

Global Trends and Knowledge Mapping on Music Research during 2010-2022: A Bibliometric Study

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Abstract

Research in music education encompasses a wide variety of foci and determining the relevancy and scope of specific topics for periodic examination. Systematic content analysis of representative and well-established publications, it is possible to infer the status and relevancy of research. The purpose of this study was to establish global trends in the study of music through a bibliometric analysis of music research literature during the period from 2010 to 2022. Excluding editorials, paper responses, and book reviews, 13,051 documents were examined. A total of 12740 authors combined contributed 13051 research papers resulting in 49380 citations. The study shows that 396967 references and 19989 author keywords were published in 114 sources. Psychology of Music (JIF=2.67) was the most relevant source with 754 publications and 8535 citations, Hallam S, affiliated with UCL Institute of Education, USA, contributed the highest number of research papers in Music with 29 publications and received 691 citations with an average of citation per publication of 23.83 and an h-index of 13. The USA was the most prolific institution with 153 publications, claiming 715 citations with an average of 4.67. The article entitled "A comparison of the discrete and dimensional models of emotion in music" (2011) by Eerola, T was the most cited research paper. We consider the period of investigation well suited for the study of research trends and related responses in music education and research as well as calls for a broader scope of the topic investigation.

Keywords: Music, Music Research, Music Education, Bibliometrics, Citation Analysis, Bibliographic Coupling

1. Introductions:

Music is one of the most universal ways of expression and communication for humankind and is present in the everyday lives of people of all ages and from all cultures around the world (Mehr et al., 2019). Scientific knowledge about the effects of music and music-making is constantly expanding. Research expands understanding about the impact of music making and music education, the importance of music at every stage of life, and relationships between music and physical and emotional wellness. Furthermore, research by anthropologists as well as ethnomusicologists suggests that music has been a characteristic of the human condition for millennia (Higham et al., 2012; Cross, 2016).

Research in music education, however, encompasses a wide range of focus and determining the relevance and scope of specific topics should be the subject of regular investigation. In addition, as research in areas such as music perception and cognition, sociology, philosophy, neuroscience, and similar disciplines become more prolific and interdisciplinary, it is reasonable to assume that at least the outputs, methods, and thematic categories related to music and related disciplines are likely to will change. Considering the multitude of variables that could potentially influence the study of phenomena in music, it seems important that music education researchers can benefit from understanding new trends in the field. Specifically, through a systematic content analysis of representative and established publications, it is possible to infer the state and relevance of research both within our field and in related areas of research. For this study, we used both content analysis and bibliometric methods to find out how trends in the study of music developed in the period 2010-2022.

2. Literature Review:

Diaz, Frank M.; Silveira, Jason M. have investigated Music and Affective Phenomena: A 20-Year Content and Bibliometric Analysis of Research in Three Eminent Journals The study showed that the "Journal of Research in Music Education", "Psychology of Music" and "Music Perception" for the years 1990 to 2009. Excluding editorials, article responses and book reviews, 1,293 articles were examined. in 286 (22%) publications that met the criteria for further analysis. The data indicated several trends concerning the analyzed sample, including a significant but not significant decrease in affective studies in the "Journal of Research in Music Education", with a significant increase in the journal "Music Perception". Other trends indicated that themes and methods emerged that were less prevalent compared to the overall sample, but which showed a significant increase over the period analyzed. Other significant trends included an increase in folk, jazz and world music rehearsals. (Diaz, Frank M.; Silveira, Jason M., 2014)

Anglada-Tort, M., & Sanfilippo, K. R. M have explored Visualizing Music Psychology: A Bibliometric Analysis of Psychology of Music, Music Perception, and Musicae Scientiae from

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1973 to 2017. This study aims to analyze all published literature from the journals *Psychology of Music*, *Music Perception*, and *Musicae Scientiae*. The retrieved literature included a total of 2,089 peer-reviewed articles, 2,632 authors and 49 countries. Visualization and bibliometric techniques were used to examine publication growth, citation analysis, author and country productivity, collaboration and research trends. Different bibliometric indicators defined the most relevant authors, countries and keywords, as well as how they are related and work together. (Anglada-Tort, M., & Sanfilippo, K.R.M, 2019).

Morales, Á., Ortega, E., Conesa, E., & Ruiz-Esteban, C have analysed the trends in music education research from Spain through bibliometric analysis of the academic output in the Web of Science database, comprising 143 articles published between 2000 and 2015. Several types of variables were analysed: a) structural variables; b) variables relating to the topic being studied; c) variables relating to the sample; and d) variables relating to the research methods and instruments used. The results show increased representation of music education in specialized journals and broad dissemination in journals from related areas. (Morales, Á., Ortega, E., Conesa, E., & Ruiz-Esteban, C. 2017)

Li K, Weng L, and Wang X have explored the State of Music Therapy Studies in the Past 20 Years and this study aimed to use the CiteSpace software to provide global scientific research about music therapy from 2000 to 2019. Methods: Publications between 2000 and 2019 related to music therapy were searched from the Web of Science (WoS) database. The results revealed that music therapy publications had a significant increase over time, as linear regression results revealed that the percentages had a significant increase from 2000 to 2019 ($t = 14.621$, $P < 0.001$). The United States had the largest number of published studies (362 publications), along with the following outputs: WoS citations (5,752), study citations (15.89), and a high H-index value (37). The three keywords “effectiveness,” “health,” and “older adults” highlighted the research trends in terms of the strongest citation bursts. Conclusions: The overall trend in music therapy is positive. The findings provide useful information for music therapy researchers to identify new directions regarding collaborators, popular issues, and research boundaries. (Li K, Weng L, Wang X, 2021)

Tirovolas, A. K., & Levitin, D. J have explored the Music perception and cognition research from 1983 to 2010: A categorical and bibliometric analysis of empirical articles in music perception. The goal was to systematically characterize the nature of empirical research in one of the main peer-reviewed workplaces for work in our field and to consider this data as a sample representative of the overall course of research over the last three decades. The specific areas examined within each article were: Themes, Participants, Stimuli, Materials, and Outcome Measurement. A total of 384 empirical journal articles were examined. In addition, relevant details were obtained from the full set of 578 articles regarding the geographical and disciplinary

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distribution of authors. Together, the data we present allows us to examine 26 years of trends in music research. (Tirovolas, A.K., & Levitin, D.J., 2011)

Fajar Ramadhan, Agus Rahayu, Chairul Furqon, Mokh. Adib Sultan has explored Bibliometric Analysis on Scopus with the Keyword “Music Streaming” Using Vosviewer Software. The music streaming research trend has been addressed by many researchers. This has increased the popularity and success of music streaming in recent years. with more and more record labels and musicians recognizing its usefulness in selling and promoting music. Regarding the analysis using bibliometric analysis, collecting the results of professional literature obtained from Scopus with the keyword "Music Streaming". Map of the development of articles on the topics of streaming music, digital music, online music, and online music purchases with the categories of the article title, abstract, and keywords in the period 2002 - 2020 compiled into six clusters. (Fajar Ramadhan, Agus Rahayu, Chairul Furqon, Mokh. Adib Sultan, 2022).

3. Objectives of the research

- What are the Global music research trends and citation impact between 2010 and 2022?
- Who are the most prolific authors of music publications?
- Which types of research publications contributed by the authors in Music and their language?
- What is the most preferred pattern of authorship by music scholars?
- Which organizations are the most productive in contributing to music research?
- What are the most preferred sources in music publications?
- What are the most frequent authors' keywords?
- What are the most cited papers in music publications?
- What is the most collaborated county in producing global music research
- What are the most important research themes from 2010 to 2022 in music research?

4. Methods and Materials:

Methods: This study used the bibliometric method to analyze global music research. The bibliometric study is a quantitative method used to examine research trends in a particular domain. Bibliographic data of this research was retrieved from the Web of Science database, and analysis focused on yearly research growth and development, most reverent source, organization and authors, the pattern of authorship, most important research theme, and country collaboration, etc.

Database consulted: Web of Science, formerly Web of Knowledge, is a database of bibliographic citations in various fields that includes the humanities, medical, scientific, and social sciences. It was inaugurated in 2004 by Thomson Reuters (Thomson Scientific). Presently

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the database is currently owned by Clarivate. The database covers 193 million records (journals, books, and proceedings), 54 million patent families, and 12 million data sets

Search Query: To retrieve the topic's bibliographic data, the following search query was run in the search box of the Web of Science database.

- TS= (" Music") or "Sangeet" (All Fields) or "folklore" (All Fields) or "Classical Music" (All Fields).
- Refined by: [Included] Document Types: (Article); Refined by: Web of Science categories: Music or Folklore.
- Timespan: 2010-2022.
- Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI, CCR-EXPANDED, IC.

Date of data extraction: The search query was run on the 6th of September 2022 at Rabindra Bharati University. A total of 13051 research publications were downloaded.

Data Analysis: Data analysis was performed using various tools and software, including MS Excel, VOSviewer, Biblioshiny, and Bibexcel.

5. Analysis of Results:

Table (1) represents the main information of global music research data indexed in the web of science between 2010 and 2022. A total of 12740 authors combined contributed 13051 research papers and 49380 citations in the music field. The table also shows that 396967 references and 19989 author keywords were published in 114 sources. The average citation per document (TC/TP) was 5.91. The analysis also reveals that most of the research was produced by a single author with 9430 publications and 22832 citations. The co-author per document was 1.51, while the international co-authorship was 9.149. This implies that researchers in the field of Music highly prefer to work with international authors.

Table (1): Main Information about Music research data

Description	Results
Timespan	2010:2022
Sources (Journals, Books, etc.)	114
Documents	13051
Total Citation (TC)	49380
Annual Growth Rate %	-3.72
Document Average Age	5.91
Average citations per doc (TC/TP)	3.784
References	396967
DOCUMENT CONTENTS	
Keywords Plus (ID)	4651

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Author's Keywords (DE)	19989
AUTHORS	
Authors	12740
Authors of single-authored docs	6630
AUTHORS COLLABORATION	
Single-authored docs	9430
Co-Authors per Doc	1.51
International co-authorships %	9.149

5. 1. Overall Growth of Music research and citation analysis: Table (2) describes the overall research growth and trends of citations in Music between 2010 and 2022. Consistent research growth was observed during the study period. The highest number of research papers were reported in 2021, with 1158 publications, while the highest number of citations were received in 2010, with 7029 TC. The year 2022 contributed the lowest research paper with 570 publications, as this is not a complete year, and data was taken in September 2022. A descending trend of average citation per publication was observed during the study period. This is because the citation score of more recently published paper need three to four years to get more citation. The highest average citation reported in 2010 with 7.81, while 2022 received the lowest average citation per publication with 0.32.

Table (2): Overall Growth of Music research and citation analysis between 2010 and 2022

Year	TP	TC	TC/TP	h-index
2010	900	7029	7.81	38
2011	896	6904	7.71	39
2012	957	6150	6.43	34
2013	944	5271	5.58	30
2014	1015	5152	5.08	26
2015	1033	4375	4.24	24
2016	1093	4161	3.81	22
2017	1084	3117	2.88	20
2018	1150	2762	2.40	17
2019	1094	1971	1.80	15
2020	1157	1437	1.24	12
2021	1158	871	0.75	9
2022	570	180	0.32	4

TP=Total publication, TC=Total citations, TC/TP=Average citation per publications

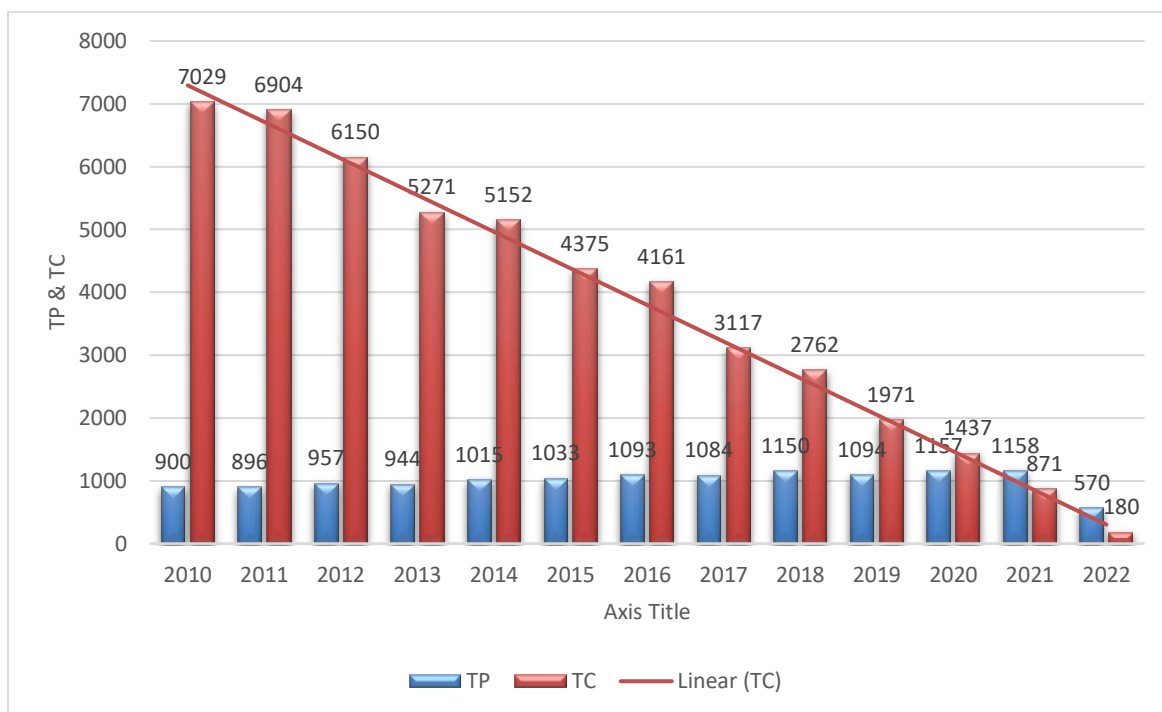
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Figure (1): Yearly Growth of Music research and citation impact during 2010-2022

5.2. Language-wise research trends in Music: Table (3) shows the language-wise global music research productivity between 2010 and 2022. The table reveals that there are 17 languages (English, German, Spanish, Turkish, Portuguese, French, Croatian, Italian, Slovene, Czech, Dutch, Slovenian, Catalan, Slovak, Latin, Estonian, and Georgian) contributed to 13051 publications in Music. English was the most preferred language by the authors while writing their research papers, with 10856 publications and 48636 citations, followed by German with 1061 publications and 202 citations, Spanish with 304 publications and 183 citations, Turkish with 196 publications and 86 citations, and Portuguese with 184 publications and 84 citations. Estonian and Georgian were the least productive language, with one publication each.

Table (3): Language-wise global music research productivity between 2010 and 2022

Rank	Language	TP	TC	TC/TP	h-index
1	English	10856	48636	4.48	59
2	German	1061	202	0.19	4
3	Spanish	304	183	0.60	5
4	Turkish	196	86	0.44	4
5	Portuguese	184	84	0.46	3
6	French	137	57	0.42	3
8	Croatian	101	32	0.32	2
10	Italian	64	15	0.23	2

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9	Slovene	60	18	0.30	2
7	Czech	47	39	0.83	3
12	Dutch	18	9	0.50	2
13	Slovenian	12	4	0.33	1
15	Catalan	4	0	0.00	0
16	Slovak	3	0	0.00	0
11	Latin	2	15	7.50	1
14	Estonian	1	0	0.00	0
17	Georgian	1	0	0.00	0

TP=Total publication, TC=Total citations, TC/TP=Average citation per publications

5.3. The most relevant source of music research: Table (4) describes the top ten most relevant sources in music research during 2010-2022. Psychology of Music (JIF=2.67) was the most relevant source with 754 publications and 8535 citations, followed by International Journal of Music Education (JIF=1.63) with 463 publications and 2676 citations, Music Education Research (JIF=1.43) with 406 publications and 2579 citations, Music Perception (JIF=1.27) with 354 publications and 5675 citations and Folklore-Electronic Journal of Folklore (JIF=0.41) with 340 publications and 345 citations. Organized Sound (JIF=0.57) was the least productive source among the top ten in the list, with 289 publications and 756 citations. Music Perception has the highest average citation per publication with 16.03 TC/TP, followed by Psychology of Music with 11.32 TC/TP and Folklore-Electronic Journal of Folklore received least average citation per publication in the top ten list with 1.01 TC/TP. It was observed that 60% (n=6) of the top ten list sources were published from the UK, followed by 30% (n=3) from the USA and one journal from Estonia.

Table (4): Top ten most important sources in music research between 2010 and 2022

Rank	Source	JIF	TP	TC	TC/TP	h-index	Country
1	Psychology of Music	2.67	754	8535	11.32	42	UK
2	International Journal of Music Education	1.63	463	2676	5.78	19	UK
3	Music Education Research	1.43	406	2579	6.35	23	UK
4	Music Perception	1.27	354	5675	16.03	36	USA
5	Folklore-Electronic Journal of Folklore	0.41	340	345	1.01	7	Estonia
6	Contemporary Music Review	0.42	334	463	1.39	8	UK
7	Musicae Scientiae	2.72	317	3331	10.51	28	USA
8	Popular Music and Society	0.45	306	1301	4.25	17	UK
9	Journal of Research in Music Education	1.98	296	2749	9.29	26	USA
10	Organised Sound	0.57	289	756	2.62	12	UK

TP=Total publication, TC=Total citations, TC/TP=Average citation per publication, JIF=journal impact factor

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5.4. Prolific authors in music research: Table (5) displays the top ten prolific authors who contributed to the music research, their total number of publications, total citations, affiliations and average citation per publication. Hallam S, affiliated with UCL Institute of Education, USA, contributed the highest number of research papers in Music with 29 publications and received 691 citations with an average citation per publication of 23.83 and an h-index of 13. The second highest prolific author recognized as Creech A from the University of London, who produced 28 publications, received 465 citations with an average of 16.61 TC/TP and an h-index of 14. This was followed by Miksza P with 26 publications and 347 citations with an average of 13.35 TC/TP, Silverman MJ with 23 publications, 268 citations with an average of 11.65 TC/TP, and Eerola T, affiliated at the University of Jyväskylä with 20 publication, while managed highest total citation of 1124 and with an average of 56.20 TC/TP. Baker FA (University of Melbourne) was the least productive author on the list, with 16 publications and 323 citations. It is important to mention that most of the top ten productive music research authors come from USA, UK, and Australian institutions.

Table (5): Top ten most prolific authors in music research between 2010 and 2022

Rank	Author	Affiliation	TP	TC	TC/TP	h_index
1	Hallam S	UCL Institute of Education	29	691	23.83	13
2	Creech A	University of London	28	465	16.61	14
3	Miksza P	Indiana University	26	347	13.35	11
4	Silverman MJ	University of Minnesota	23	268	11.65	11
5	Eerola T	University of Jyväskylä	20	1124	56.20	13
6	Leman M	Ghent University	19	316	16.63	10
7	Kopiez R	Hanover University of Music	18	290	16.11	7
8	McAdams S	McGill University	18	198	11.00	6
9	Schubert E	University of New South Wales	17	370	21.76	10
10	Baker FA	University of Melbourne	16	323	20.19	9

TP=Total publication, TC=Total citations, TC/TP=Average citation per publications

5.5. Pattern of authorship and collaboration level in Music research during 2010-2022: Figure two depicts the authorship pattern in music research. The figure shows that 15 types of authorship patterns were observed during the study period of music research. The single authorship published the highest number of publications with 9430 publications and 22832 citations, followed by two authorship patterns with 1968 publications and 12552 citations, three authorship with 917 publications and 7822 citations, four authorship with 414 publications and 3113 citations and five authorship with 188 publication and 1661 citations. The authorship pattern of 12,13, and 20 contributed only a single research paper in the field. Overall, 72% of publications were contributed by single authorship, while multiple authors contributed 28%. This

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analysis reveals that authors contributing to music research were interested in solo research. This implies that there is a greater scope to collaborate in music research in the future.

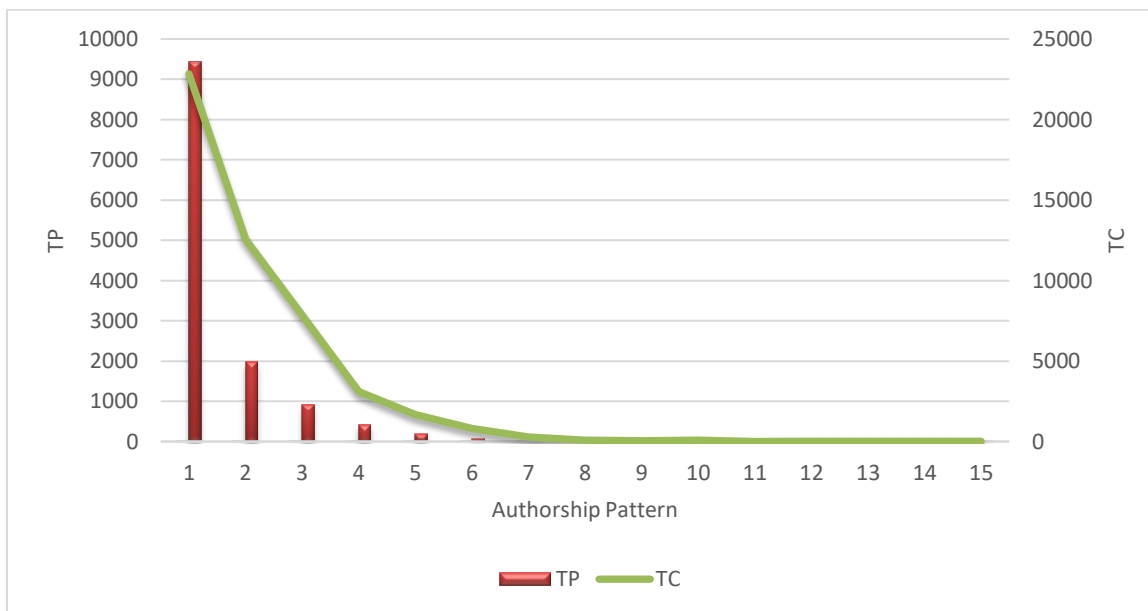


Figure (2): Authorship and citation pattern in Music research during 2010-2022

5.6. Most productive affiliations in music research during 2010-2022: Table (6) describes the top ten most productive affiliations in music research in terms of total publications, total citations, and average citation per publication. Indiana University, USA was the most prolific institution with 153 publications, claiming 715 citations with an average of 4.67, followed by the University of London, the UK is the 2nd highest most productive institution with 128 publications and 1665 citations with an average citation impact of 13.01, Monash University, Australia was the 3rd highest most prolific institutions with 97 publications, received 786 citations with a citation impact of 8.10. This was followed by the University of Cambridge, UK, with 94 publications and 561 citations, and the University of Melbourne, Australia, with 92 publications and 925 citations. Harvard University, USA, was the least productive in the table, with 76 publications and 660 citations. University of London, UK, received the highest total citations (TC=1665) and the highest average citation per publication (TC/TP=13.01) among the top ten list. The table shows that among the top ten prolific institutions, four institutions are from the UK, three are from the USA, Two are from Australia, and one is from Canada.

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Rank	Organization	Country	TP	TC	TC/TP	h-index
1	Indiana University	USA	153	715	4.67	16
2	University of London	UK	128	1665	13.01	22
3	Monash University	Australia	97	786	8.10	14
4	University of Cambridge	UK	94	561	5.97	10
5	University of Melbourne	Australia	92	925	10.05	16
6	McGill university	Canada	89	672	7.55	13
7	University of Oxford	UK	84	363	4.32	11
8	University of Sheffield	UK	77	526	6.83	13
9	Ohio State University	USA	77	544	7.06	12
10	Harvard University	USA	76	660	8.68	12

TP=Total publication, TC=Total citations, TC/TP=Average citation per publications

5.7. Bibliographic coupling of Organizations: Bibliographic coupling of the organization is displayed in figure (3). A minimum of 40 documents of an organization are considered for the analysis. Out of 4565 organizations, 54 organizations meet the thresholds. For each of (the 54) organizations, the total strength of the bibliographic coupling links with the other organizations will be calculated. The organizations with the greatest total link strength were selected. The selected 54 organizations comprised 3 clusters (As represented by the colour red, green, and blue), 1431 links, and 300511 total link strengths. Columbia University was the most prominent organization with 60 publications, 161 citations with 59827 total link strengths, followed by the university of Ljubljana with 76 publications, 50 citations, and 35624 total link strengths. The University of London with 128 publications, 1665 citations, and 28689 total link strengths. Indiana University with 153 publications, 715 citations, and 26328 total link strengths, and the University of Jyväskylä with 70 publications, 1973 citations, and 25418 total link strengths.

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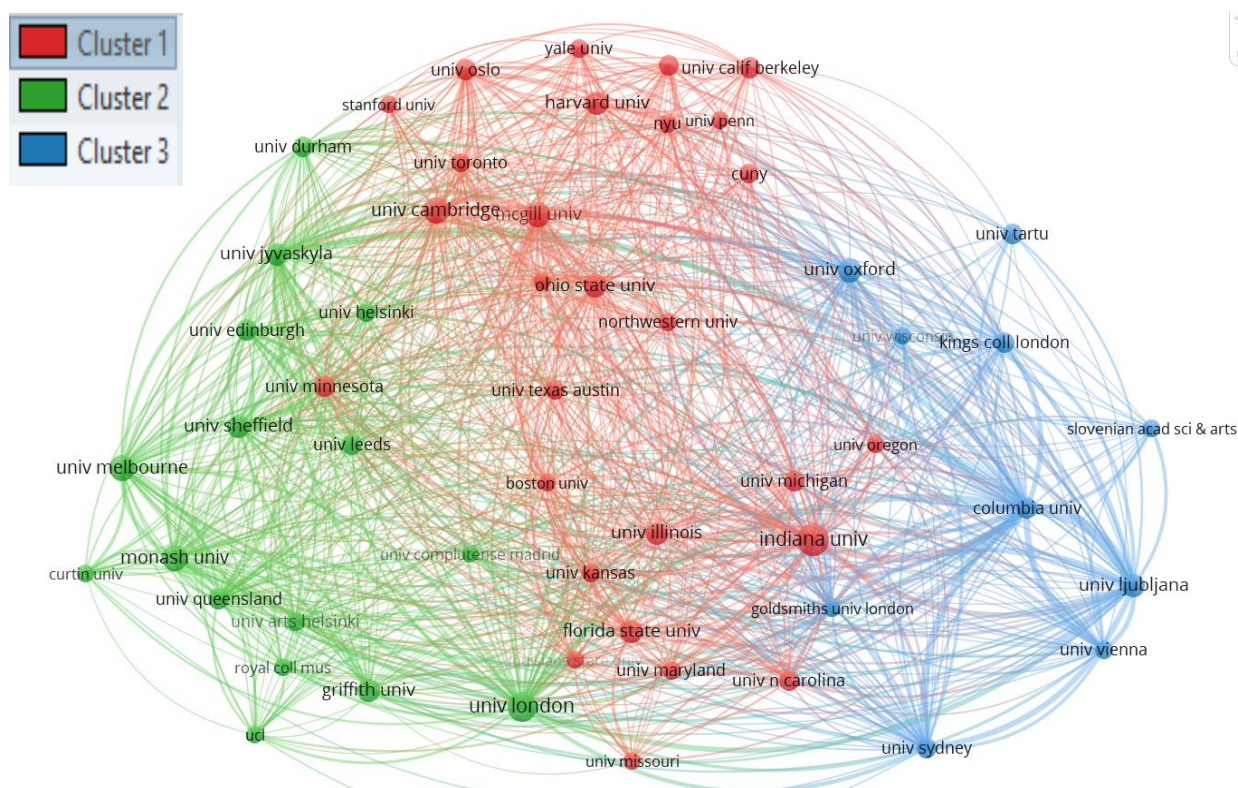


Figure (3): Bibliographic coupling of the organization by Vosviewer software (Minimum number of documents of an organization: 40)

5.8. Most productive country: Table (6) describes the top ten most prolific countries in music research. The USA was identified as the most productive country in terms of total publications (TP=3951 publications) and total citations (TC=) 17451 citations. The UK placed 2nd ranked with 1698 publications and 9180 citations, followed by Germany with 759 publications and 2718 citations, Australia with 648 publications and 5590 citations, and Canada with 553 publications and 3292 citations. Finland was the least productive country with 238 publications and 2881 citations in the top ten list, while secured first ranked in terms of citation impact per publication with 12.11 TC/TP. Australia was identified as the 2nd highest and most impactful country with 8.63 TC/TP, followed by Canada with 5.95 TC/TP. Turkey received the lowest average citation per publication, with 1.27 TC/TP in the top ten.

Table (6): Top ten most productive authors in global music research

Rank	Country	TP	TC	TC/TP	h-index
1	USA	3951	17451	4.42	39
2	UK	1698	9180	5.41	34
3	Germany	759	2718	3.58	26
4	Australia	648	5590	8.63	34
5	Canada	553	3292	5.95	27

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6	Spain	396	1438	3.63	18
7	France	267	756	2.83	15
8	Brazil	261	439	1.68	10
9	Turkey	255	324	1.27	9
10	Finland	238	2881	12.11	25

TP=Total publication, TC=Total citations, TC/TP=Average citation per publications

5.9. Bibliographic coupling: Countries: The co-citation analysis is the opposite of bibliographic coupling. If two research papers cite any 3rd research paper, then the two research papers will be considered bibliographically coupled. Figure (4) represents the bibliographic coupling of countries with network visualization. A country's minimum number of documents was 10. Out of the 102 countries, 54 met the thresholds. Fifty-four countries represent 9 clusters, 1419 links, and 2078851 total links strength—all the clusters represented by a particular colour. The size of the circle represents the number of publications that are coupled; therefore, the wider the circle, the more coupling of papers was discovered. The length of their lines represents the relationship between the two countries. Thus, a short line between two countries denotes a tight relationship. Different colours in Figure 4 depict various clusters that were more frequently connected. It indicates that studies from the same cluster of countries cite one another more frequently. The most influential countries on the map include the USA, UK, Australia, Canada, Germany, Finland, Spain, Slovenia, Brazil, and Austria

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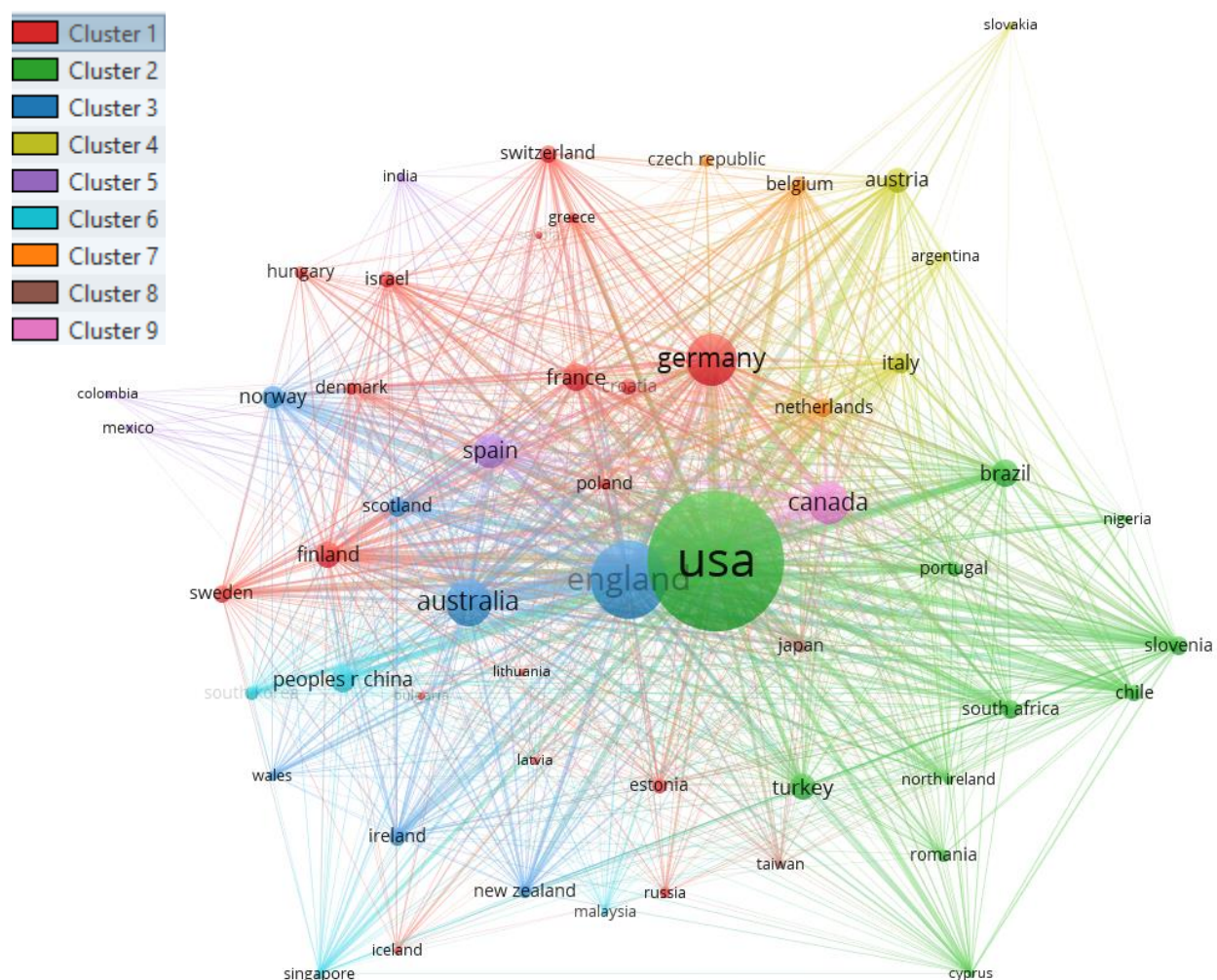


Figure (4) Bibliographic coupling of countries (Minimum number of occurrences:10)

5.10. Mapping co-occurrence of author keywords: Figure (5) analyzed the author's keywords in Music research, which reflected the contents and viewpoints of their research theme and topic. For analysis, a minimum of 30 occurrences of author keywords are considered. Out of the 19989 keywords, 79 meet the thresholds. According to link strengths and occurrences, the spheres or circles with larger sizes indicate the most popular keywords. The strength of the relationship between the nodes indicates the number of research publications that contain the displayed keywords. These 79 keywords form 5 different clusters, 1002 links, and 2311 total link strengths, and each cluster is represented by different colours, as shown in figure 5.

Cluster 1 (Blue colour): This is the largest cluster, which comprises 24 author keywords such as arousal, Attention, Children, Depression, Emotion, Expertise, Language, Memory, Motivation, Music, Music Listening, Music Perception, Music Performance, Music Performance Anxiety,

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Music Therapy, Music Training, Musicians, Personality, Practice, Self-Efficacy, Self-Regulation, Singing, Stress, and Well-Being.

Cluster 2 (Green colour): This is the Second Largest Cluster with 16 Author Keywords, Including, Analysis, Communication, Dance, Embodiment, Form, Harmony, Meter, Narrative, Perception, Pitch, Popular Music, Rhythm, Tempo, Timbre, Tonality, and Voice

Cluster 3 (Navy colour): This cluster also includes 16 keywords, namely Aural Skills, Cognition, Collaboration, Composition, Creativity, Gender, Improvisation, Jazz, Listening, Music Analysis, Music Theory, Notation, Performance, Performance Practice, Phenomenology and Race

Cluster 4: This cluster is comprised of 13 keywords (Aesthetics, Contemporary Music, Culture, Ethnomusicology, Folklore, Genre, Identity, Modernism, Musicology, Nationalism, Opera, Politics, and Tradition).

Cluster 5: This is the smallest cluster which includes ten keywords (Assessment, Community, Music, Covid-19, Curriculum, Education, Higher Education, Music Education, Music Teacher Education, Pedagogy, and Technology)

The top 20 most frequently occurring author keywords in the dataset are Are music (n=451), Music Education (n=327), Popular Music (n=192), Performance (n=163), Music Therapy (n=159), Emotion (n=144), Improvisation (n=130), Gender (n=122), Identity (n=109) and Folklore (n=91).

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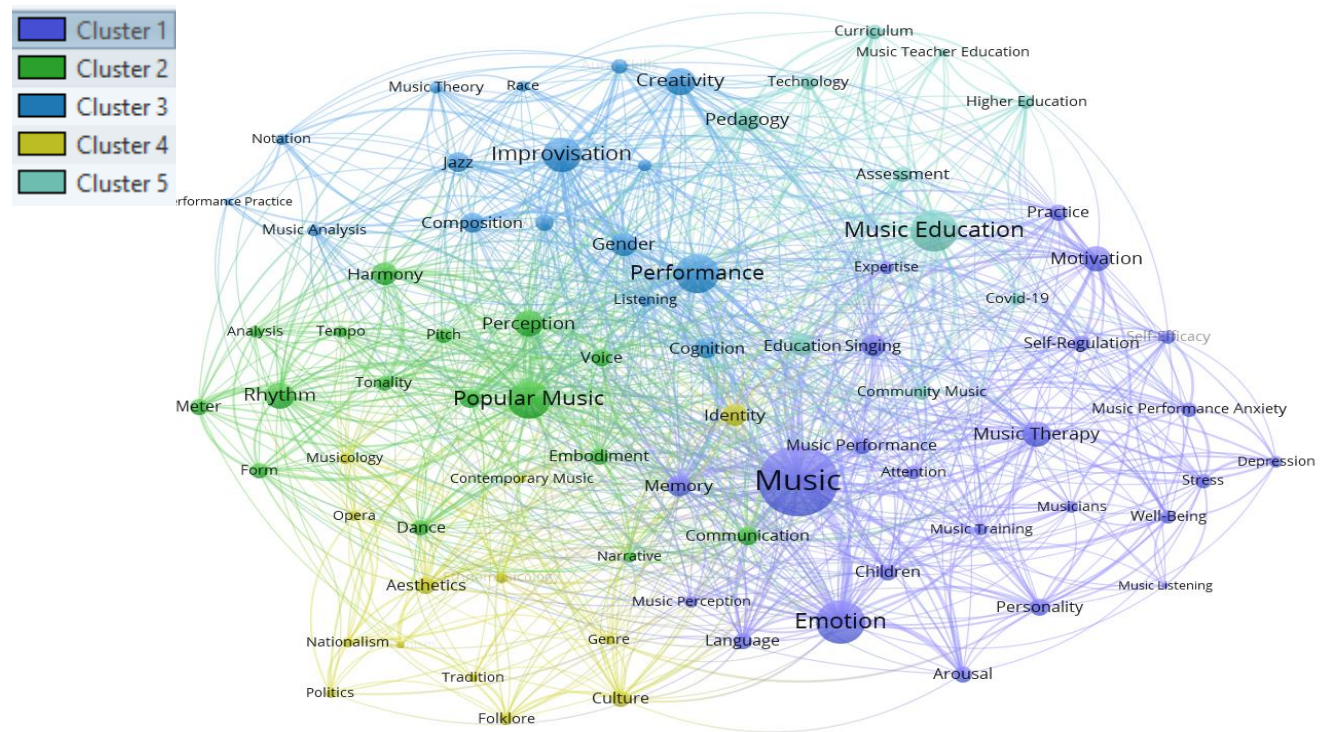


Figure (5): Visualizing co-occurrence of author keywords by Vosviewer (Minimum number of keyword occurrence: 30)

5.11. Thematic Evolution author keywords: Figure (6) demonstrates the thematic evolution of author keywords in three-time slices (2010–2014, 2015–2018, and 2019–2022). This thematic evolution of author keywords was created by Biblioshiny packages. The keywords "music" and "music education" are the most important author keywords as these show up in all three-time slices, but the keywords "folklore" appeared only in the first two time slices (2010–2014 and 2015–2018), while words "rhythm" was most popular in first stages (2010–2014). The words "identity" and "harmony" were the most popular in the second stage (2015–2018). The new topics that have recently gained popularity in music research include "gender," "popular music," "music performance," and "improvisation." The analysis reveals that "folklore", "rhythm", "identity" and "harmony" were identified as the research areas that require further

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attention in the field of music research.

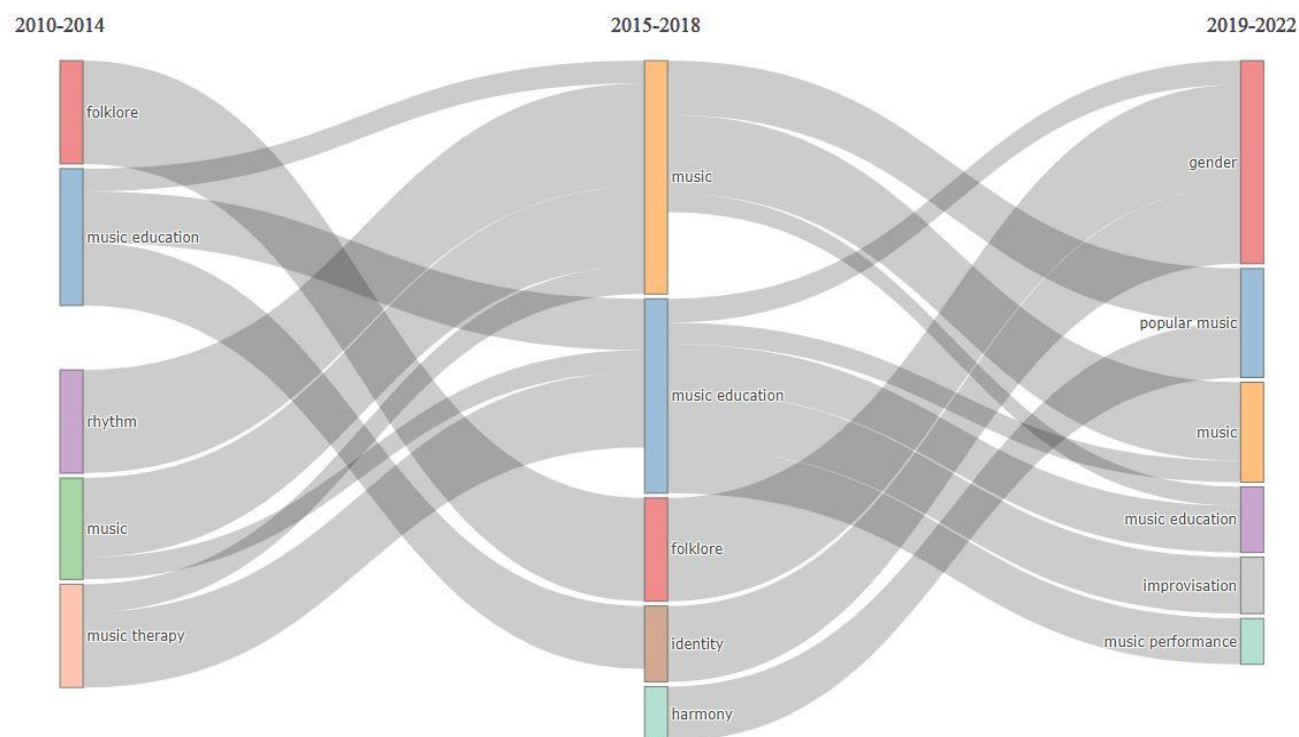


Figure (6): Thematic Evolution of author keywords by biblioshiny software

5.12. Country Collaboration in Music research: Figure (7) highlights international collaboration patterns regarding music research between 2010 and 2022. The highest country collaboration occurred between the USA and the UK with 86 publications, followed by 60 collaborative publications between the USA and Canada, the UK and Australia with 58 publications, the UK and Germany with 48 publications, and the USA and Germany with 44 publications. The lowest number of international collaborations among the top ten countries was found between the UK and Ireland, with 23 publications. Overall, it is noticed that there is fair country collaboration in producing research in music.

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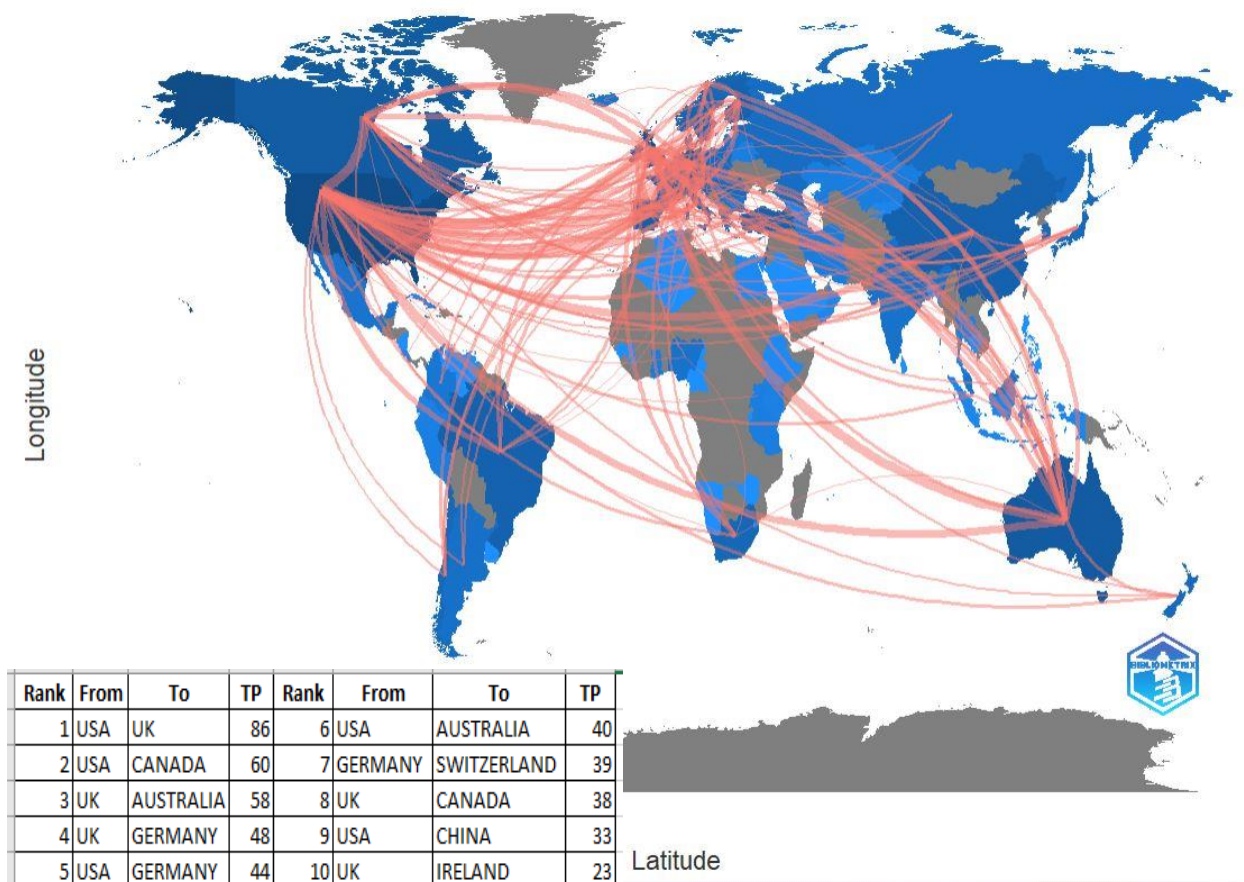


Figure (7): Country collaboration map generated by Biblioshiny Software

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5.13. Most cited research paper in Music: Table (7) describes the top ten most cited research papers in music. The article entitled "A comparison of the discrete and dimensional models of emotion in music" (2011) by Eerola, T was the most cited research paper in music with 323 citations, followed by "The power of Music: Its impact on the intellectual, social and personal development of children and young people" (2010) by Hallam, S with 252 citations, "Timbre and Affect Dimensions: Evidence from Affect and Similarity Ratings and Acoustic Correlates of Isolated Instrument Sounds" (2012) by Eerola, T with 184 citations, "The Ecology of Entrainment: Foundations of Coordinated Rhythmic Movement" (2010) by Phillips-Silver J with 176 citations, and "Music as emotional self-regulation throughout adulthood" (2011) by Saarikallio S with 167 citations. The articles named "Individual Differences in Music Reward Experiences" (2013) by Mas-Herrero E and "The functions of Music for affect regulation" (2011) by Van Goethem A were the least cited research papers in the top ten list with 121 citations each.

Table (7): Top ten most cited research papers in Music

TC	Title	Author, Year, and Source	TC per Year	Normalized TC
323	A comparison of the discrete and dimensional models of emotion in Music	Eerola T, 2011, Psychol Music	26.92	40.11
252	The power of Music: Its impact on the intellectual, social and personal development of children and young people	Hallam S, 2010, Int J Music Educ	19.38	31.11
184	Timbre and Affect Dimensions: Evidence from Affect and Similarity Ratings and Acoustic Correlates of Isolated Instrument Sounds	Eerola T, 2012, Music Percept	16.73	27.82
176	The Ecology of Entrainment: Foundations of Coordinated Rhythmic Movement	Phillips-Silver J, 2010, Music Percept	13.54	21.72
167	Music as emotional self-regulation throughout adulthood	Saarikallio S, 2011, Psychol Music	13.92	20.74
147	Embodied Meter: Hierarchical Eigenmodes in Music-Induced Movement	Toiviainen P, 2010, Music Percept	11.31	18.14
146	Who Enjoys Listening to Sad Music and Why?	Vuoskoski JK, 2012, Music Percept	13.27	22.08
123	Universals in the world's music	Brown S, 2013, Psychol Music	12.30	21.80
121	The functions of Music to affect regulation	Van Goethem A, 2011, Music Sci	10.08	15.02
121	Individual Differences in Music Reward Experiences	Mas-Herrero E, 2013, Music Percept	12.10	21.44

Conclusion:

The current research review used the bibliometrics method and visualization technology to analyze the literature on music research published in the Web of Science during 2010-2022. Bibliometric analysis software packages Biblioshiny, Histcite, and VOS-viewer are used for data processing and extraction of bibliometric indicators. Most document types in this field are in the form of articles. A total of 12740 authors combined contributed 13051 research papers and 49380 citations in the music field. The study shows that 396967 references and 19989 author keywords were published in 114 sources. The average citation per document (TC/TP) was 5.91. The analysis also reveals that most of the research was produced by a single author with 9430 publications and 22832 citations. The co-author per document was 1.51, while the international co-authorship was 9.149. This implies that researchers in the field of Music highly prefer to work with international authors. Consistent research growth was observed during the study period. The highest number of research papers were reported in 2021, with 1158 publications, while the highest number of citations were received in 2010, with 7029 TC. The year 2022 contributed the lowest research paper with 570 publications, as this is not a complete year, and data was taken in September 2022. The study reveals that English was the most preferred language by the authors while writing their research papers, with 10856 publications and 486336 citations. Psychology of Music (JIF=2.67) was the most relevant source with 754 publications and 8535 citations, followed by the International Journal of Music Education (JIF=1.63) with 463 publications and 2676 citations. Hallam S, affiliated with UCL Institute of Education, USA, contributed the highest number of research papers in Music with 29 publications and received 691 citations with an average citation per publication of 23.83 and an h-index of 13. The USA was the most prolific institution with 153 publications, claiming 715 citations with an average of 4.67. The article entitled "A comparison of the discrete and dimensional models of emotion in music" (2011) by Eerola, T was the most cited research paper. The collaboration network or collaboration between authors, institutions and countries on music research, results show some have a connection, and some are not. Several collaboration clusters show that many authors, institutions and countries are collaborating in music research. We consider the period of investigation well suited for the study of research trends and related responses in music education and research as well as calls for a broader scope of the topic investigation.

Declaration of conflicting interests:

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

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