 publications in total (Table 4).

**Table 4.** Corresponding author's country

Country	Total Articles	SCP <sup>a</sup>	MCP <sup>b</sup>	Frequency	MCP_Ratio <sup>c</sup>
1. USA	161	147	14	0.359	0.087
2. Australia	54	48	6	0.121	0.111
3. Italy	33	28	5	0.074	0.152
4. United Kingdom	31	24	7	0.069	0.226
5. Canada	18	15	3	0.04	0.167
6. Spain	18	16	2	0.04	0.111
7. Netherlands	12	12	0	0.027	0
8. Switzerland	9	2	7	0.02	0.778
9. India	9	8	1	0.02	0.111
10. China	8	4	4	0.018	0.5
11. Germany	8	6	2	0.018	0.25
12. Brazil	8	7	1	0.018	0.125
13. Austria	6	5	1	0.013	0.167
14. Japan	6	6	0	0.013	0
15. Sweden	5	5	0	0.011	0
16. Hungary	5	5	0	0.011	0
17. Poland	5	5	0	0.011	0
18. France	4	3	1	0.009	0.25
19. Czech Republic	4	4	0	0.009	0
20. Türkiye	4	4	0	0.009	0

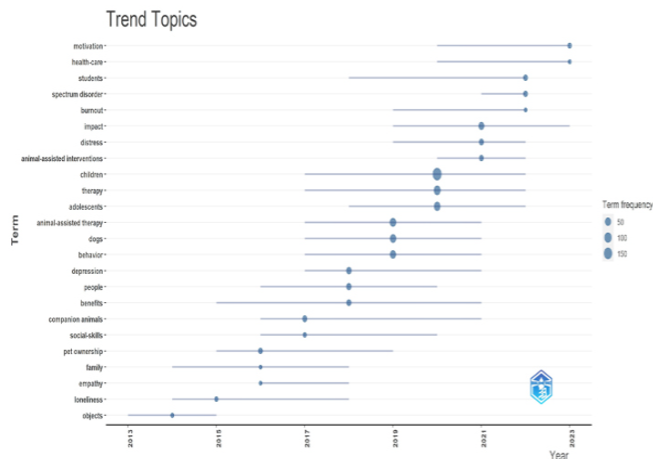
Notes: <sup>a</sup>SCP=Single country publications, <sup>b</sup>MCP= Multiple country publications, <sup>c</sup>MCP\_Ratio=MCP/Total articles

The most frequently used KeyWords Plus word cloud in the studies on the research topic is given in Figure 4.

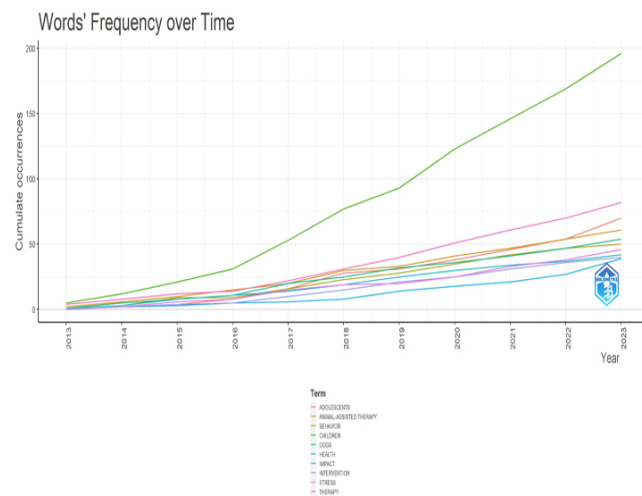


**Figure 4.** Visualized word clouds of KeyWords Plus

As the frequency of words increases, they appear in a larger size in the word cloud. As indicated in Figure 4, the most used KeyWords Plus words are Children (196 times), Therapy (82 times), adolescents (70 times), animal-assisted therapy (61 times), dogs (54 times), behavior (50 times), stress (46 times), health (42 times), intervention (40 times), and impact (39 times). According to the results of the analysis, when the distribution of trending topics by years is analyzed, it is determined that the most common topic between 2013 and 2023 was "children" and reached its peak in 2020 (n=196). From 2023 onwards, "motivation, health-care, and impact" started to trend (Figure 5, Figure 6).



**Figure 5.** Trends over the years: Distribution of popular topics



**Figure 6.** The Distribution of Word Frequency in Trending Topics Over the Years

### DISCUSSION

In this study, 448 studies published in the field of AAI in the field of children and important articles, influential authors, current research topics, most cited articles, developing trends, and countries with the most publications were identified. The fact that there is no study in the literature in which the trends of the studies on AAI with children are determined, collaborations and recent developments are visualized reveals the unique value of this study. It is thought that this study will provide important information about the gaps in the field and contribute to a better understanding of future trends.

According to the results of the study analysis, it was found that the number of studies published on AAI with children increased continuously from 2013 to 2019 and the number of studies peaked in 2023. Studies in the literature emphasized that interaction with an animal is very important in the social, psychological, emotional, and cognitive development of children (5, 35-37). Animal-assisted interventions, which are increasingly used today, have been reported to be very useful in eliminating emerging children's medical problems and

pre-existing problems (5, 12, 36). According to the results of the analysis, the increase in studies examining the relationship between animal-assisted interventions in children is an important indicator of scientific productivity and is expected to increase in the coming years. When the studies conducted in the field of animal-assisted interventions in children were analyzed according to the countries of the authors, it was found that the USA ranked first with a total of 161 articles, 147 of which were single-country articles and 14 of which were co-authored with authors from other countries. The USA is followed by Australia, and Italy. Türkiye ranks twenty-sixth with 4 articles (17,38-40). Although the use of animal-assisted interventions has increased recently, we can say that scientific productivity is not at the desired level in our country. In this direction, it is recommended to conduct studies investigating the relationship between animal-assisted interventions in children in our country. In addition, in this study, it was determined that Türkiye does not cooperate with any countries and focuses more on local studies in cooperation. In this direction, it is recommended that health professionals, researchers, managers, and institutions working in the field of animal-assisted interventions in children in our country should cooperate with countries working in this field.

One of the important findings of the study is the rate of increase in the number of citations over the years. While the number of citations was 71 in 2013, the number of citations was 213 in 2017. This rapid increase shows that the awareness of animal-assisted interventions has increased with the increase in scientific opportunities in recent years. When the publications were evaluated in terms of citations, the study with the highest number of citations (213) was published in the Journal of Autism and Developmental Disorders in 2013 by Marguerite E. O'Haire from the University of Queensland, titled "Animal-Assisted Intervention for Autism Spectrum Disorder: A Systematic Literature Review". As a result of this study, it was reported that animal-assisted interventions increased the social interaction and communication of individuals with autism spectrum disorder, as well as reducing problematic behaviors, autistic violence and stress (41). When the word cloud was examined, it was found that the keywords children, therapy, adolescents, animal-assisted therapy, dogs were the most focused on in the field of animal-assisted interventions between 2013-2023. Among the keywords determined by the authors in the articles, "children" is the most frequently used keyword. Considering the inclusion criteria in terms of keywords, it is usual that the most important keyword is "children". In addition, as of 2023, it is seen that researchers are predominantly inclined to research on "motivation, health-care, and impact". Using the keywords identified in this study in accordance with the subject areas in

studies on animal-assisted interventions and children may increase the visibility and citation rate of the study.

## CONCLUSIONS

In conclusion, this bibliometric analysis bibliometric ally analyzed the articles in the WoS database in the field of animal assisted interventions and children and revealed information that is believed to be useful for researchers in this field. It revealed the status of AAI research in the pediatric field, the most contributing countries, journals, institutions, authors, decreasing and increasing trends, and showed that there has been an increasing interest in AAI in the pediatric field for the last 10 years. When the keywords of the studies were examined, it was revealed that the most common word in the subject clusters of the studies was "children", and the studies focused on the keywords "motivation, health-care, and impact", and that the studies conducted today are more focused on the topics covering these keywords. In this direction, it is thought that focusing the studies to be conducted with AAI on less studied topics and increasing global cooperation may be effective in deepening the international literature in the field of children. This study is thought to be useful in guiding researcher academicians who focus on AAI, especially in terms of trending topics and limitations specific to this field. Analyzing this research attempts to shed light on next studies to be conducted and encourage national and international academicians. These results will guide evidence-based guideline applications in the studies to be carried out. The results will provide researchers with a guide and road map for the field. As a result, it is suggested that future research to be carried out should be addressed under the headings of social interaction, behaviors, quality of life, social skills, language, autism-spectrum.

## Limitations and Strengths

The strength of this study was that it is the first bibliometric study in the field of animal-assisted interventions and children. This study was four limitations. Databases such as WOS, Scopus, Google Scholar, PubMed and MEDLINE were used to access data in bibliometric studies. However, it was used WoS as a database for the aim of this study is the first limitation of the study. Secondly, studies published in non-WOS indexed journals on the use of AAI in pediatrics could not be included in the bibliometric analysis because the literature search was conducted in the WOS database. In this regard, it is recommended to conduct similar studies in other databases such as PubMed and Scopus and to repeat the study by updating the data in the coming years. Thirdly, only articles and review articles were analyzed. The fourth limitation is that only studies published in English were included as the language of publication.

**Author Contribution**

Conceptualization: BA, SCY; Design: BA, SCY; Counseling: BA, SCY Data Gathering/Processing: BA, SCY; Analysis/Interpration: BA, SCY; Literature Review: BA, SCY; ST; Writing: BA, SCY; ST; Critical Review: BA, SCY; Resources: BA, SCY; Materials: BA, SCY.

**Disclosure Statement**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Ethical approval**

Ethics committee approval is not required for this study.

*This study will be presented as an presentation at the 5th International Young Researchers Student Congress on 01-03 June 2023.*



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