

ANIMAL ASSISTED THERAPY AND MENTAL HEALTH: A BIBLIOGRAPHICAL ANALYSIS

Shubham Sharma*; Dr. Simplejit Kaur Dhanoa**,

*Research Scholar, Department of Psychology, Chandigarh University, Gharuan, India. (ID-21YHY1004))

**Associate Professor, Department of Psychology, Chandigarh University, Gharuan, India.
Shubhamsharma7794@yahoo.com

Abstract:

Purpose: This study uses bibliometric analysis to investigate the relationship between animal-assisted therapy and mental wellness.

Method: Scopus was used to compile bibliographic data on animal aided treatment and mental health from 2001 through the end of 2021.

Results: In total, 43 papers were discovered, and 62.8% of those documents were taken from research articles. The survey found that the output of the scientific community increased on average annually at a pace of 12.69 percent. In comparison to any successive years, 2017 through 2021 saw the highest growth. Among the most significant and effective nations were Spain, the United States, India, Switzerland, Ireland, and Hong Kong. The most often mentioned subfields in this issue were health care, psychology, and the social sciences, along with the arts and humanities, medicine, and the medical profession. The most often used keywords were adolescent, anxiety, posttraumatic stress disorder, animal-assisted interventions, pet ownership, human-animal link, pet therapy, residential care, mental health, creativity in counselling, animal assisted psychotherapy, single-case design, and depression. Most people read the Journal of Creativity in Mental Health. It was observed that all 43 research documents were published in 32 journals.

Conclusion: The discipline of animal-facilitated mental health treatment is still in its infancy. Since late 2001, there has been a significant increase in the number of publications on animal-assisted therapy for mental health. The number of animal aided therapy in mental health documents that were published each year was quite small, but after 2017, there was a noticeable improvement in growth. It has been demonstrated that books receive more citations than journals, articles, and other printed works. It was also discovered that there isn't much research on this subject.

Keywords: Animal assisted therapy, human, mental health, female, bibliography.

Introduction: The increasing number of people are embracing the practice of animal-assisted therapy (AAT). People from a variety of fields and specialties are turning to animal-assisted therapy for help. In the beginning AAT was conceived as a novel and unorthodox therapy. However, because of its obvious advantages, it has been categorized as a supplemental treatment. Health care, education, and other service industries are increasingly turning to animal-assisted therapy. Animal-assisted therapy has been largely developed in the Western world. Animal-assisted therapy is still in its infancy in eastern countries including China, Japan, Sri Lanka, and India (Nammalwar and Rangeeth 2018).

However, despite the lack of data on animal-assisted therapy (AAT), writers like (Wesley, Minatrea, and Watson 2009), have emphasized its distinctive beneficial effect on the therapeutic partnership. When introducing AAT components into psychotherapy, (Kruger, Serpell, and Fine 2006) claimed that AAT might allow the counsellor to swiftly develop good therapeutic bonds with their patients. For this reason, it is consistent with (Chandler 2005) the statement that a therapeutic relationship between the human counsellor and a client's therapy pet enhances rapport. In (Wesley, Minatrea, and Watson 2009), they found that integrating a therapy animal into therapy session boosted the client's awareness of the therapeutic bond's quality. – If the level of the therapeutic bond isn't up to standard, AAT may have a positive influence on counselling. In a healthy therapeutic alliance, according to (Horvath & Symonds, 1991), there is mutual affection, regard, rapport, faith, warmth, acceptance, and collaboration (or therapeutic alliance). It is possible that the use of a therapy animal might help create the feelings of security, warmth, and acceptability that are so essential to a person's recovery (Reichert, 1998).

Animals are revered in India, and there are many myths and superstitions surrounding them. For example, Hindu culture is reflected in animals like cows, elephants, and dogs. Animals are revered in Hinduism because of their relationship to the deity they serve. Aside from Hinduism and Buddhism, India's major religions also place a great deal of importance on animals and consider them to be a vital part of the natural world and our universe. Depending on the nature of their religious beliefs, these groups may or may not use animal-assisted therapy in the future Krishna, N. (2014). *Sacred Animals of India*.

The goal of this bibliometric study is to have a better understanding of how animals may be used in mental health treatment. Bibliometrics is the use of bibliographic data from academic publications to assess and disclose the structure, productivity, and trends of research efforts. It is possible to use bibliometrics to track the flow of scientific data, analyze the current state of research, and predict the upcoming research on a given issue by using this method. Investigators and sponsors alike can benefit from the findings. As far as we know, no bibliometric study has been conducted on animal aided treatment in the field of mental health. For this study, we employed several bibliometric methodologies and tools, including scientific papers, subject categories, prominent journals, regional distribution and trends of subjects to get insight into patterns of animal aided treatment in mental health.

Methods:

2.1 Primary Database collection

In addition to Web of Science and Scopus, popular databases like Scimago and Google Scholar are frequently utilized across the world. Scopus is the most used database in bibliometric research. In 2004, Elsevier introduced it as a revolutionary search-discovery tool. For example, in the study of Schotten el Aisati Meester Steinginga et al. As a result, it served as our main information source.

Search Procedure

We used the term "animal assisted therapy in mental health" in our search for relevant papers:

TITLE-ABS-KEY ("animal assisted therapy" AND mental AND health) AND (LIMIT-TO (SUBJAREA , "PSYC")) AND (LIMIT-TO (LANGUAGE , "English"))

and looked at the phrase in question in the document's title, abstract, and any relevant keywords. Psychology was the only field of interest, and the only language used was English. Somewhere among the materials that were found, animal aided treatment and mental health were referenced. From 2001 through 2021, the research was conducted. In order to gather data, Microsoft Excel was employed We utilised Scopus analysis' online tool to display the most popular topic areas. R-studio script was built to uncover the most popular subjects, such as the most popular keywords, subject categories, and authors.

Selection of search keyword for bibliometric analysis	
Primary Keyword	"Animal assisted therapy"
Secondary keyword using (AND)	"Mental health"

2.2 Outcomes of initial search

Table 1 displays the total number of articles connected to the research that have been found in the Scopus database. According to the language used, they are studied further. More than forty-six papers were found.

There are 43 publications in English, followed by two in French, and one in Russian, according to the data.

Publication language	Number of publications
English	43
French	2
Russian	1

Source: <http://www.scopus.com> (12th December 2021)

2.3 Published results based on the top 20 search terms

After doing a search, further keywords are discovered. Table 2 and Figure 1 show the top 15 keywords. As a result, "animal aided treatment" appears more often and is used more widely than any other keyword. The articles in a certain study topic may be filtered and picked by using the right combination of keywords.

Table 2: Keyword Trends	
Words	Occurrences
animal assisted therapy	29
Human	21
mental health	18
Female	16
Humans	15
Male	15
Article	12
Adolescent	11
animal	10
animals	10
treatment outcome	10
dog	8
anxiety	7
child	7
controlled study	7
procedures	7
quality of life	7
adult	6
aged	6
nonhuman	6

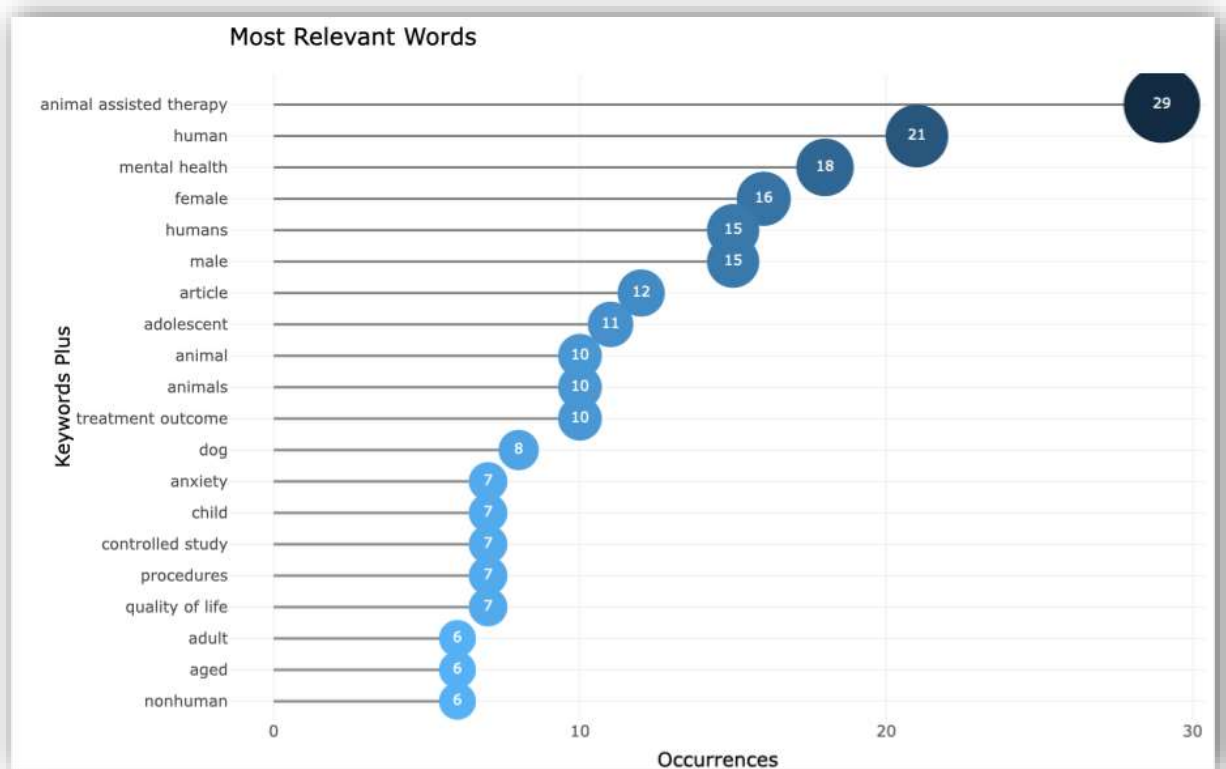


Figure 1: Keywords trend

Source: <https://www.scopus.com>(12 December 2021)

III. Analysis of Performance

R-Studio is used for database analysis, as well as for Scopus analysis. In terms of co-citations, co-occurrences, bibliometric couplings, and the like, it's a really efficient and precise tool.... Analyzing databases involves the use of the following sorts of analysis.

Databases' Statistical Analysis

1. Document through sources
2. Document through year
3. Document through subject area
4. Document through type
5. Document through country
6. Document through author
7. Document through affiliation
8. Document through top funding agencies

Databases' Network Analysis

1. Co-authorship: Organization, country, authors
2. Co-occurrence: Author keywords, Index keywords, All keywords
3. Citation Analysis: authors, Organization, sources, country
4. Bibliographic coupling: Authors, Documents

IV. RESULT AND DISCUSSION

This section includes a full Bibliometric analysis to help us to comprehend the literature and its variety, as well as use keywords related to Mental Health and Animal Assisted Therapy to discover more about researchers and their work. Visuals such as various charts and graphs are used to show the range of research based on countries and geographic locations. Aside from the connections of organizations and institutions, it is also carried out.

Two types of methods/analysis for conducting the Bibliometric analysis for Animal Assisted Therapy and Mental Health are there:

- **Statistical analysis** is mostly based on country contributions to the study area, subject contributions, author contributions, author's collaboration, source type, and source titles.
- **Network analysis** majorly depends on publication title, keywords, the year of publication, geographical areas, origin of a title, and participation in authors, the number of citations, etc.

4.1 Analysing Statistically

4.1.1 Document Analysis by Source

The source type of scholarly article refers to the location of the original work's publication. The database identifies a variety of sources, including conferences, journals, book chapters, and reviews, for example. According to the quantity of documents produced each year, various sources are shown graphically (see Figure 2).

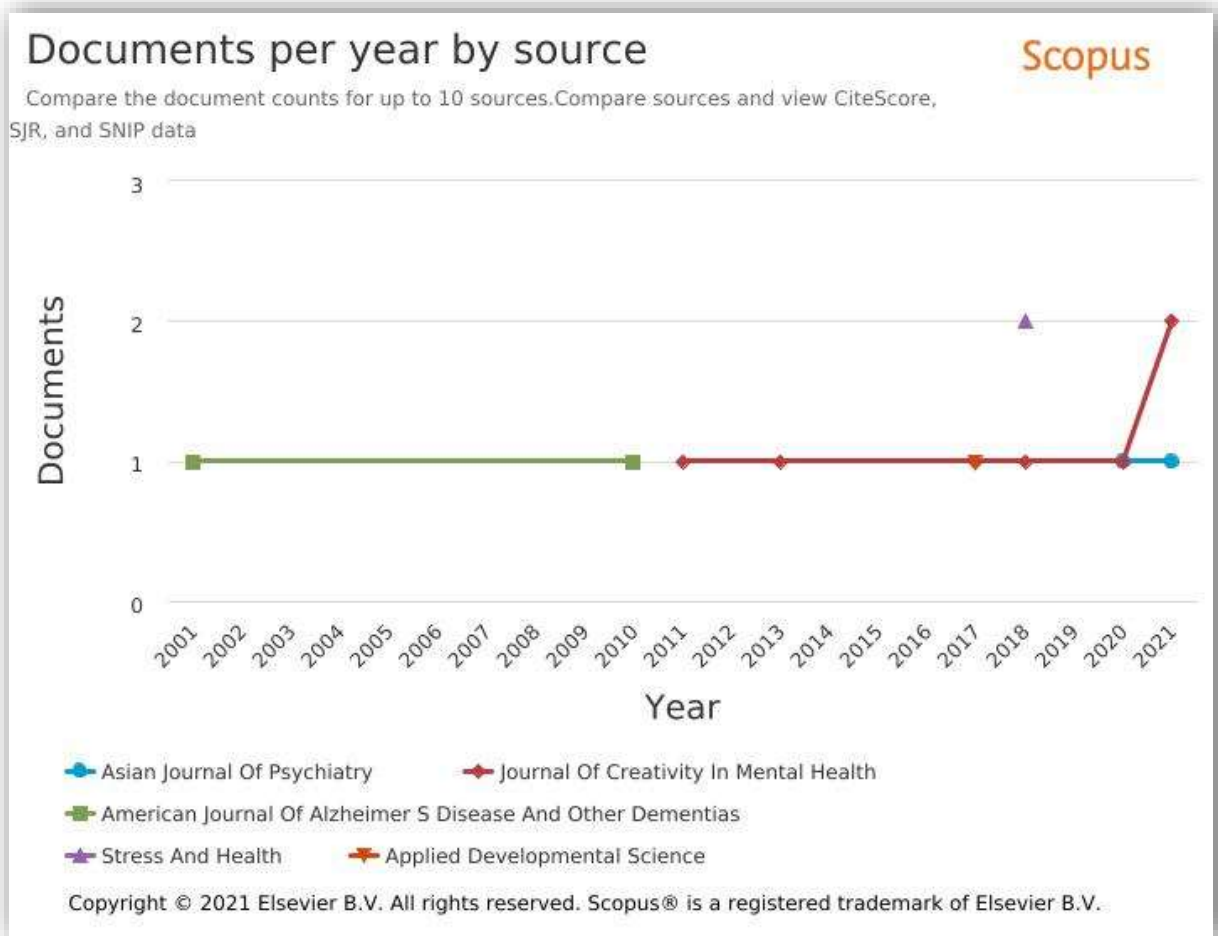


Figure no. 2: The Document as per year

Source: <https://www.scopus.com> (12 December 2021)

4.1.2 Documents Analysis through Years

From 2001 through 2021, the Scopus database contains documents from a variety of sources, including journals, chapters, book reviews, and more. There is statistical information in table 3 and a graph of the data in figure 3. There was no significant change in number of documents from the year 2001 to 2008 seen. It is observed from the analysis that there was a drastic change from the year 2008 to 2010, where rise in documents can be observed. According to the data, the year 2018 had most publications, followed by 2021. This suggests that in the years to come, there will be plenty of scope and opportunity to work in this field.

Year	count of publications	Mean T C per Art	Mean T C per Year	Citable Years
2021	6	0.666666666666667		0
2020	5	4.2	4.2	1
2019	4	2.5	1.25	2
2018	6	11.1666666666667	3.72222222222222	3

2017	4	20	5	4
2016	1	0	0	5
2015	2	11	1.83333333333333	6
2014	2	39.5	5.64285714285714	7
2013	1	9	1.125	8
2012	2	160.5	17.8333333333333	9
2011	2	6	0.6	10
2010	4	18	1.63636363636364	11
2009	1	214	17.8333333333333	12
2008	0	0	0	0
2007	0	0	0	0
2006	0	0	0	0
2005	1	32	2	16
2004	0	0	0	0
2003	1	20	1.11111111111111	18
2002	0	0	0	0

Source: <https://www.scopus.com> (12thDecember 2021)

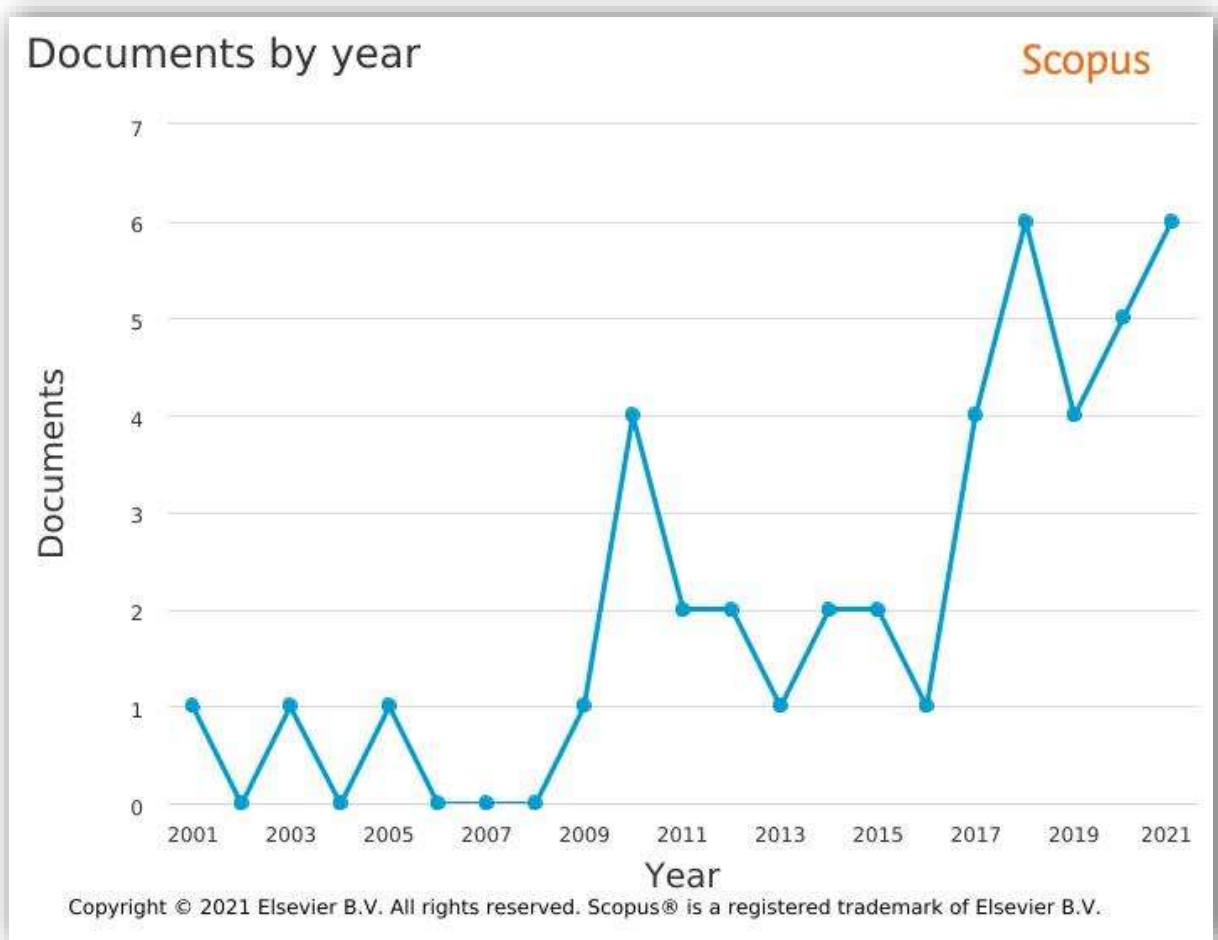


Figure no. 3: Documents through the years

Source: <https://www.scopus.com> (12th December 2021)

4.1.3 Document through the subject area

The pie chart of Figure 4 demonstrates the information about the subject area under which animal assisted therapy was published. Psychological studies account for 51.8 percent of the total number of articles published on this issue, followed by medical, social, art, and humanities, health professions, neuroscience, and nursing at 27.7 percent, 8.4 percent, and 2.4 percent, respectively. The main reason for having highest number of publications in psychology is that, animal assisted therapy is majorly done in mental health which is core part of psychology.

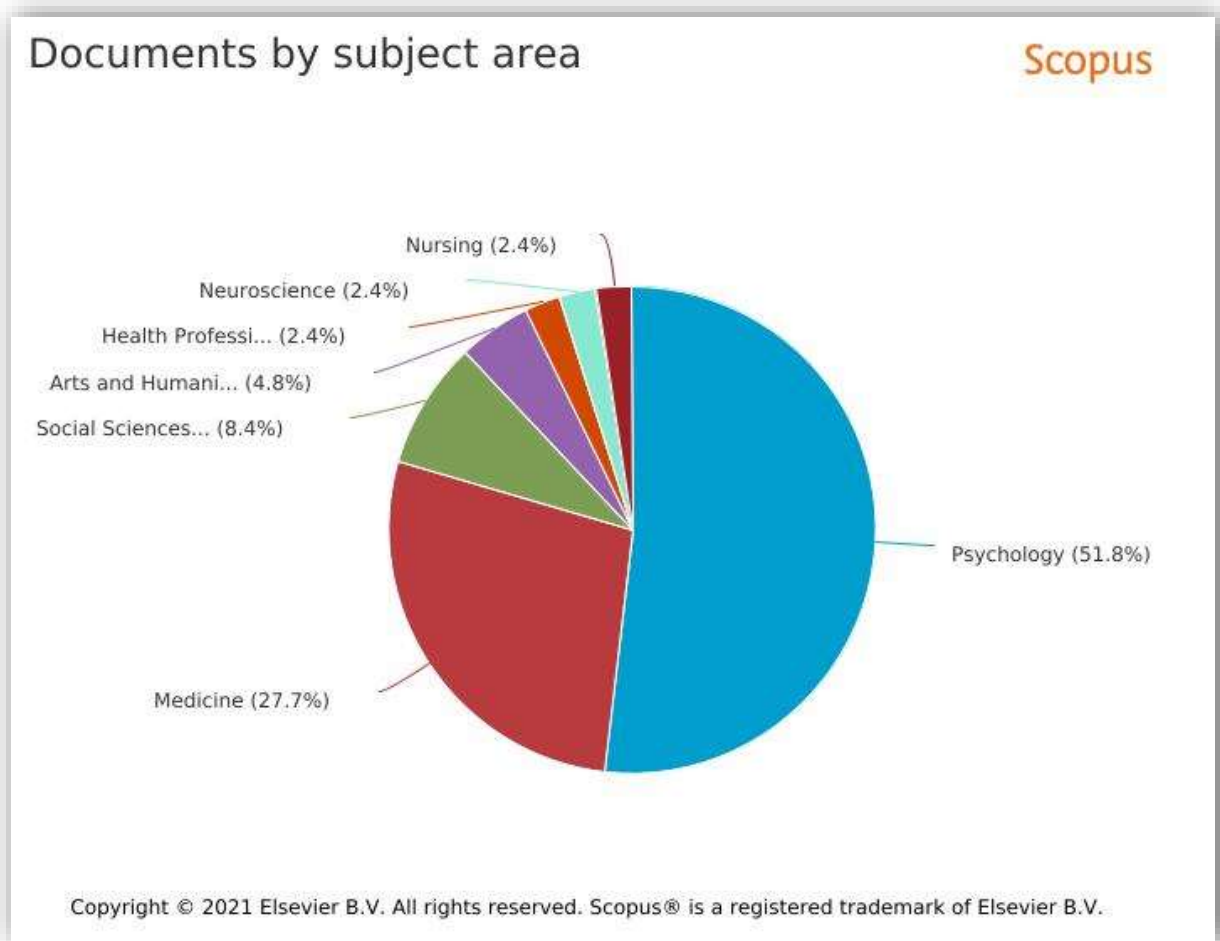


Figure no.4: Analysis of documents through the subject area

Source: <https://www.scopus.com> (12th December 2021)

4.1.4 Documents through type

As can be seen in Table 4 and Figure 5, research on animal-assisted therapy and mental health has been taken from the Scopus database, with journal articles accounting for 62.8% of the total number of publications, followed by book chapters and reviews accounting for 11.6%. There are just a few new additions to the overall numbers of papers, including books, editorials, and letters.

S. no.	Type of Document	Publications
1	Article	27

2	Book chapter	5
3	Review	5
4	Editorial	2
5	Book	2
6	Letter	2

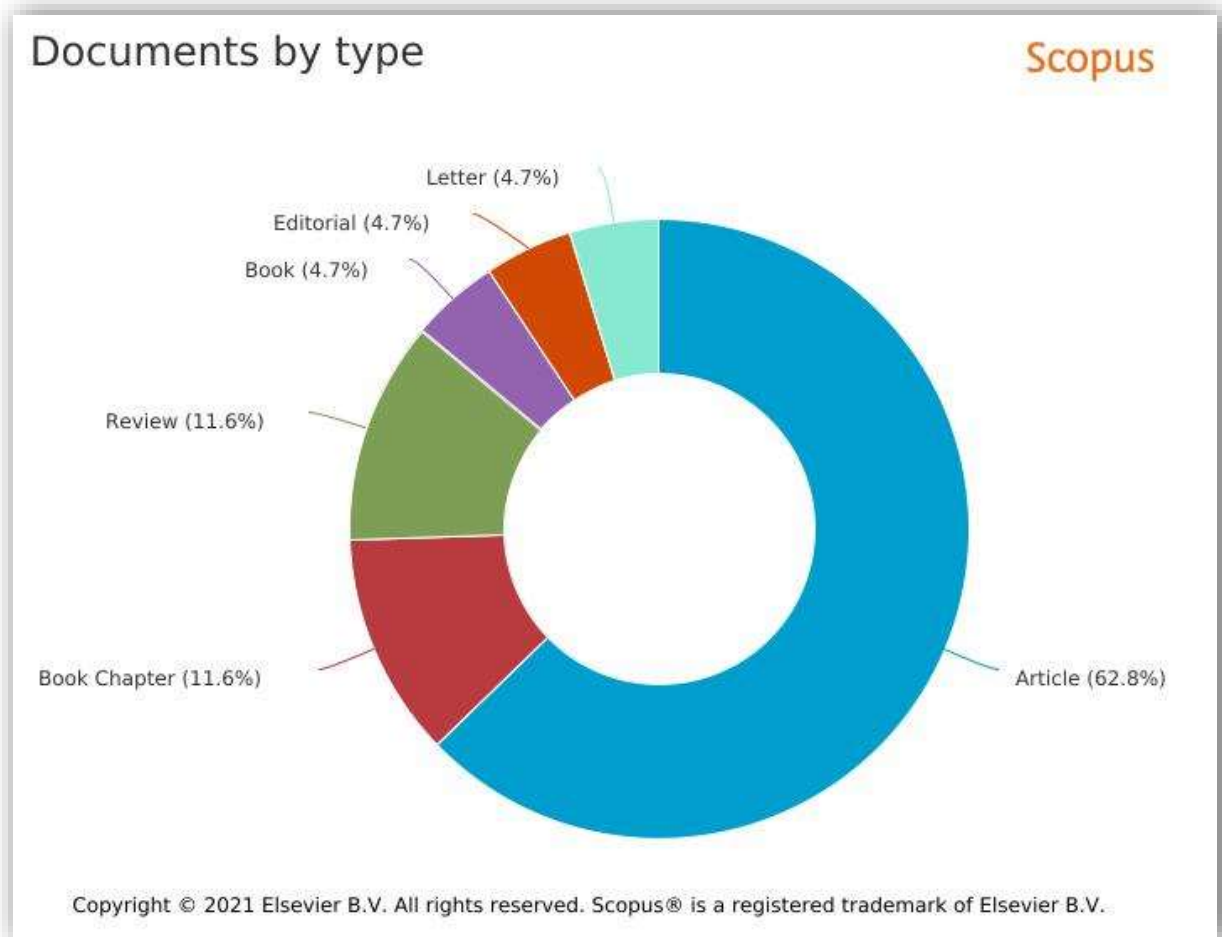


Figure 5: Document's analysis by Type

Source: <https://www.scopus.com> (12th December 2021)

4.1.5 Publications' analysis through country or territory

According to the number of papers published in the Scopus database, countries are evaluated. According to Figures 6 and 7, the United States is the country that publishes the most papers between elected terms. Spain, Australia, Canada, Germany, and India are the next four countries on the list.

Geographic location analysis is carried out using the Microsoft Excel Map, which requires two columns of input, such as the name of the country and the research papers' number for that nation. Once this data is supplied, based on the data it creates a geographical map, displaying the number of publications in each geo-location. India is the country where the most articles published, according to the geographical map,



Figure6: Analysis of the document by the country

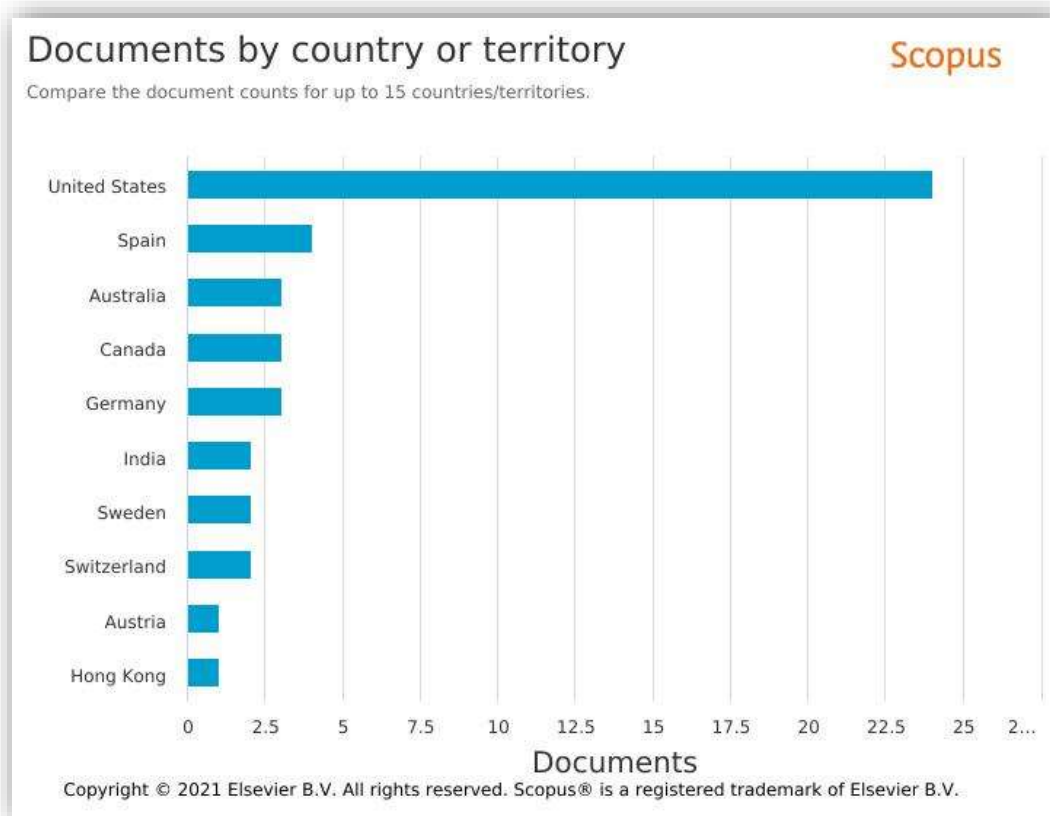


Figure no.7: Analysis of the document by the territory or country

Source: <https://www.scopus.com> (12th December 2021)

4.1.6 Documents through authors

In the study, writers who have most publications are taken into account. Total 133 authors were found and showing top 22 in the table-5 and top 15 in figure-8. Amiano N, Balluerka N, Caldenty MA and Muela A are

among the top authors with three publication each. Maximum authors have an appropriate average publication count is 1.

Table 5: Analysis of the document by author		
Authors	Articles	Articles Fractionalized
AMIANO N	3	0.70
BALLUERKA N	3	0.70
CALDENTEY MA	3	0.70
MUELA A	3	0.70
CHANDLER CK	2	1.50
ELLMO F	2	0.50
FINN-STEVENSON M	2	1.33
HEDIGER K	2	0.67
HOLMAN LF	2	0.50
STEWART LA	2	0.58
WILKERSON S	2	0.50
ACRI M	1	0.25
ALIRI J	1	0.20
ANDERSON B	1	0.14
BAIER MEM	1	0.20
BAILEY TK	1	1.00
BATES KL	1	0.14
BEETZ A	1	0.25
BILLERA DM	1	0.14
BRENNER LA	1	0.14

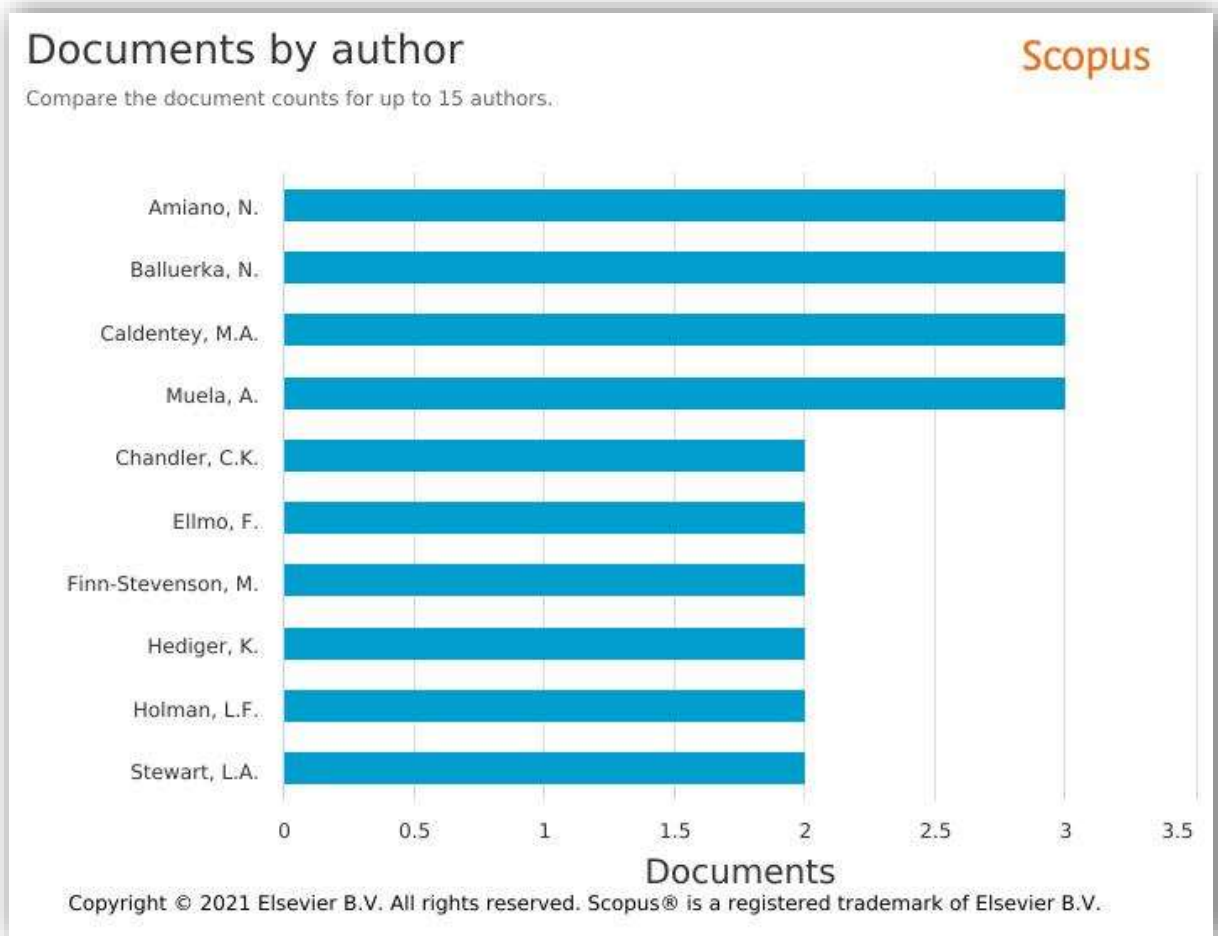


Figure no. 8: Analysis of the document through the authors

Source: <https://www.scopus.com> (12thDecember 2021)

4.1.6 Documents through Affiliation

According to the connections of universities and organizations the donations are shown in figure 9. In this study, the top 10 affiliations are taken into account. It lists the top 10 organizations that have made significant contributions to the field of animal-assisted therapy and mental health research during the last decade. It is found that, Anotheis among the top affiliation followed by Universidad del Pais Vasco, Yale school of medicine and so on.

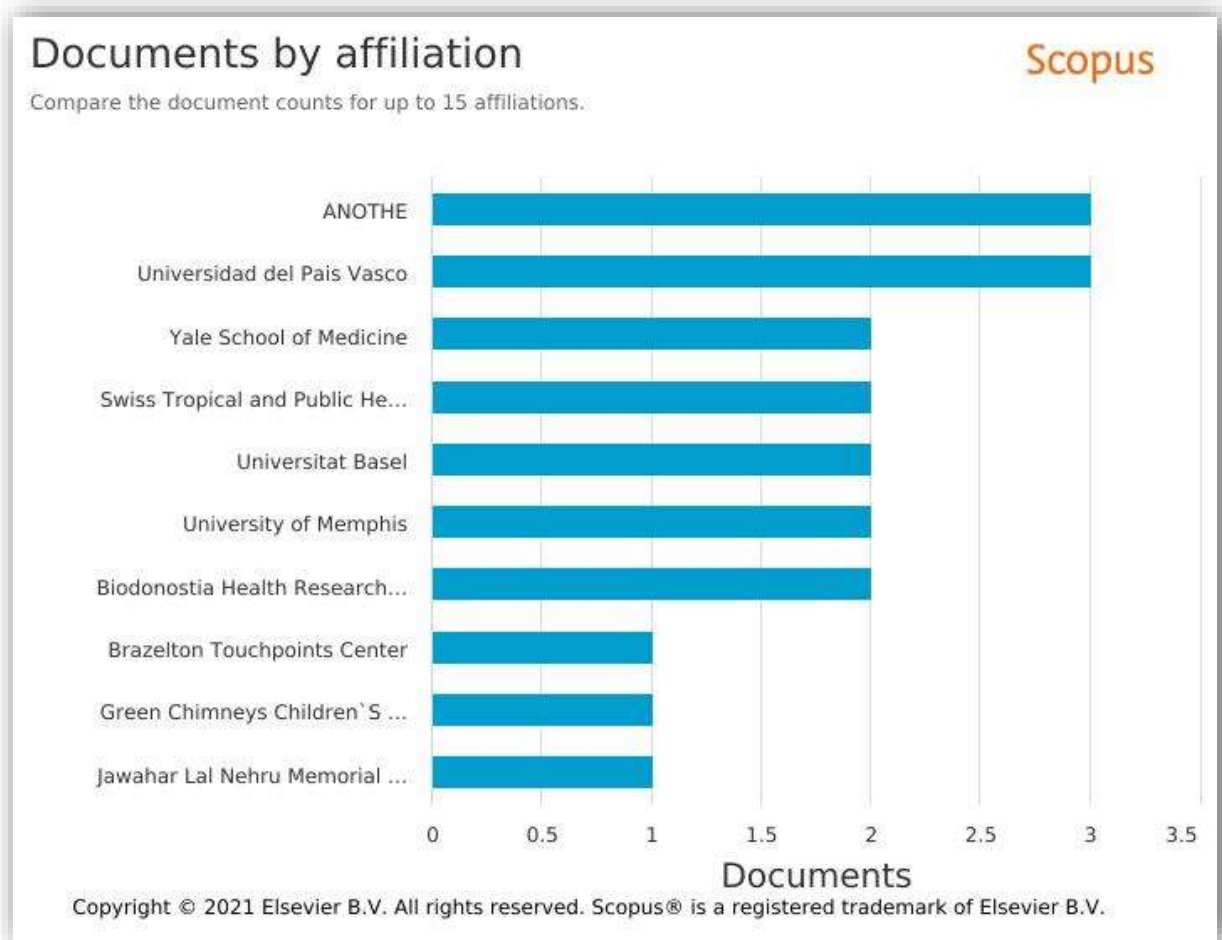
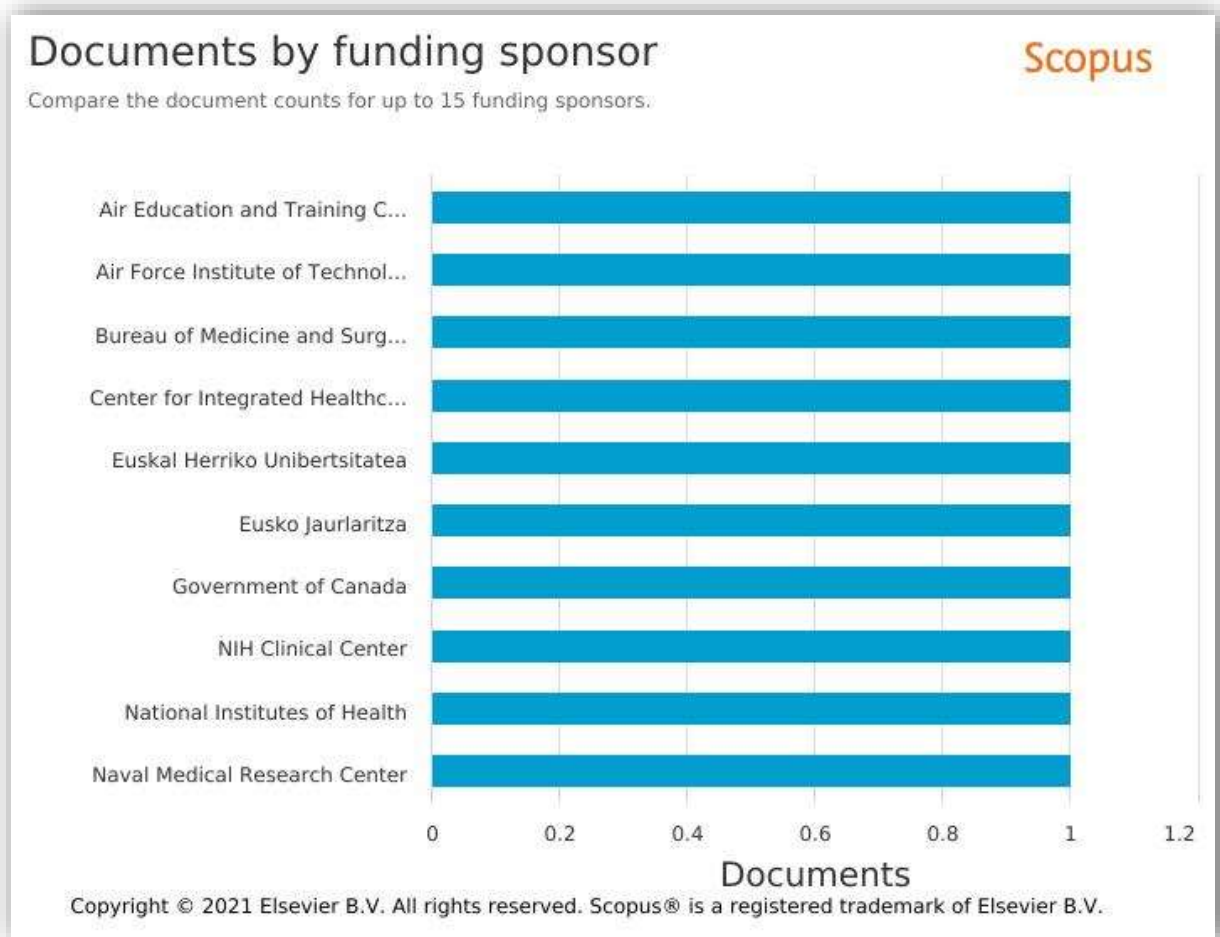


Figure no.9: Analysis of the document through affiliation
Source: <https://www.scopus.com> (12th December 2021)

4.1.8 Analysis through Funding Sponsors

Figure-10 depicts the results of a study based on the financial sponsors of publications. In this case, Air education and training command is among the top funding sponsors followed by the Air force institute of technology. The least funded sponsor is the Naval medical research center.



Figureno. 10: Analysis of the document through the funding sponsor

Source: <https://www.scopus.com> (12th December 2021)

4.2 Network Analysis

Network analysis shows the interrelationships between the many variables that go into the calculation. In network analysis, the graphical figure is shown. Numerous network analysis diagrams in this article are created using VOSviewer.

VOSviewer is a free utility that may be obtained by visiting the VOSviewer website. The computable parameters may be analyzed using VOSviewer utilizing a Bibliometric network. The VOSviewer requires a comma-separated value file, often known as.csv file, as input. VOSviewer supports three types of visualization analysis: network visualization, overlay visualization, and density visualization.

Figures below shows, a visualization of the keywords and source titles derived from the Scopus database. Circles in the diagram indicate the keywords derived from the source's title. The size of the circle represents the term's frequency of occurrence. The distance between the circles represents the strength of the connection between the words, with a smaller distance suggesting a stronger link and a larger distance indicating a weaker relationship. The colors used to symbolize the terms that are closely linked are the same. Colors are used to symbolize the various groupings. The weight of keywords is used to define the size of the circle and the label

that represent the actual keyword. The larger label size reflects terms with a higher weight. The lines reflect the connections between the words.

4.2.1 Analysis of Co-authorship

a) Co-authorship on the basis of authors

This analytical parameter is examined in conjunction with three other parameters. For this parameter, authors, organizations, and nations are taken into account.

This study excludes documents with a significant number of authors. According to some estimates, the number is 25. If an author produces three documents, they are said to have crossed the threshold.

Only four writers out of a total of 133 authors matched the criteria. With the help of additional writers, the overall strength of co-authorship is computed. The network strengths are obtained using this approach; AMIANO N, BALLUERKA N, CALDENTEY MA, and MUELA A are found to have the greatest link strength of 9 with the overall count of 57 citation for 3 different documents. Only four writers were discovered to have a relation of co-authorship. As a result, they are just shown in Figure 11. Because there was no relationship between 129 writers in terms of co-authorship, they were eliminated.

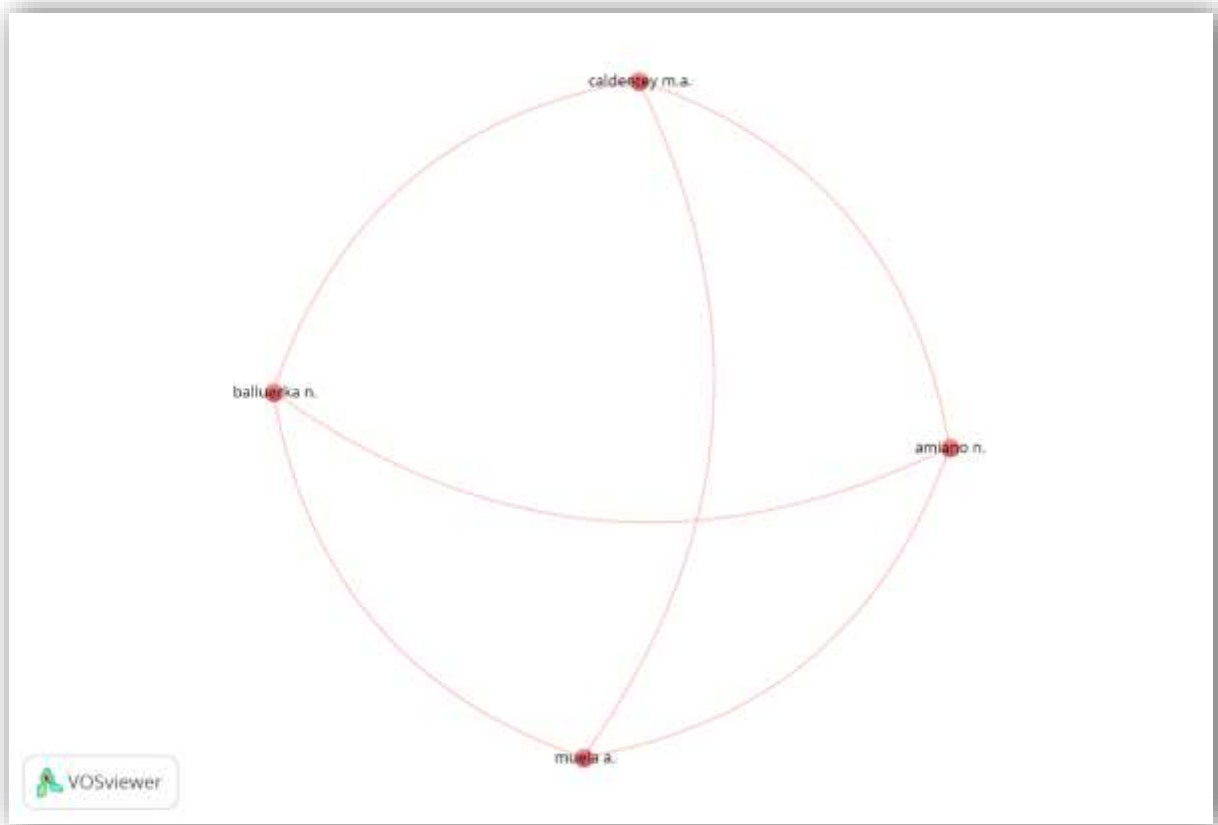


Figure no.11: Co-authorship network analysis on the basis of authors

Source: <https://www.scopus.com> (13thDecember 2021)

B) Co-authorship on the basis of organizations

Co-authorship as in unit of organization is estimated using a minimum of 01 articles in organizations without taking into consideration citations. Out of a total of 100 organizations, 80 matched the criterion, as shown in Figure 12. All five organizations have the greatest link strength of 4, with the maximum citation of 3, as seen below:

- University of Colorado Boulder, Anschutz medical campus, united states.
- U.S. Air force academy, Colorado Springs, united states, CO.

- Department of systems engineering and management, Wright-Patterson AFB, Air force institute of technology. 2950 Hobson way, United States.
- Military and veteran microbiome: Denver, co, united states, consortium for research and education.
- Denver veterans' affairs medical center. Denver. co. united states.

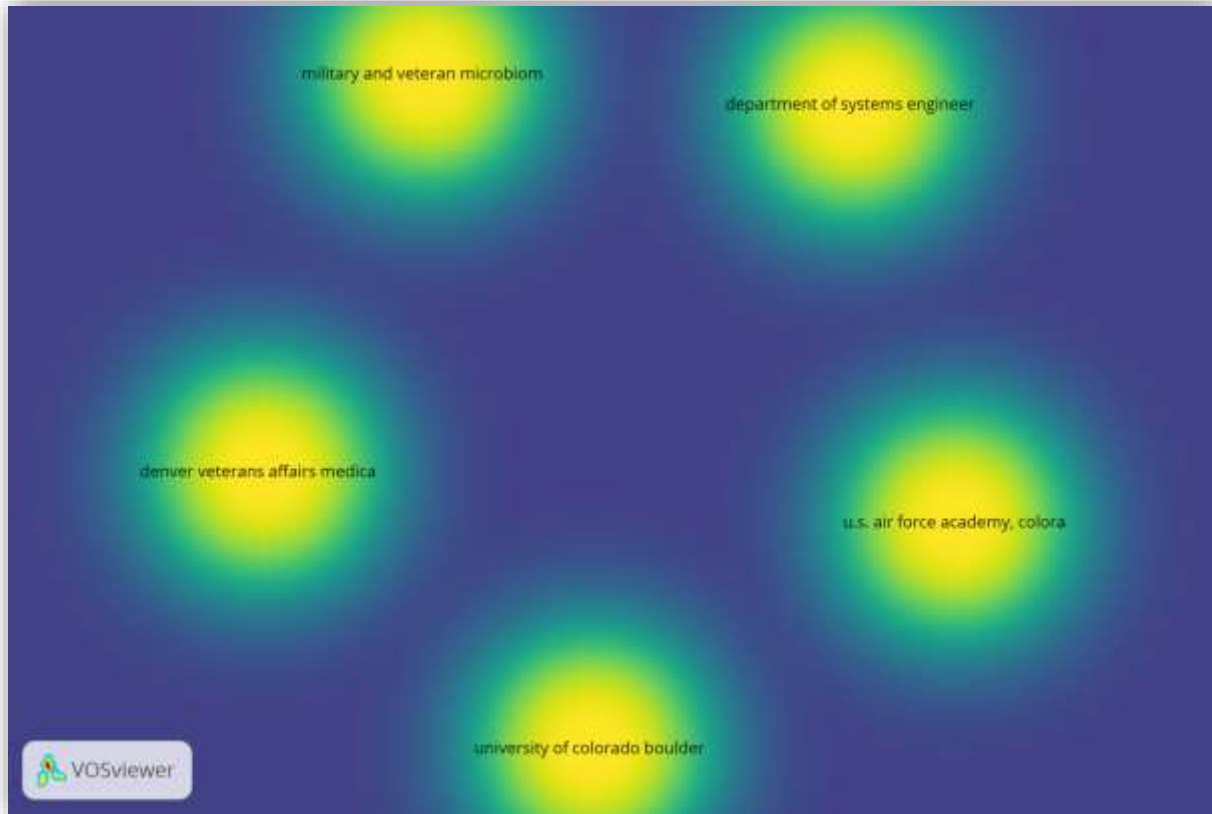


Figure no.12: Co-authorship network analysis on the basis of the organization (highest link strength)
Source: <https://www.scopus.com> (13thDecember 2021)



Figure no. 14: Co-authorship network analysis on the basis of Countries
Source: <https://www.scopus.com> (13th December 2021)

4.2.2. Network Analysis: co-occurrence

A) Co-occurrence analysis on the basis of all keywords

For analysis of co-occurrences, different keywords are considered. Number of occurrences in the keywords is considered 5. Out of 355 keywords 22 met the threshold as shown in figure-15.

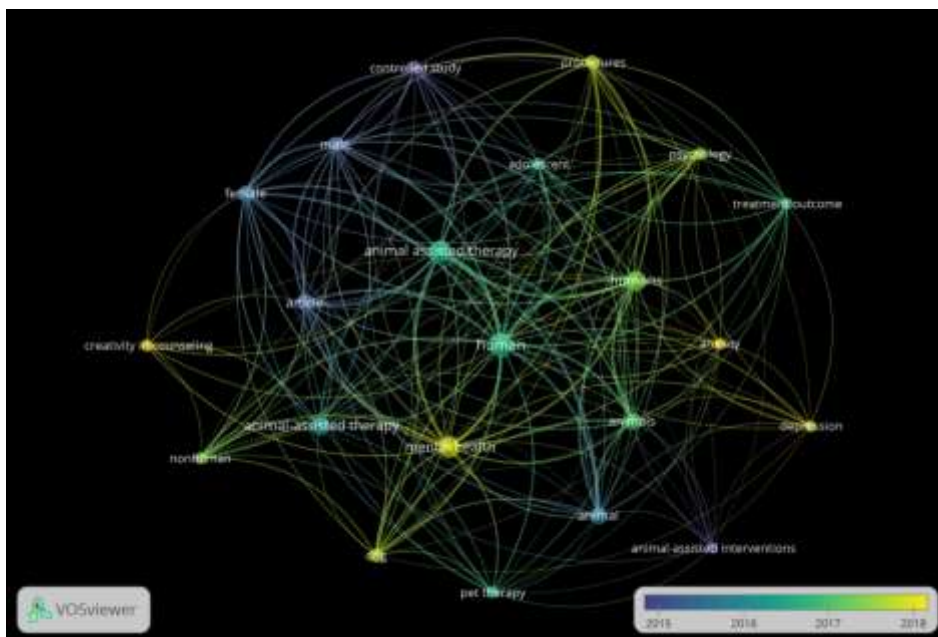


Figure 15: Co-authorship network analysis on the basis of co-occurrence(all the keywords are included)
Source: <https://www.scopus.com> (13thDecember 2021)

B) Co-occurrence analysis on the basis of author keywords

With a lower threshold of 5 per author, the co-occurrence on the basis of author keywords is examined. As indicated in figure-16, four keywords out of 106 by the writers fulfilled the requirement.



Figure 16: Co-authorship network analysis on the basis of co-occurrence (author keyword)
Source: <https://www.scopus.com> (13th December 2021)

C) Co-occurrence on the basis of index keywords

Figure-17 shows which only 17 of the 256 index phrases met the condition for co-occurrence.

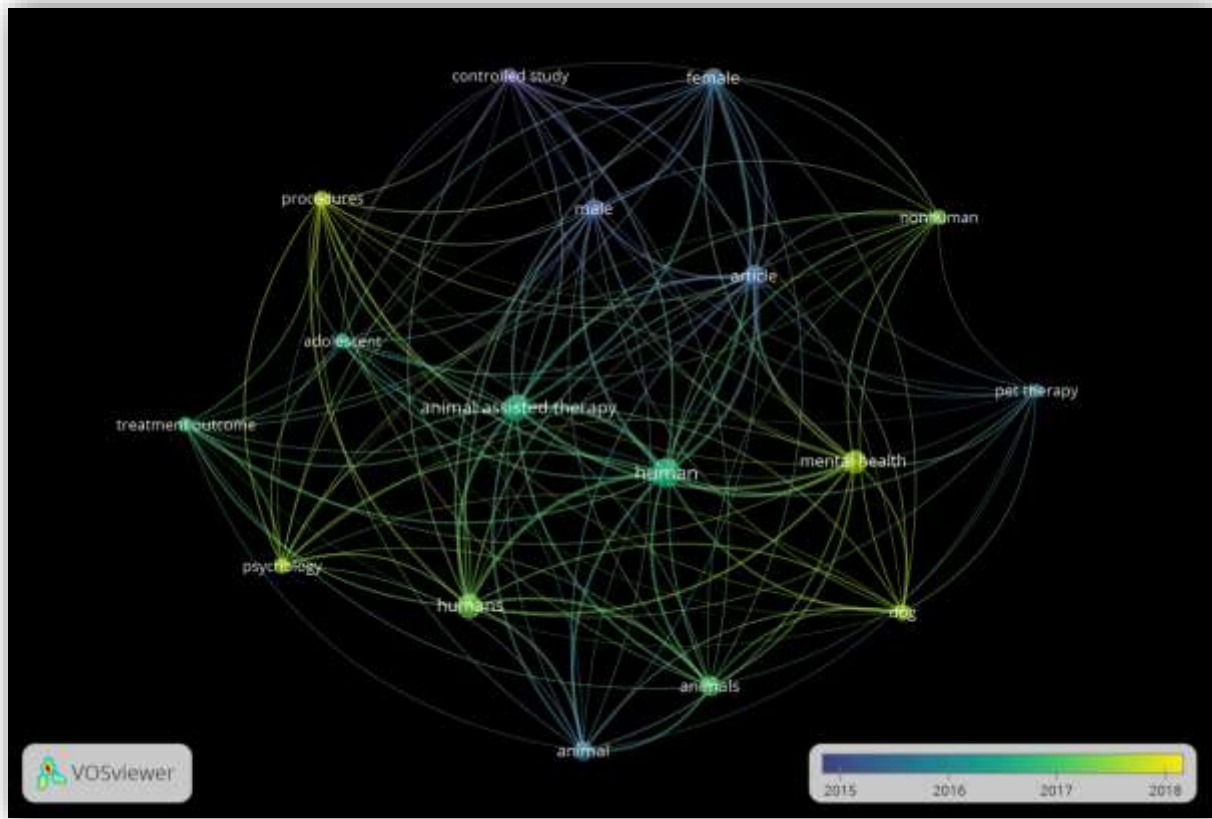


Figure 17: Co-authorship network analysis on the basis of the co-occurrence. (Index keyword)
Source: <https://www.scopus.com> (13th December 2021)

4.2.3. Network analysis: citations

Network analysis shows how computation is related to each of the variables that make up its value. The graphical representation serves as a visual depiction of network analysis. Documents, sources, authors, the nation, and organization are the units of analysis in this study.

A) Citation Analysis: Documents

A minimum of five citations is required for each of the 43 texts. As a result, 23 papers were found to be relevant. While Lanning B.A. (2014) has the most citations (48), Balluerka n. (2014) has the greatest link strength (figure-18), as demonstrated.



Figure 18: Co-authorship network analysis on the basis of CITATION(In term of the documents)
Source: <https://www.scopus.com> (13th December 2021)

B) Citation analysis: sources

The criterion of 5 citations per source is used to produce a citation analysis of sources. Only four of 34 sources satisfied the criteria. As shown in figure-19, the American journal of Alzheimer and other dementias has a highest citation of 138 with a minimum of two documents.



Figure 19: Network analysis of CITATION. (In term of sources)

Source: <https://www.scopus.com> (14th December 2021)

C) Citation analysis through authors

The criterion used is three citations as per author. When the minimal documents' number was adjusted to one, 101 writers out of 133 matched the criteria. Only 19 of 101 writers have a relationship or connection from one another. MIANO N, BALLUERKA N, CALDENTEY MA, and MUELA A, as shown in figure-20, got the highest and identical citation of 57.

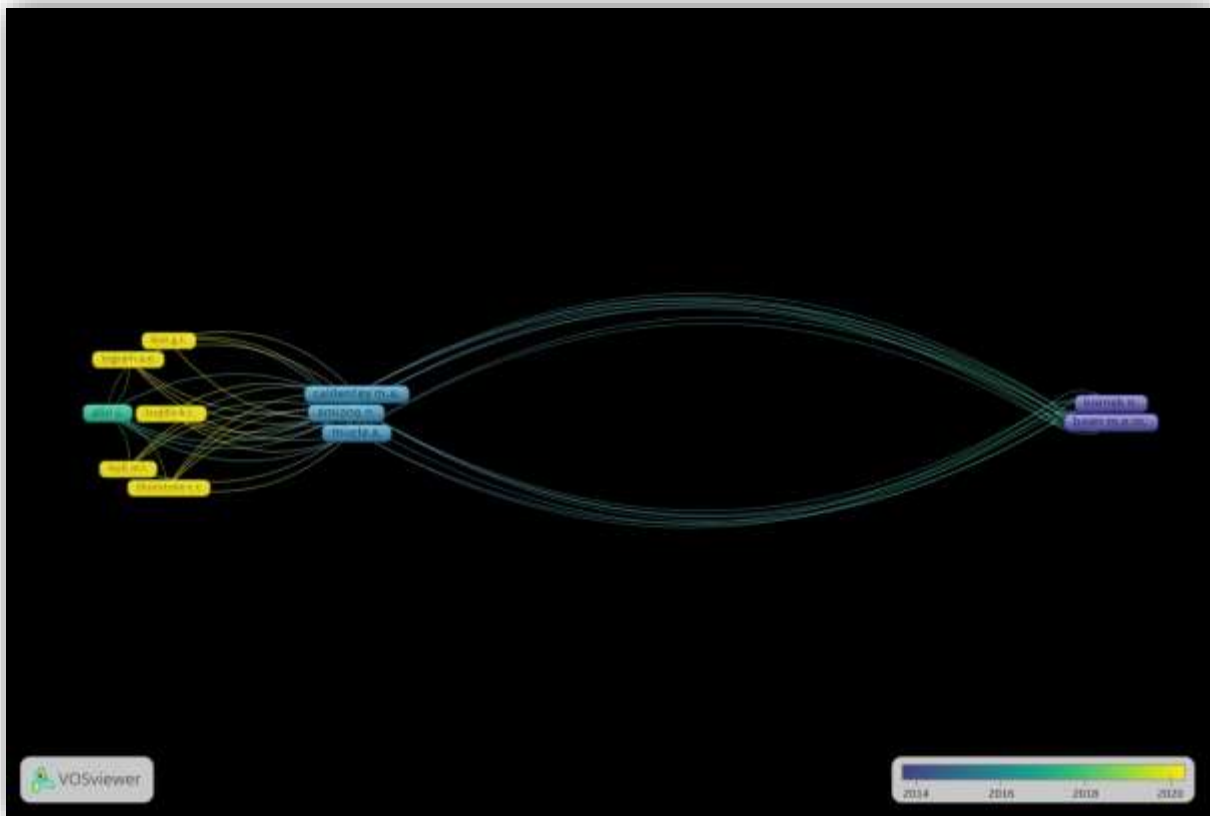


Figure 20: Network analysis of CITATION. (In term of the authors)

Source: <https://www.scopus.com> (14th December 2021)

D) Citation analysis through the organization

Out of 100 organizations, 74 fulfilled the requirement when the barrier was set to a minimum of one document and three citations. Only 19 of the 74 organizations had some form of relationship or link between them, as illustrated in Figure 21a, b, c, and d. As shown in figure-21, the connection of nature and assisted therapy, Bizkaia, Spain, Getxo, and the University of Basque upv-ehu, Spain, have the highest number of citations with 31.

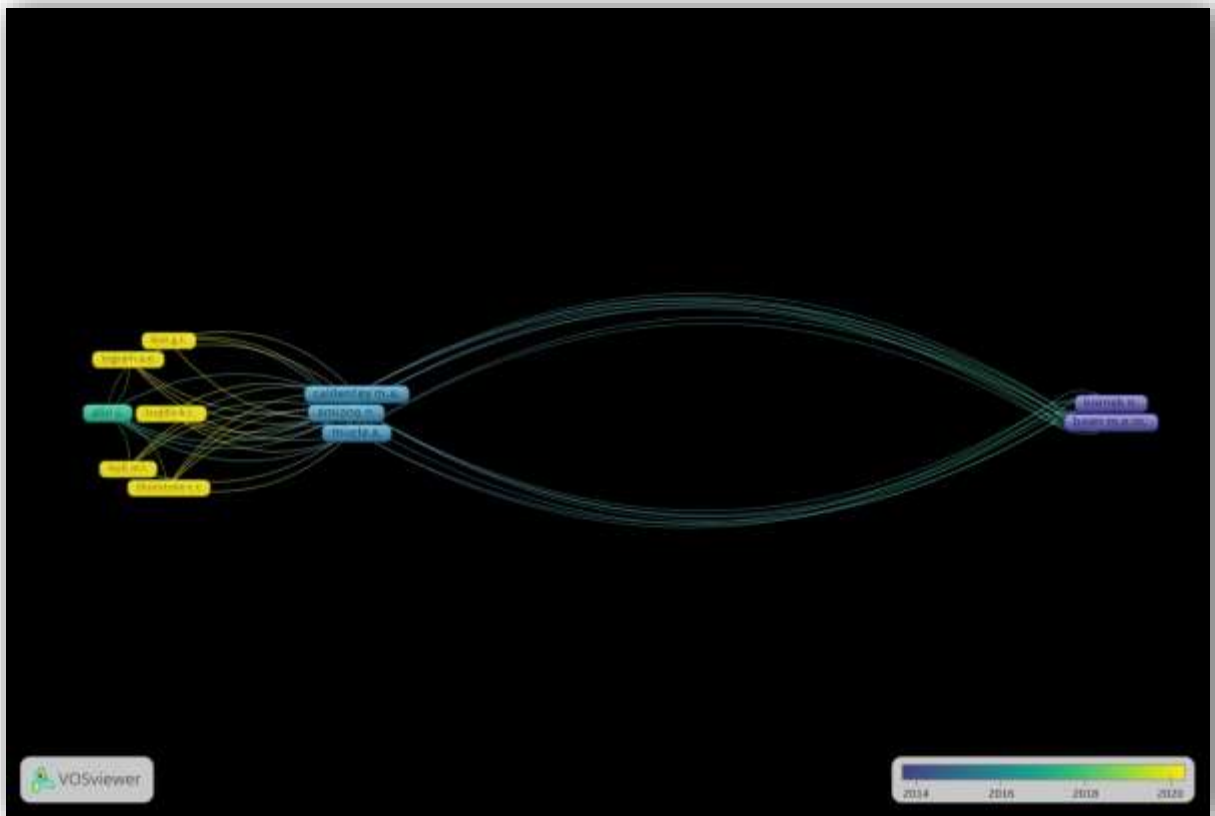


Figure: 21a

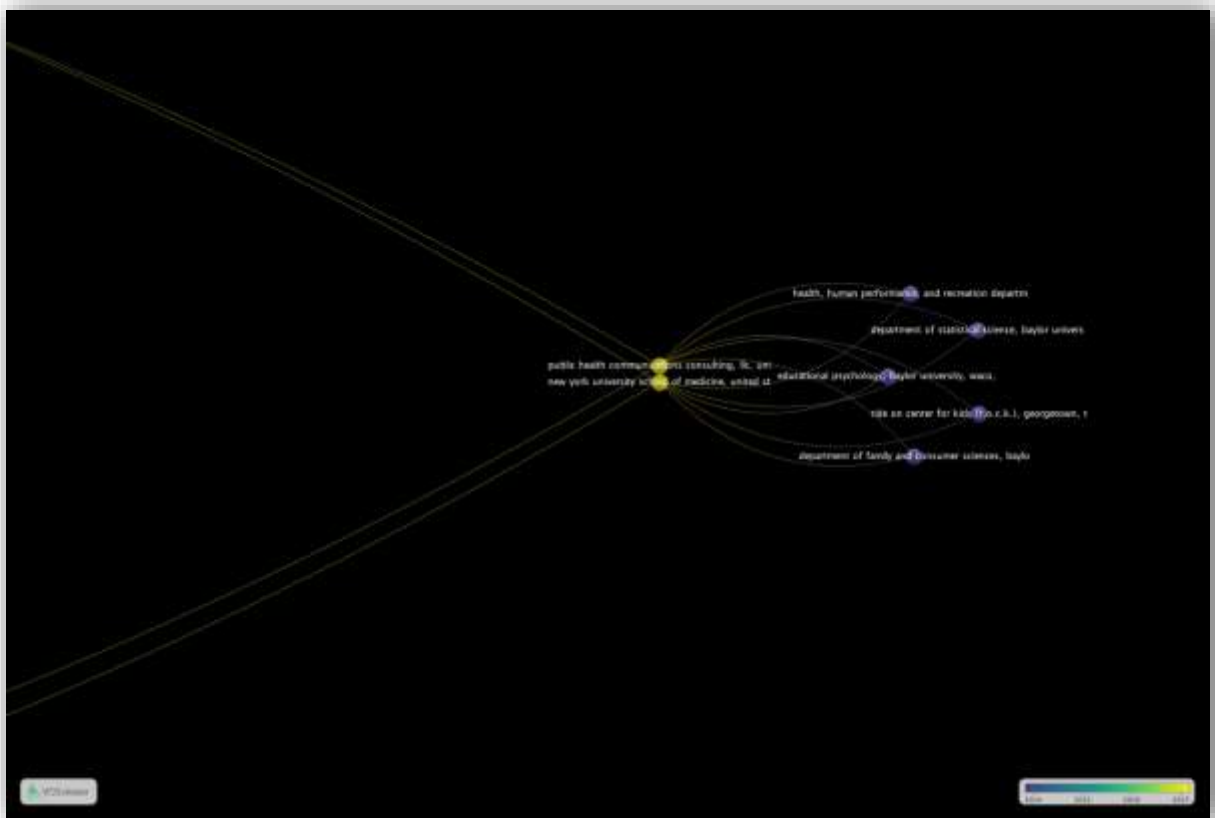


Figure: 21b

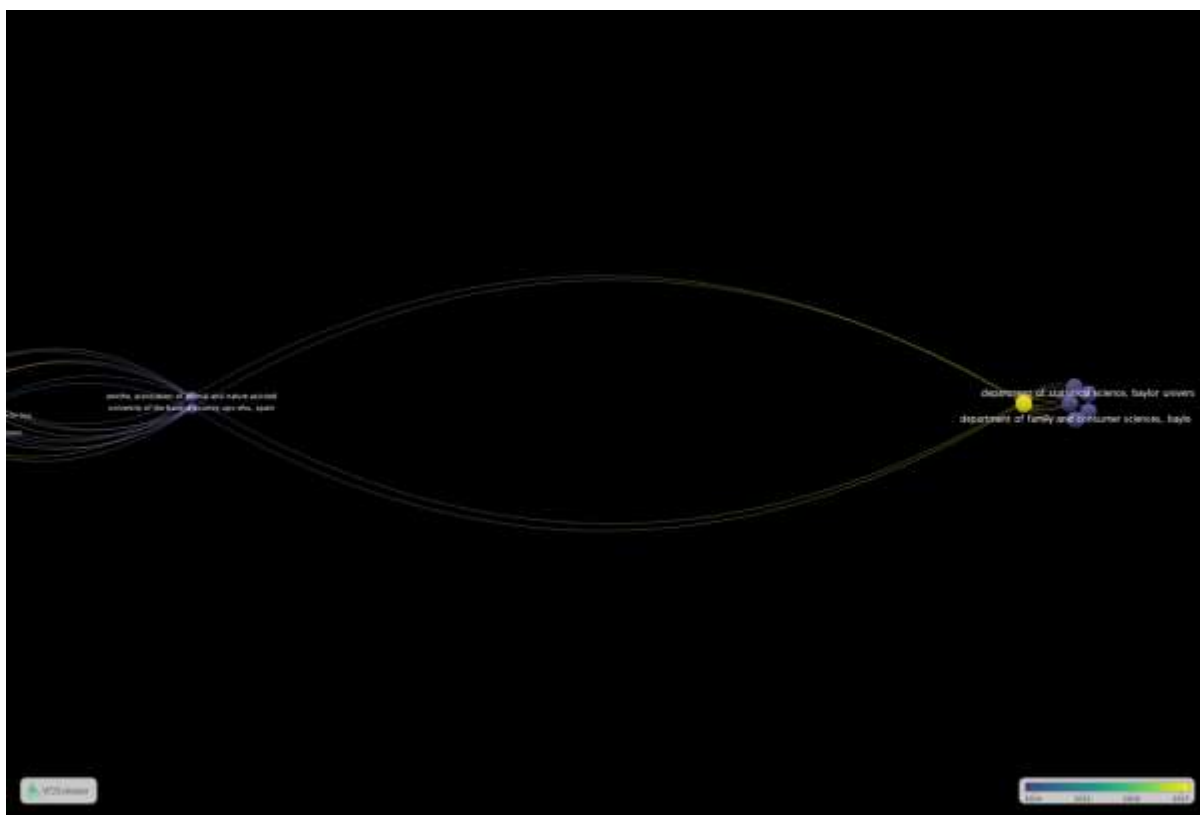


Figure: 21c

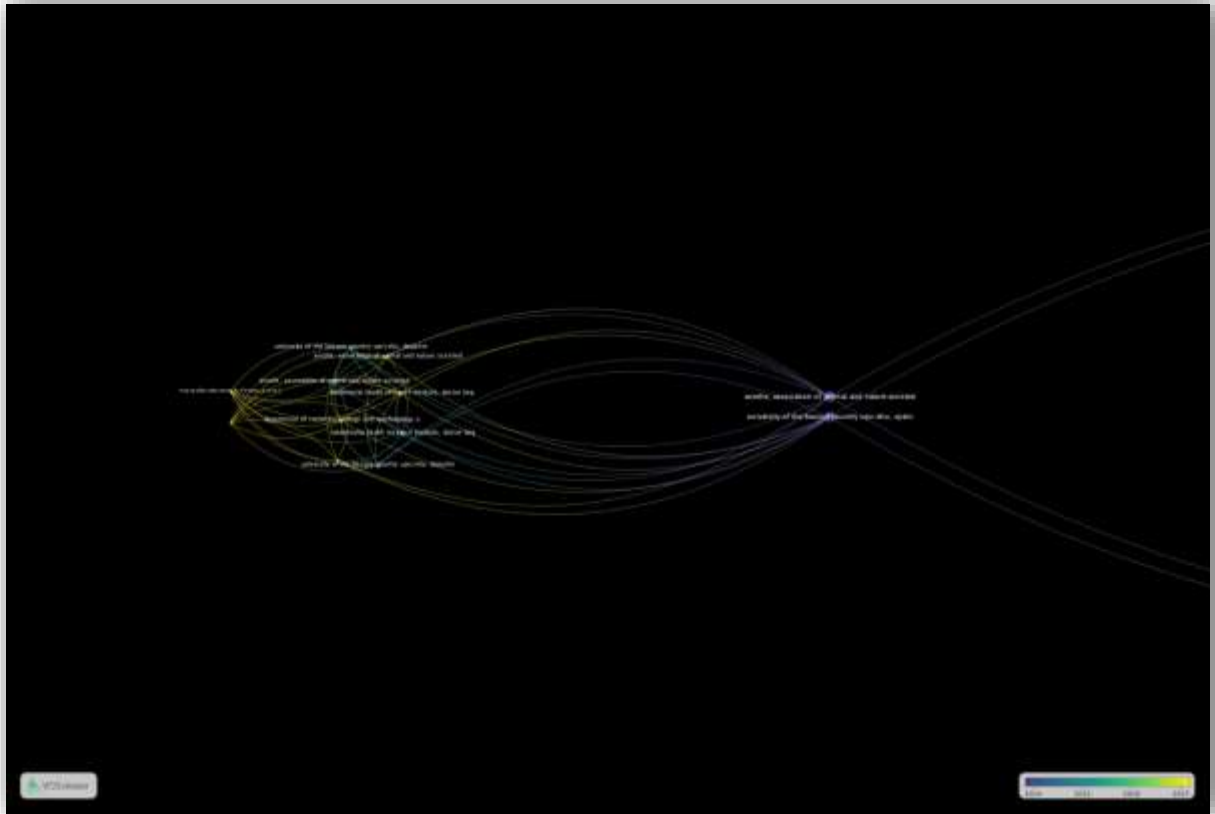


Figure: 21d

Figure 21d: Network analysis of CITATION. (In term of organization)
Source: <https://www.scopus.com> (14thDecember 2021)

E) Citation analysis on the basis of the country

Out of 14 countries has the database of work related to the animal assisted therapy. Out of which, 10 countries met the threshold of minimum one document and at least 5 citation per country. It is seen in figure-22 that only 4 of the 10 are related.

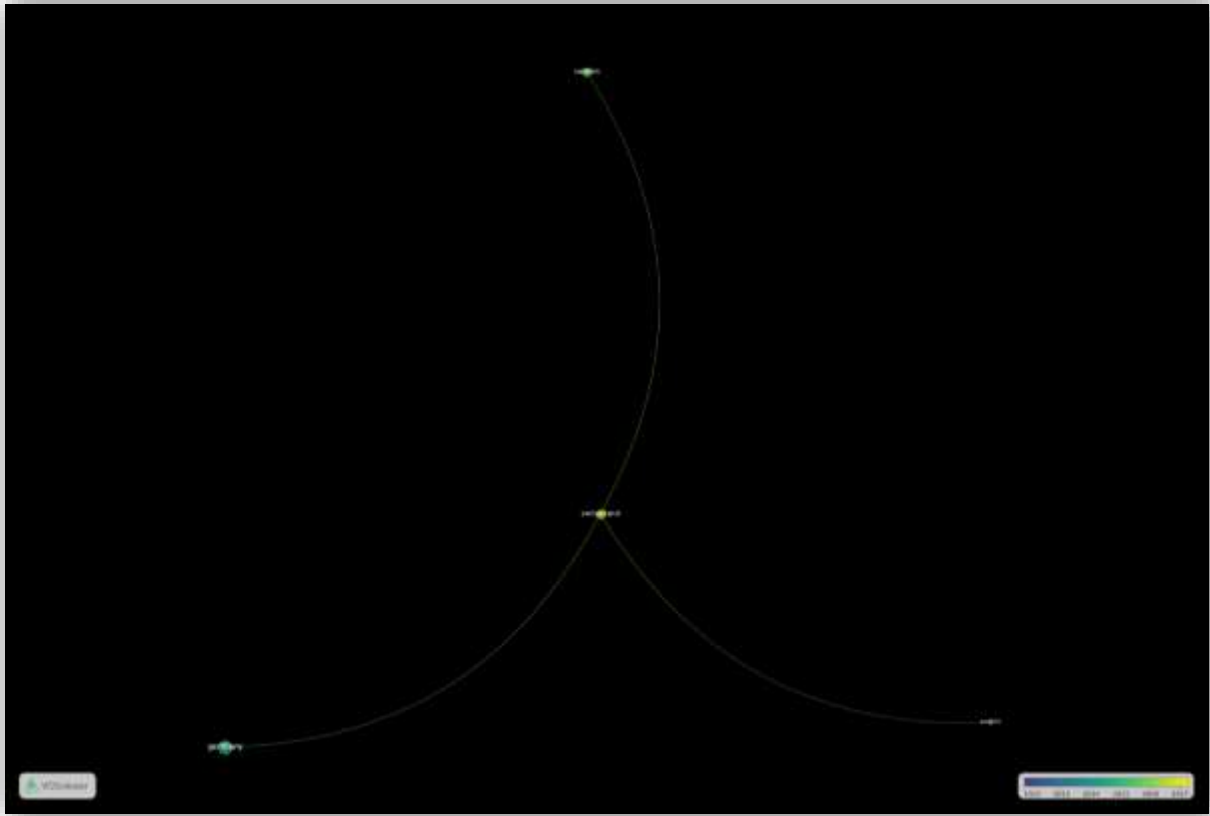


Figure-22: Network analysis of CITATION. (In the terms of the country)

Source: <https://www.scopus.com> (14thDecember 2021)

4.2.4. Network analysis: bibliographic coupling

A) Bibliographic coupling through documents

Only 28 of the total 43 papers fulfilled the minimal citation requirement of three per document. Beetz a. (2012) was having the highest link strength of 121 as well as citation of 316 as shown in figure-23.

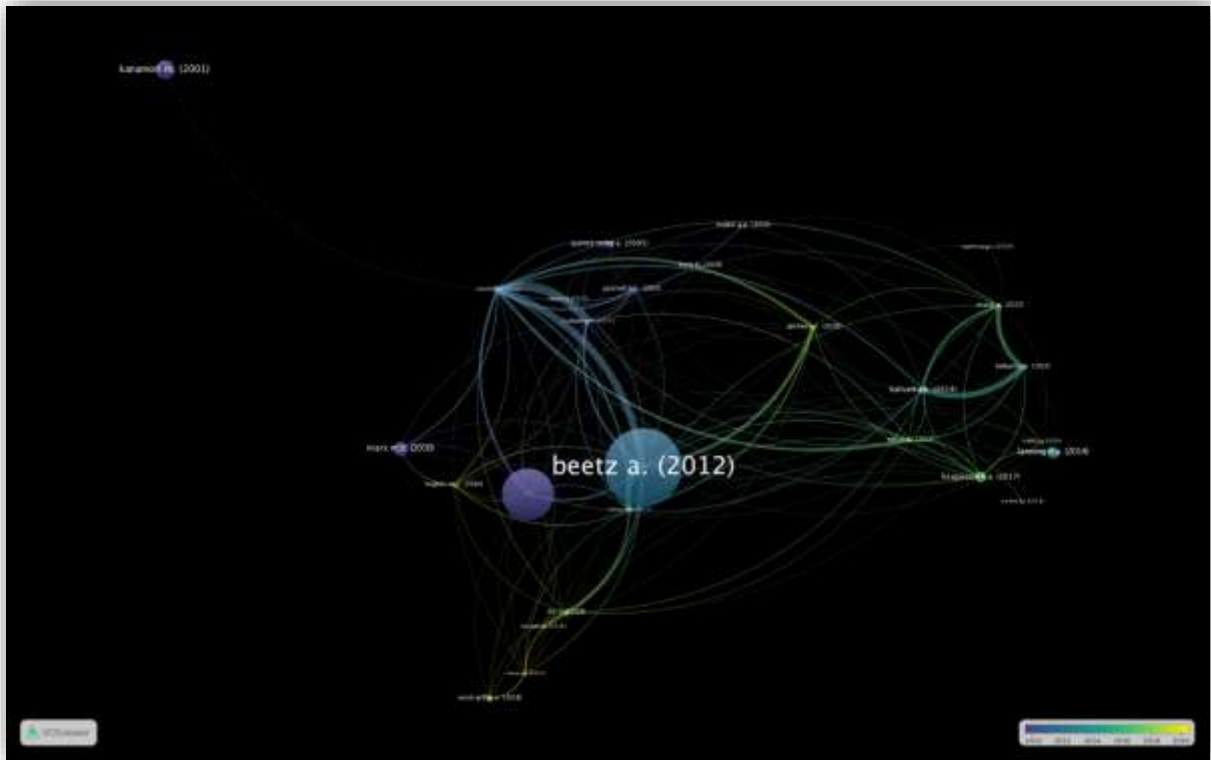


Figure no.23: Bibliographic coupling through documents

Source: <https://www.scopus.com> (14thDecember 2021)

B) Bibliographic coupling through sources

Taking a lowest threshold value of two documents per source. Only five sources out of 32 matched the criterion. Only four of the five were connected, as illustrated in Figure 24.



Figure no.24: Bibliographic coupling through the sources
Source: <https://www.scopus.com> (14th December 2021)

Bibliographic coupling through author Taken into account as a minimum of three documents per author. Only four writers out of a total of 133 matched the criteria, as shown in Figure 25.

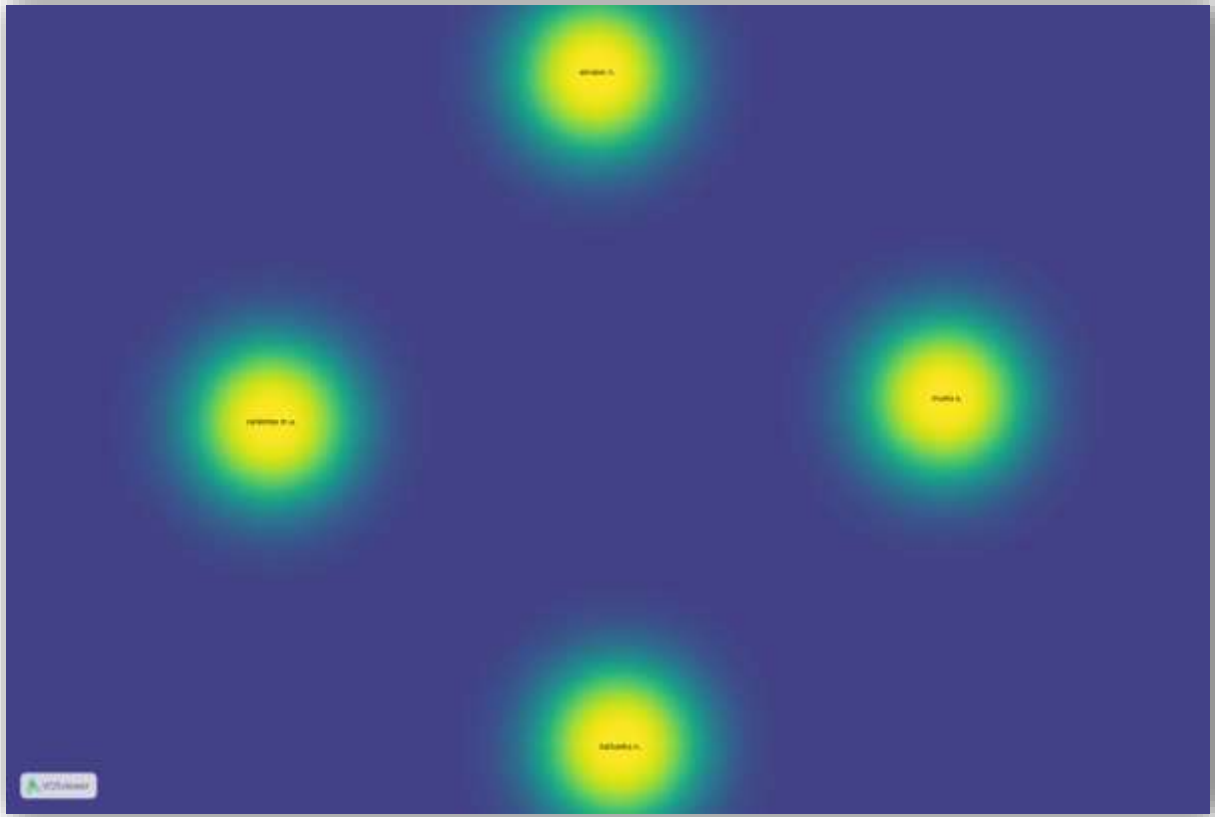


Figure-25: Bibliographic coupling through the authors

Source: <https://www.scopus.com> (14th December 2021)

C) Bibliographic coupling on the basis of the organization

Taking in consideration, 1 document and 3 citations as threshold value per organization. Out of 100 organization only 74 organization met the threshold. Among those 74 organizations only 68 had largest set of connection and only those are represented in the figure-26 below.

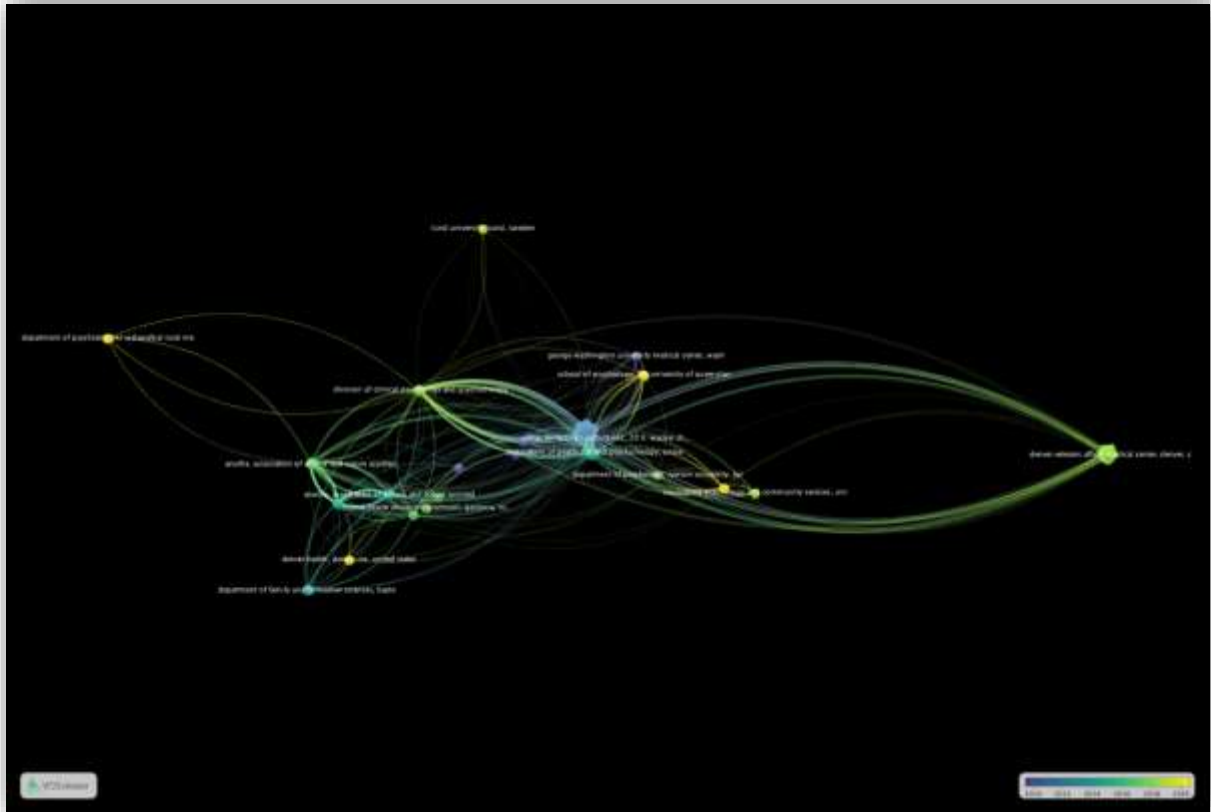


Figure no.26: Bibliographic coupling of the organization

Source: <https://www.scopus.com> (14th December 2021)

D) Bibliographic coupling on the basis country

Considering the 3 documents as threshold value as per country. Out of 14 countries only 5 countries met the threshold. Those 5 countries are represented in the figure 27 below.

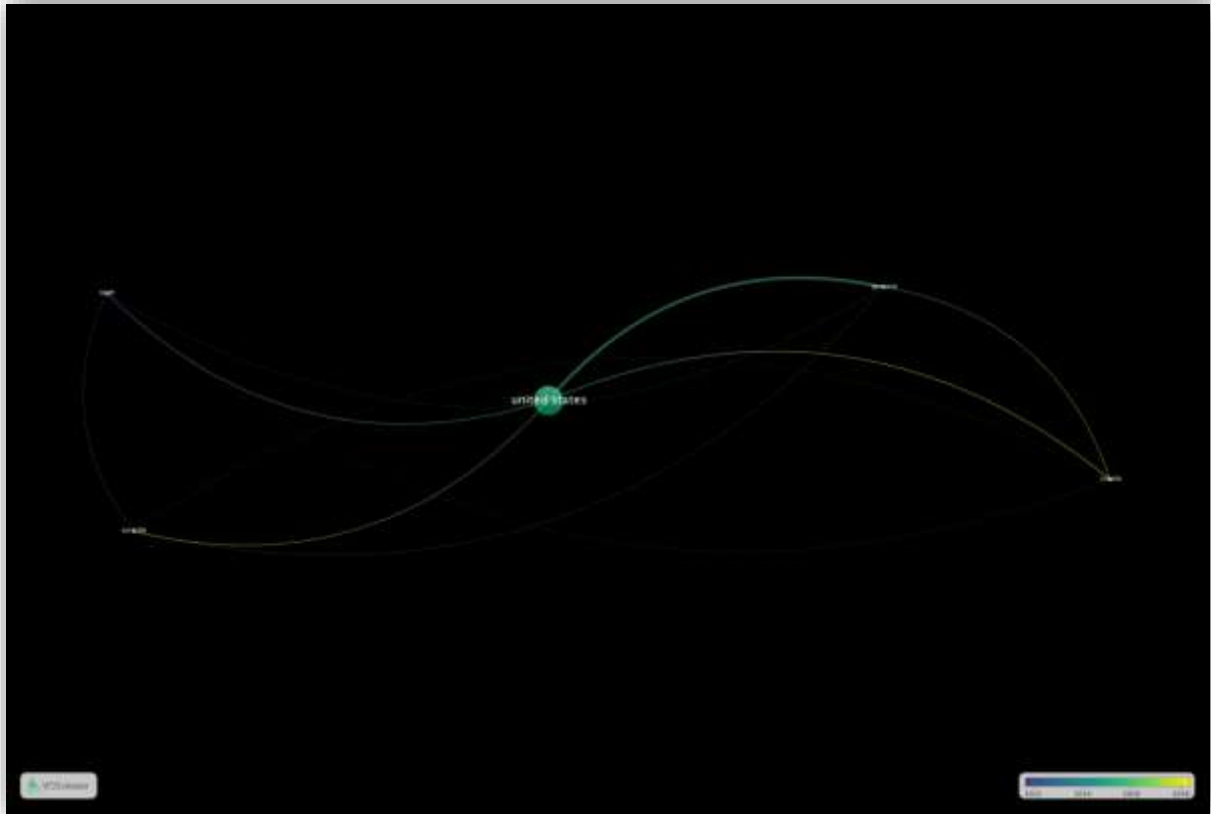


Figure 27: Bibliographic coupling of country
Source: <https://www.scopus.com> (14thDecember 2021)

4.2.5. Network analysis: co-citation

The units of cited reference, cited source, and cited authors are used in this sort of study.

A) Network analysis of co-citation by cited references

Considering 3 citations as threshold value per cited reference, out of 2177 cited references only 9 met the threshold. Among those 9 cited references, 7 are the only who are linked, and they are represented in the figure-28 below.

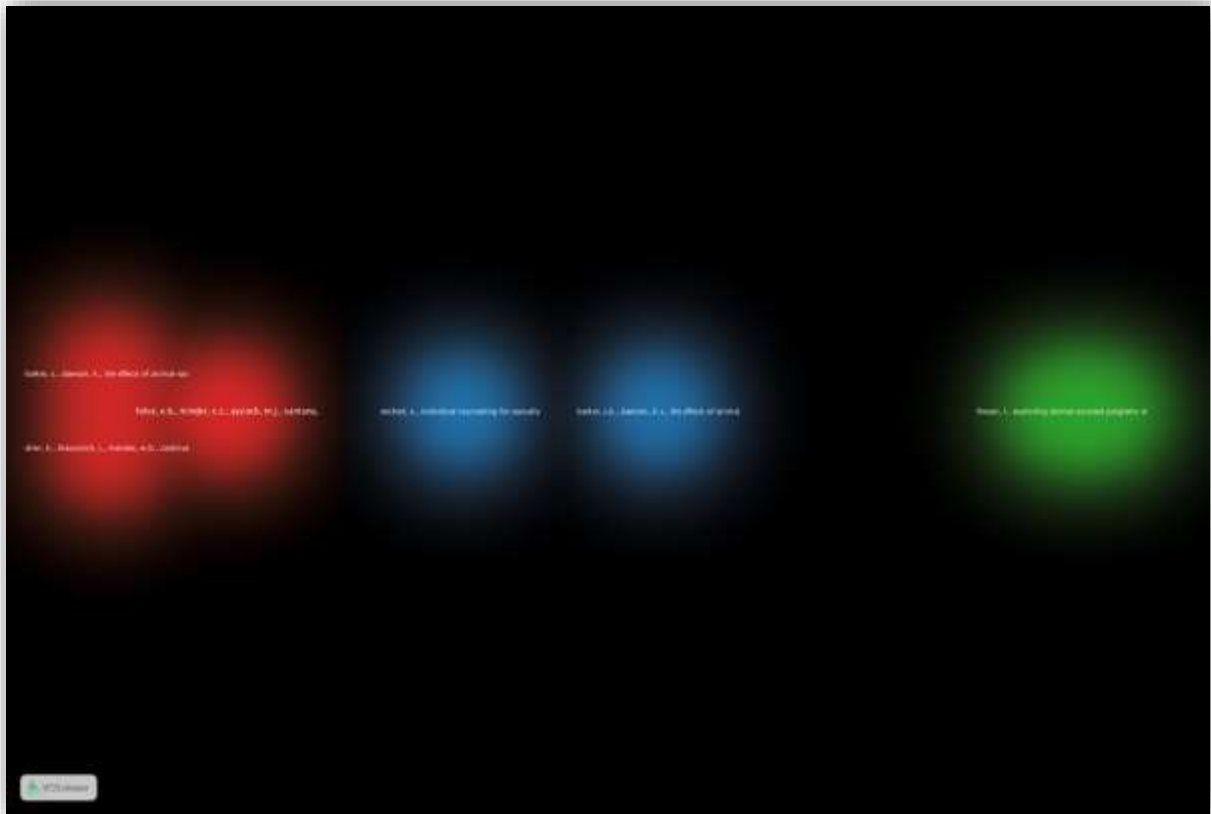


Figure 28: Analysis of co citation in the term of the cited reference
Source: <https://www.scopus.com> (14thDecember 2021)

B) Network analysis: co-citation on the basis of the cited sources

Considering 3 citations as threshold value per cited sources, out of 1241 cited sources only 142 met the threshold. Anthrozoos was the most cited source among all and is shown in figure-29.



Figure 29: analysis of co- citation in the term of the cited sources
Source: <https://www.scopus.com> (14thDecember 2021)

C) Network analysis: co-citation through cited author

Assuming a threshold of three citations per cited author. Only 406 of the 3940 referenced writers fit the criteria, as shown in Figure 30.

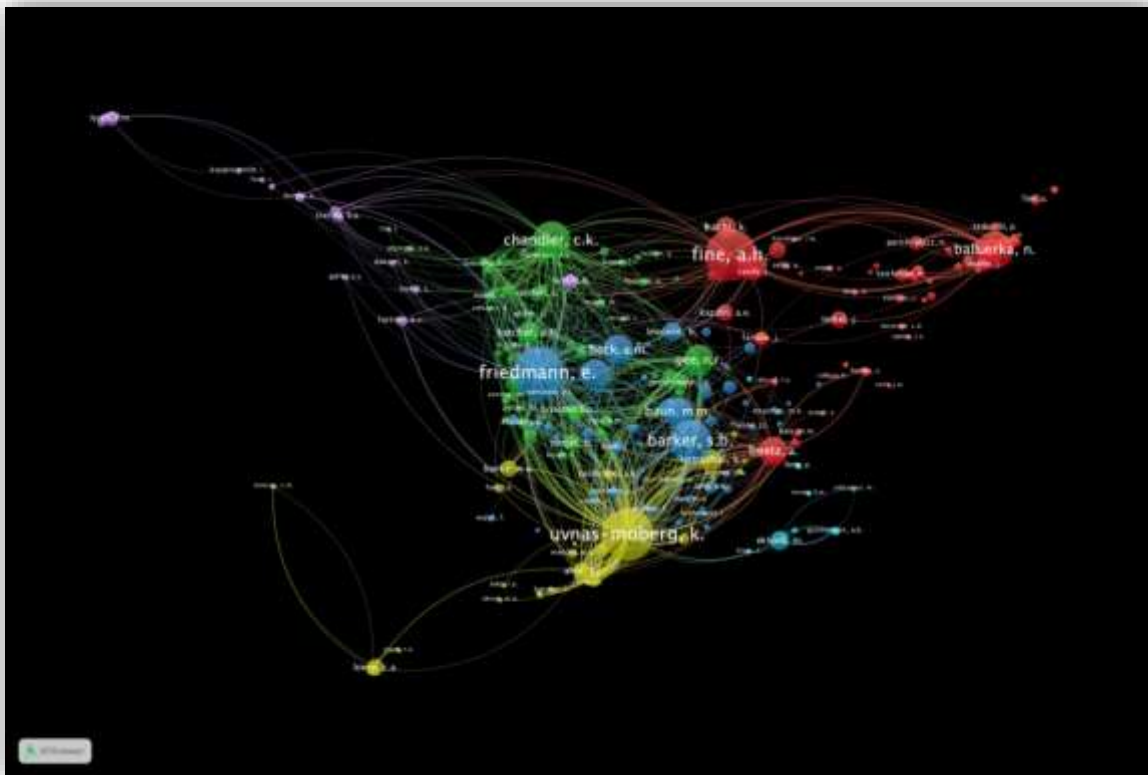


Figure no.30: co-citation in the term of the cited author analysis

Source: <https://www.scopus.com> (14thDecember 2021)

V. LIMITATION OF THE PRESENT STUDY

For the purpose of this investigation, only the Scopus database was used to choose the literature. More databases, such as Google Scholar and Web of Science on the other hand, could have been considered. As the keywords are arranged, the listing of previous research changes dynamically in terms of outcome or result. The current study considers the sequence in which the research writers placed the keywords. As a result, several combinations might be attempted, as well as including or excluding a few synonyms with comparable meanings, depending on the study topic. This study looked at publications from a certain time period, namely 2 decades (2001-2021), which excludes research done prior to 2001, hence there is no data before 2001 mentioned in research. As a result, there is room for more investigation.

VI. CONCLUSION

Animal assisted therapy for mental health is analysed bibliometrically using Scopus, the most widely used and biggest database in the world. From 2001 until 2021, the database is considered. By employing keyword search with AND operator and semicolon operator, the database search is carried out. The search yields 46 documents from the whole collection.

This database was analysed using a different parameter. There are 43 documents in English, followed by two in French, and one in Russian. The English language contains the most documents. The results of keyword research showed that most articles were written about animals being used in treatment. The year 2018 is the year with the most papers issued, followed by 2021. Nearly 51.8% of the texts were devoted to psychology. Articles from journals and book chapters both rank well in terms of document types. There were more papers in the USA than any other country during the time period studied.

The average number of publications by each author was also taken into consideration, and the most prolific writers had an average of 1. Documents from Another make up the majority of those analyses and training command Air education is the primary funder.

Additionally, the RStudio and VOSviewer 1.6.17 version softwares are used to analyse the network. Citation analysis, co-occurrence analysis, bibliographic coupling, co-authorship analysis all use the same database for their analyses. They all revealed a lot about the parameters listed above via various network analysis It might take a long time and effort to complete.

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