



RESEARCH ARTICLE

Childcare Research: A Bibliometric Analysis

Aidanazima Abashah^{1,2*}, Che Azlan Taib¹, Razleena Razali², Muhammad Ashlyzan Razik³, Md Zaki bin Muhamad Hasan⁴, Mohd Fathi Abu Yaziz⁵

¹School of Technology Management and Logistics, Universiti Utara Malaysia, 06010 Sintok, Kedah, Malaysia

²Faculty of Applied and Human Sciences, Universiti Malaysia Perlis, 01000 Kangar, Perlis, Malaysia

³Faculty of Entrepreneurship and Business, Universiti Malaysia Kelantan, 16100 Pengkalan Chepa, Kelantan, Malaysia

⁴Faculty of Business Management and Professional Studies, Management and Science University, 40100 Shah Alam, Selangor, Malaysia

⁵Arshad Ayub Graduate Business School, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia

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***Corresponding Author:**

aidanazima@unimap.edu.my

Childcare provides the care of children by an institution called a nursery for children up to four years old on behalf of their parents or guardians. The research on childcare started almost a century, in the 1930s. Based on the Scopus database, none of the scholarly attention has been paid to laying out a broad overview of this field of study, especially bibliometric analysis. This study addresses the limitations by analyzing the study's current trend in a childcare research study by extracting the data from the Scopus database and has been analyzed by using bibliometric analysis (Microsoft Excel, Harzing's Publish and Perish software, and VOSviewer software). The article title search has extracted 3023 documents. The highest productivity was in 2021 (161 documents). There were 12 main clusters of childcare research areas that have been visualized in VOSviewer software. The United States was ranked first as the most active country and the University of North Carolina at Chapel Hill (95 total publications, 6678 total citations, and 42 h-index) was the most active university published in childcare studies. The findings demonstrate that many studies on multi-author collaboration have been undertaken in this research area and the findings add to the significant body of knowledge on childcare research worldwide.

INTRODUCTION

The childcare services or childcare centers are the institutions that provide the care services of taking care of children from infants up to four years old. The basic requirement to establish childcare institutions is bound by several acts and conditions from the particular government to benefit children's welfare. Currently, childcare is a need for most working families, and millions of parents across the country rely on it every day, where the expectation the child care providers must pass a background check and be well-trained (Schochet, 2017).

Childcare has been reported to have many benefits for the children's development as the foundation for them to explore the future. In 1930, the childcare research focusing on "Public Health Nursing and Child Care in the United States" was first published (Thomson, 1930) and has continued to rise in numbers over the years. Studies on childcare have mainly focused on its

potential for children's development, and the research evidence from developed countries has been reported widely, specifically in a qualitative method of a research study. The childcare has garnered authority support, including the UNESCO, the World Bank, the Center for Universal Education at the Brookings Institution, and UNICEF towards the "National Early Childhood Care and Education Quality Monitoring Systems" project (Anderson et al., 2017).

However, the rapid advancement in childcare research may have been underestimated; consequently, utilizing established literature databases, it is necessary to assess recent trends in childcare research activities. There have been no previous bibliometric studies on childcare research. Therefore, these studies show significant growth in childcare research from the year 1930 to the year 2021. This initial attempt at bibliometric analysis and mapping using the Scopus database aims to understand global childcare research trends better.

The use of bibliometric research to demonstrate the trend of studies is becoming more widespread (Ahmi & Mohamad, 2019) and according to Wan Omar et al. (2020), a technique called bibliometric analysis uses statistical analysis to determine the impact of papers that have been published and cited. Meanwhile, two distinct aspects of bibliometric analysis are the creation of bibliometric maps and their graphical representation where the bibliometric literature devotes the most emphasis to the construction of bibliometric maps (Suhaimi et al., 2022). Limited to the author's knowledge, none of the bibliometric studies published on childcare studies have been published, based explicitly on the Scopus database. Thus, the goals of the bibliometric analysis are to document and analyze trends where this analysis addressed the following research questions:

- RQ1: What is the knowledge structure based on the author's keywords in childcare research?
- RQ2: What is the current trend and impact of publications on childcare research?
- RQ3: Which journals actively publish articles related to childcare research?
- RQ4: Which articles received higher citations in the childcare research?
- RQ5: Which authors, institutions, and countries actively contributes to the childcare research publications?
- RQ6: What is the co-authorship by authors, institutions, and countries actively contributes to the childcare research publications?
- RQ7: What is the current publication and impact for Malaysian childcare publication?

LITERATURE REVIEW

In order to perform a bibliometric analysis for childcare research, an analysis was performed using the Scopus database. The search term "child care" OR "childcare" was used in the article's title to find relevant research articles published in the English language about the childcare research study. The concentration is on the article titles because, as usual, the title is the first thing that readers will notice, and it reflects a relevant topic that is pertinent to the research area and the study's goal. There is no limitation in terms of the time frame and source type to explore childcare research trends. However, the document type is limited to the article only, in the subject area of "social sciences", "arts and humanities", "business management, and accounting".

Figure 1 illustrates the flow diagram of the research strategy based on the PRISMA diagram. With the "Scope & Coverage" and "Keywords & Search String" mentioned in the chart, a total of 3023 research articles and all of the documents were included for the bibliometric data analysis. Thus, Microsoft Excel was used to determine the frequency and percentage of published materials and build the necessary charts and graphs, VOSviewer was used to create and visualize bibliometric networks, and Harzing's Publish and Perish software was used to calculate citation metrics.

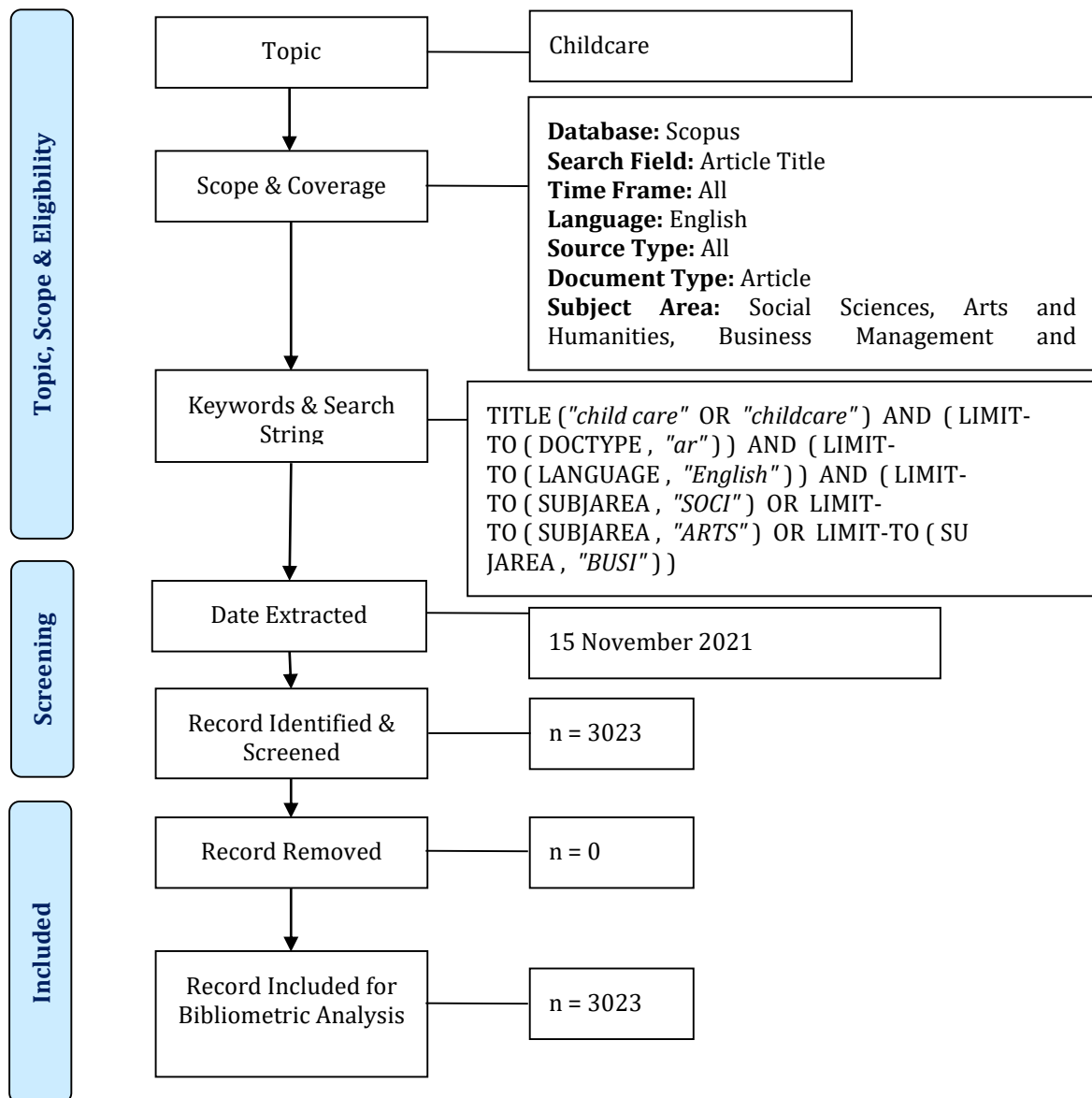


Figure 1: Flow diagram of the search strategy

RESULTS

Documents Profiles

A total of 3023 research articles were included for the bibliometric data analysis based on the Scopus database. The document type is limited to the article only (100%), where the retrieved documents received a total of 61128 citations and 671.74 citations per year, and the h-index was 105.

Table 1: Source Type

Source Type	Total Publications (TP)	Percentage (%)
Journal	3012	99.64
Book Series	7	0.23

Trade Journal	3	0.10
Undefined	1	0.03
Total	3023	100

Table 1 shows that the 3023 documents are from various sources, including the journal, book series, trade journal, and undefined source type. Most of the source types are the journal (3012, 99.64%), followed by the book series (7, 0.23%), trade journal (3, 0.10%), and undefined (1, 0.03%).

Table 2: Languages

Language	Total Publications (TP)	Percentage (%)
English	3023	99.77
French	2	0.07
Chinese	1	0.03
Croatian	1	0.03
German	1	0.03
Korean	1	0.03
Portuguese	1	0.03
Total	3030	100.00

Note: Seven documents have been prepared in dual languages

The retrieved documents were limited to being published in the English language only. However, seven documents have been prepared in dual languages, including French, Chinese, Croatian, German, Korean, and Portuguese as presented in Table 2.

Knowledge structure based on the author keywords

Table 3 shows the top 15 keywords in publications. The highest occurrences keywords is child care with the 880 publications (29.11%), followed by human (443 publications, 14.65%), article (330 publications, 10.92%), childcare (328 publications, 10.85%), and child (320 publications, 10.59%). There are a total of 3778 keywords have been used by the publication shown a wide coverage in the childcare research study worldwide.

The mapping with the VOSviewer technique of author keywords with a minimum incidence of 5 and the full counting method revealed the most often encountered author keywords in Figure 2. The circles in the same color cluster indicate that the publications are about the same area of research publications. There are twelve clusters of childcare research publications differentiating in a different color. Each is a subset of the childcare study field. Keywords assessment, center-based child care, child care centers, and childcare quality, etc., are all associated as illustrated in the red cluster (cluster 1, 46 items). Keywords like child abuse, child care policy, child care subsidy, child neglect, etc., are centered on the core in the green cluster (cluster 2, 28 items). Then there were keywords associated in blue (cluster 3, 28 items), such as attitude, child care arrangement, child care services, education, employment, family, etc.

Cluster 4 with 19 items (attachment, burnout, caregivers, child and family policy, childcare worked, etc.), Cluster 5 with 16 items (childcare arrangements, children with disabilities, families and work, family structure, etc.), Cluster 6 with 14 items (behavior problems, childcare providers, cognitive skills, school readiness, etc.), Cluster 7 with 13 items (fathers, gender equality, marketization, parental leave, etc.), Cluster 8 with 11 items (care, caregiving, female employment, grandmothers, motherhood, etc.), Cluster 9 with 11 items (care work, class, emotional labor, social investment, welfare state, etc.), Cluster 10 with 10 items (childcare choice,

childcare decisions, daycare, division of labor, low-income, etc.), Cluster 11 with 7 items (evaluation, parental involvement, public policy, satisfaction, etc.), and Cluster 12 with 4 items (quality, subsidies, workforce, etc.) respectively.

Table 3: Top 15 Occurrences Keywords

Author Keywords	Total Publications (TP)	Percentage (%)
Child Care	880	29.11
Human	443	14.65
Article	330	10.92
Childcare	328	10.85
Child	320	10.59
Female	307	10.16
Male	252	8.34
Humans	201	6.65
Preschool Child	190	6.29
Child, Preschool	186	6.15
Infant	157	5.19
United States	123	4.07
Day Care	115	3.80
Adult	101	3.34
Education	100	3.31

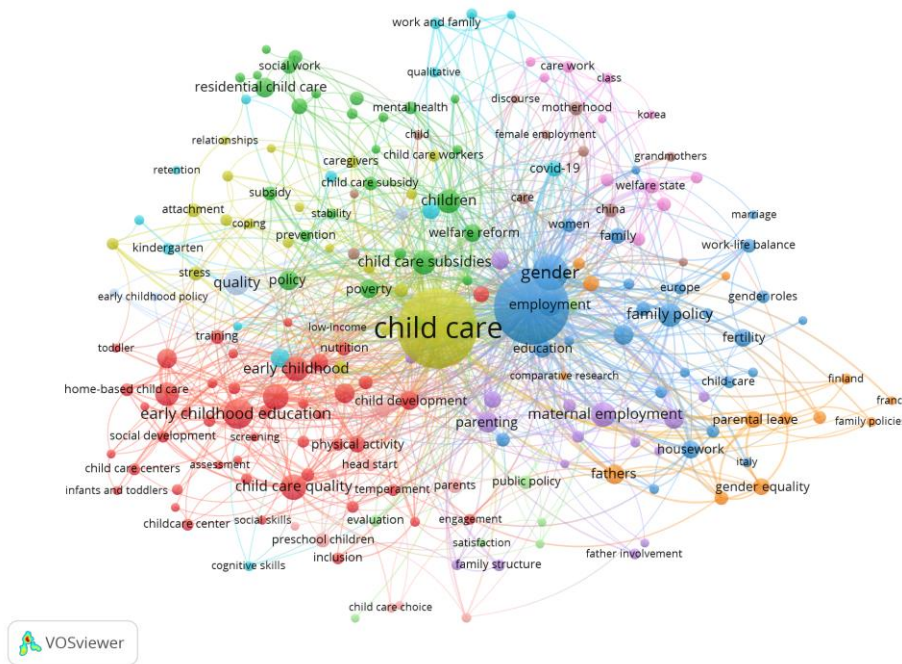


Figure 2: Network visualization map of the keywords

Research Trend and Impact

Table 4 displays the total number of publications by year and the information about the total citations, number of cited papers, citations per paper, citation per cited paper, h-index, and g-index by year. The trend is also illustrated in Figure 3. For the years 1930 to 1965, the number of contributors to this discipline is lower, and the growth of literature is likewise lower. Thus, lead to understood that applying Lotka's law to the social sciences would be challenging (Sen et al., 1996) at the beginning of the early phase of childcare research development. Lotkas Law, on the other hand, explains the frequency with which authors in a specific topic publish, and it specifies the number of authors who contributed during a specified time period (Lotka, 1926).

Table 4: Year of Publication

Year	TP	NCP	TC	C/P	C/CP	h	g
1930	1	1	2	2.00	2.00	1	1
1936	1	0	0	0.00	N/A	0	0
1945	1	0	0	0.00	N/A	0	0
1946	1	0	0	0.00	N/A	0	0
1947	2	0	0	0.00	N/A	0	0
1948	1	1	1	1.00	1.00	1	1
1949	1	0	0	0.00	N/A	0	0
1952	1	1	4	4.00	4.00	1	1
1953	1	1	4	4.00	4.00	1	1
1954	2	1	1	0.50	1.00	1	1
1955	1	1	6	6.00	6.00	1	1
1956	1	1	6	6.00	6.00	1	1
1958	2	0	0	0.00	N/A	0	0
1959	2	0	0	0.00	N/A	0	0
1962	2	1	1	0.50	1.00	1	1
1964	1	0	0	0.00	N/A	0	0
1965	1	0	0	0.00	N/A	0	0
1966	2	1	10	5.00	10.00	1	2
1969	3	1	5	1.67	5.00	1	2
1970	3	1	5	1.67	5.00	1	2
1971	4	4	11	2.75	2.75	2	3
1972	10	4	23	2.30	5.75	3	4
1973	21	15	42	2.00	2.80	4	5
1974	13	7	41	3.15	5.86	3	6
1975	17	13	72	4.24	5.54	4	8
1976	17	7	40	2.35	5.71	4	6
1977	21	13	319	15.19	24.54	7	17
1978	20	16	95	4.75	5.94	5	9
1979	22	15	72	3.27	4.80	5	7
1980	19	12	136	7.16	11.33	4	11
1981	22	15	59	2.68	3.93	5	6
1982	24	18	126	5.25	7.00	7	10
1983	18	15	135	7.50	9.00	6	11
1984	16	10	92	5.75	9.20	4	9
1985	12	9	142	11.83	15.78	5	11
1986	19	15	114	6.00	7.60	6	10
1987	22	15	600	27.27	40.00	9	22

1988	23	18	495	21.52	27.50	9	22
1989	35	28	643	18.37	22.96	11	25
1990	45	35	908	20.18	25.94	11	30
1991	61	52	1250	20.49	24.04	19	34
1992	54	49	1782	33.00	36.37	17	42
1993	34	30	732	21.53	24.40	14	27
1994	35	31	1066	30.46	34.39	15	32
1995	37	31	764	20.65	24.65	13	27
1996	69	59	2436	35.30	41.29	26	49
1997	51	45	1895	37.16	42.11	17	43
1998	64	59	2242	35.03	38.00	23	47
1999	61	57	2054	33.67	36.04	22	45
2000	74	69	3523	47.61	51.06	29	59
2001	54	51	2092	38.74	41.02	22	45
2002	68	64	3541	52.07	55.33	31	59
2003	56	54	2980	53.21	55.19	25	54
2004	56	52	2369	42.30	45.56	23	48
2005	64	62	1982	30.97	31.97	26	43
2006	70	68	2310	33.00	33.97	26	47
2007	77	73	2972	38.60	40.71	31	53
2008	79	78	2452	31.04	31.44	29	47
2009	87	83	2033	23.37	24.49	28	42
2010	89	85	3138	35.26	36.92	29	54
2011	97	95	2231	23.00	23.48	27	44
2012	96	89	1751	18.24	19.67	23	37
2013	122	118	2080	17.05	17.63	27	36
2014	121	115	2041	16.87	17.75	26	38
2015	102	96	1177	11.54	12.26	19	27
2016	121	113	1232	10.18	10.90	20	28
2017	130	109	1064	8.18	9.76	18	24
2018	138	115	833	6.04	7.24	13	18
2019	120	101	408	3.40	4.04	9	11
2020	144	94	344	2.39	3.66	6	14
2021	161	50	140	0.87	2.80	5	8
2022	1	0	0	0.00	N/A	0	0
Total	3023						

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

The research subject has an increasing pattern and popularity by looking at the documents

released by year. It was starting to show a rising from year to year, with the highest productivity in 2021, with a total of 161 documents. However, by looking at the trend on citations number, it was increased until 2002 and slowly decreased starting from that particular year. It began to show an increase in the number of citations from 1966, where the earlier years showed an inconsistent number of publications and citations. Since 1966, the year with the highest citations number was 2002, with 3541 citations.

Historically, the development of the childcare research become the concern since the modernization of the childcare transformation in United States through a Model Day Nursery in the Children’s Building at the 1893 World’s Columbian Exhibition in Chicago. Meanwhile, the National Federation of Day Nurseries (NFDN), and a policy was introduced to support the working mothers by the U.S Children’s Bureau (Michel, 2011). Hence, lead to the research and development since there, as shown at the research trends.

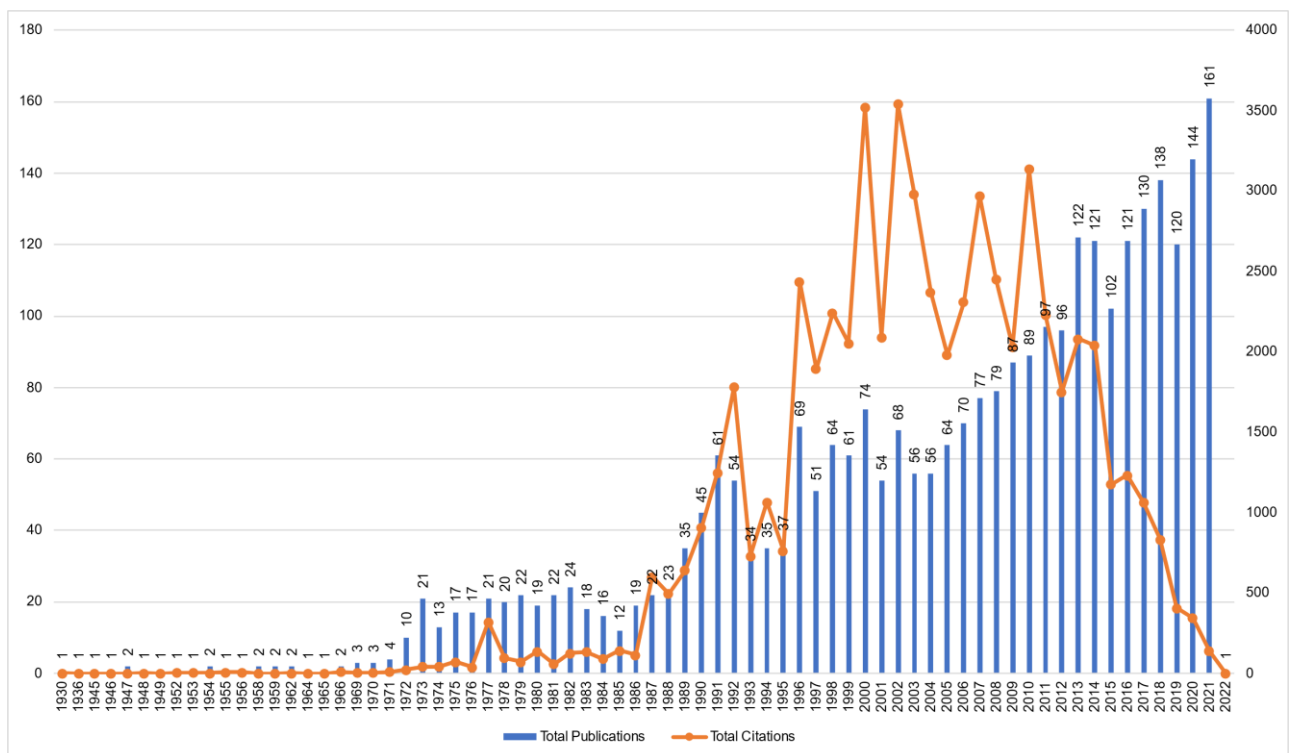


Figure 3: Total Publications and Citations by Year

Active Journals Publish the Childcare Articles

The top ten childcare research journals are listed in Table 5. The highest was Early Childhood Research Quarterly with a complete publication of 193, citations 8079, and h-index49. The Child Care Quarterly came in second with 143 documents. However, the Child Care Quarterly was discontinued from Scopus, where the Scopus coverage is from 1971 to 1986. The third highest was the Children and Youth Services Review with 106 publications, followed by the Early Education and Development (87 publications). The top ten childcare research journals were published by various leading publishers globally, such as Elsevier, Taylor & Francis, Wiley-Blackwell, Springer Nature, and SAGE.

Table 5: Most Active Source Title

Source Title	Publisher	TP	CR	SJR 2020	SNIP 2020	NCP	TC	C/P	C/CP	h	g
Early Childhood	Elsevier	193	4.40	1.79	2.08	190	8079	41.86	42.52	49	81

Research Quarterly											
Child Care Quarterly	Human Sciences Press	143	N/A	N/A	N/A	105	662	4.63	6.30	10	20
Children and Youth Services Review	Elsevier	106	2.50	0.82	1.30	87	1032	9.74	11.86	19	26
Early Education and Development	Taylor & Francis	87	3.00	1.04	1.29	81	1279	14.70	15.79	22	31
Child Development	Wiley-Blackwell	64	9.40	3.10	2.97	64	9304	145.38	145.38	44	64
Early Childhood Education Journal	Springer Nature	64	2.70	0.61	1.18	52	603	9.42	11.60	17	21
Child and Youth Care Forum	Springer Nature	61	2.30	0.54	1.00	55	551	9.03	10.02	14	20
Journal of Family Issues	SAGE	47	2.80	0.81	1.30	41	834	17.74	20.34	19	28
Journal of Marriage and Family	Wiley-Blackwell	43	5.00	1.58	2.07	41	1305	30.35	31.83	23	35
Child Care in Practice	Taylor & Francis	39	1.60	0.34	0.70	29	141	3.62	4.86	6	10

Notes: TP=total number of publications; TC=total citations; CR= Cite Score

* Child Care Quarterly (Scopus coverage years: from 1971 to 1986(coverage discontinued in Scopus)

Higher Citations Articles

Overall, the citations metrics based on the Harzing and Perish software, as shown in Table 6, for 3023 documents of publications retrieved from the Scopus database, represent a total number of 61128 citations, with 671.74 citations per year and 20.22 citations per paper. The same documents gained 105 of h-index and 164 of g-index.

Table 6: Citations Metrics

Metrics	Data
Papers	3023
Number of Citations	61128
Years	91
Citations per Year	671.74
Citations per Paper	20.22
Cites_Author	28312.87

Papers_Author	1763.79
Authors_Paper	2.35
h_index	105
g_index	164

Based on the overall 3023 publications, Table 7 shows the top twenty childcare-related articles cited the most. In 2001, Child Development published "The relation of preschool childcare quality to children's cognitive and social developmental trajectories through second grade," the paper with the most citations. It garnered 655 citations, with 32.75 citations per year. Prior to this article, the findings show that child care quality has a long-term impact on children's cognitive and socioemotional development patterns, at least through, where the children's linguistic and academic skills were linked to observed classroom practises, whereas the closeness of the teacher-child relationship was linked to both cognitive and social skills, with the latter having the highest benefits (Peisner-Feinberg et al., 2001).

The second most cited articles were "Are there long-term effects of early child care?" with 542 citations, followed by "The relation of child care to cognitive and language development" (531 citations), "Early child care and children's development prior to school entry: Results from the NICHD study of early child care" (521 citations), and "The Effects of Infant Child Care on Infant-Mother Attachment Security: Results of the NICHD Study of Early Child Care" with 513 citations. The most influential article based on the highest citations per year of 39.36, is dominant and led by Vandell et al. (2010) with the research title of "Do effects of early child care extend to age 15 years? Results from the NICHD study of early child care and youth development "and garnered a total of 433 citations.

Table 7: Top 20 Highly cited articles

No.	Authors	Title	Year	Cites	Cites per year	Source
1	Peisner-Feinberg et al. (2001)	The relation of preschool childcare quality to children's cognitive and social developmental trajectories through second grade	2001	655	32.75	Child Development
2	Belsky et al. (2007)	Are there long-term effects of early child care?	2007	542	38.71	Child Development
3	National Institute of Child Health and Human Development Early Child Care Research Network (2000)	The relation of child care to cognitive and language development	2000	531	25.29	Child Development
4	NICHD Early Child Care Research Network (2002)	Early child care and children's development prior to school entry: Results from the NICHD study of early child care	2002	521	27.42	American Educational Research Journal
5	NICHD Early Child Care Research	The Effects of Infant Child Care on Infant-Mother Attachment Security: Results of the NICHD Study of Early	1997	513	21.38	Child Development

	Network (1997)	Child Care					
6	NICHD Early Child Care Research Network (1999)	Chronicity of maternal depressive symptoms, maternal sensitivity, and child functioning at 36 months. NICHD Early Child Care Research Network.	1999	494	22.45	Developmental psychology	
7	NICHD Early Child Care Research Network (1999)	Child care and mother-child interaction in the first 3 years of life. NICHD Early Child Care Research Network.	1999	473	21.5	Developmental psychology	
8	National Institute of Child Health and Human Development Early Child Care Research Network and Greg J. Duncan (2003)	Modeling the Impacts of Child Care Quality on Children's Preschool Cognitive Development	2003	437	24.28	Child Development	
9	Vandell et al. (2010)	Do effects of early child care extend to age 15 years? Results from the NICHD study of early child care and youth development	2010	433	39.36	Child Development	
10	NICHD Early Child Care Research Network (1996)	Characteristics of infant child care: Factors contributing to positive caregiving: NICHD early child care research network	1996	394	15.76	Early Childhood Research Quarterly	
11	Burchinal et al. (2010)	Threshold analysis of association between child care quality and child outcomes for low-income children in pre-kindergarten programs	2010	388	35.27	Early Childhood Research Quarterly	
12	National Institute of Child Health and Human Development Early Child Care Research Network (2003b)	Does Amount of Time Spent in Child Care Predict Socioemotional Adjustment during the Transition to Kindergarten?	2003	375	20.83	Child Development	
13	The NICHD Early Child Care Research Network (1998)	Early Child Care and Self-Control, Compliance, and Problem Behavior at Twenty-Four and Thirty-Six Months: The NICHD Early Child Care Research Network	1998	355	15.43	Child Development	
14	Howes et al. (1992)	Thresholds of Quality: Implications for the Social Development of Children in Center based Child Care	1992	349	12.03	Child Development	
15	M. R.	Relating quality of center-based child	2000	342	16.29	Child	

	Burchinal et al. (2000)	care to early cognitive and language development longitudinally					Development
16	Brooks-Gunn et al. (2002)	Maternal employment and child cognitive outcomes in the first three years of life: The NICHD study of early child care	2002	322	16.95	Child Development	
17	Goff et al. (1990)	Employer Supported Child Care, Work/Family Conflict, and Absenteeism: A Field Study	1990	311	10.03	Personnel Psychology	
18	Loeb et al. (2004)	Child Care in Poor Communities: Early Learning Effects of Type, Quality, and Stability	2004	301	17.71	Child Development	
19	Friedman et al. (2000)	Characteristics and quality of child care for toddlers and preschoolers	2000	284	13.52	Applied Developmental Science	
20	Howes (2000)	Social-emotional classroom climate in child care, child-teacher relationships and children's second grade peer relations	2000	278	13.24	Social Development	

Active Authors, Institutions, and Countries Contribute to the Childcare Research Publications

Table 8 shows the top twelve most productive authors throughout the childcare research study. The productive authors in the childcare research are led by the researchers from the United States in various institutions such as the University of California, University of Virginia, Georgetown University, Harvard University, Arizona State University, Columbia University, University of Minnesota Twin Cities, University of Alabama, and the University of Texas. Howes, C. (37 publications; 4405 citations; h-index 29) was the most productive author with the most publications, followed by Burchinal, M. (36 publications; 5597 citations; h-index 32), and Phillips, D. (25 publications; 2212 citations; h-index 19), Vandell, D.L. (18 publications; 2610 citations; h-index 12), and McCartney, K. (16 publications; 2494 citations; h-index 15).

Table 8: Most Productive Authors

Author's Name	Affiliation	Country	TP	NCP	TC	C/P	C/CP	<i>h</i>	<i>g</i>
Howes, C.	University of California	United States	37	37	4405	119.05	119.05	29	37
Burchinal, M. R	University of Virginia	United States	36	36	5597	155.47	155.47	32	36
Phillips, D.	Georgetown University	United States	25	25	2212	88.48	88.48	19	25
Vandell, D.L.	University of California	United States	18	18	2610	145.00	145.00	12	18
McCartney, K.	Harvard University	United States	16	16	2494	155.88	155.88	15	16
Belsky, J.	University of California	United States	15	15	2156	143.73	143.73	15	15

Fuller, B.	University of California	of United States	15	15	1009	67.27	67.27	13	15
Herbst, C.M.	Arizona State University	United States	15	14	288	19.20	20.57	9	15
Brooks-Gunn, J.	Columbia University	United States	12	11	1094	91.17	99.45	10	12
Davis, E.E.	University of Minnesota Twin Cities	United States	12	12	149	12.42	12.42	7	12
Hooper, A.	University of Alabama	United States	11	8	47	4.27	5.88	4	6
Owen, M.T.	University of Texas	United States	11	10	1511	137.36	151.10	10	11

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

Table 9 shows the top eleven, the most influential institutions with minimum of thirty publications. Overall, all institutions are based in United States, who lead the childcare research worldwide. However, in United States, the most influential institutions based on the total number of publication is the The University of North Carolina at Chapel Hill (95 total publications, 6678 total citations, and 42 h-index), followed by University of California, Los Angeles (49 total publications, 4016 total citations, and 29 h-index), University of Wisconsin-Madison (46 total publications, 1943 total citations, and 19 h-index), University of Minnesota Twin Cities (40 total publications, 1336 total citations, and 17 h-index), and Pennsylvania State University (38 total publications, 1010 total citations, and 18 h-index).

Table 9: Most influential institutions with minimum of thirty publications

Affiliation	Country	TP	NCP	TC	C/P	C/CP	<i>h</i>	<i>g</i>
The University of North Carolina at Chapel Hill	United States	95	92	6678	70.29	72.59	42	81
University of California, Los Angeles	United States	49	49	4016	81.96	81.96	29	49
University of Wisconsin-Madison	United States	46	41	1943	42.24	47.39	19	44
University of Minnesota Twin Cities	United States	40	37	1336	33.40	36.11	17	36
Pennsylvania State University	United States	38	35	1010	26.58	28.86	18	31
University of Washington	United States	37	34	1431	38.68	42.09	19	37
University of Maryland, College Park	United States	33	32	935	28.33	29.22	17	30
University of Virginia	United States	33	33	3053	92.52	92.52	22	33
Columbia University	United States	33	32	1372	41.58	42.88	18	33
The University of Texas at Austin	United States	31	29	1456	46.97	50.21	19	31
University of Pittsburgh	United States	31	27	1017	32.81	37.67	15	31

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

The top thirty countries contributed to the childcare research publications are listed in Table 10. It was led by the United States with a complete publication of 1460, citations 36089, and h-index 91, followed by United Kingdom (338 publications, 6502 citations, h-index 41), and Canada (201 publications, 2798 citations, h-index 30). Overall, in terms of continent, North America (1661 publications), and Europe (930 publications) continent are most actively contributed to the publications related to childcare topic. Oceania continent contributes to 199 publications (Australia 173 publications, and New Zealand 26 publications). However, the Asia continent, including South Korea (50 publications, 340 citations, h-index 10), Japan (32 publications, 288 citations, h-index 9), China (21 publications, 290 citations, h-index 7), India (18 publications, 148 citations, h-index 6), Israel (18 publications, 602 citations, h-index 9), Hong Kong (16 publications, 106 citations, h-index 6), Malaysia (9 publications, 75 citations, h-index 4), and Singapore (9 publications, 71 citations, h-index 5), contributed to only 173 total publications.

Table 10: Top 30 Countries contributed to the publications

Country	Continent	TP	NCP	TC	C/P	C/CP	h	g
United States	North America	1460	1280	36089	24.72	28.19	91	139
United Kingdom	Europe	338	296	6502	19.24	21.97	41	70
Canada	North America	201	173	2798	13.92	16.17	30	45
Australia	Oceania	173	146	2112	12.21	14.47	23	39
Germany	Europe	111	99	2197	19.79	22.19	26	44
Netherlands	Europe	97	87	2113	21.78	24.29	27	42
Italy	Europe	52	44	1256	24.15	28.55	17	35
South Korea	Asia	50	34	340	6.80	10.00	10	17
Sweden	Europe	49	42	1406	28.69	33.48	20	37
Norway	Europe	46	39	1068	23.22	27.38	18	32
Spain	Europe	44	39	571	12.98	14.64	13	23
Belgium	Europe	34	28	480	14.12	17.14	11	21
Ireland	Europe	33	30	352	10.67	11.73	11	17
Japan	Asia	32	25	288	9.00	11.52	9	16
New Zealand	Oceania	26	22	229	8.81	10.41	9	14
Switzerland	Europe	25	22	460	18.40	20.91	9	21
France	Europe	24	21	240	10.00	11.43	9	15
Finland	Europe	23	19	284	12.35	14.95	9	16
China	Asia	21	16	290	13.81	18.13	7	17
Denmark	Europe	19	15	234	12.32	15.60	7	15
India	Asia	18	11	148	8.22	13.45	6	12
Israel	Asia	18	17	602	33.44	35.41	9	18
Hong Kong	Asia	16	14	106	6.63	7.57	6	10
South Africa	Africa	13	10	161	12.38	16.10	6	12
Austria	Europe	12	11	231	19.25	21.00	7	12
Chile	South America	12	12	107	8.92	8.92	5	10
Portugal	Europe	12	12	173	14.42	14.42	6	12
Czech Republic	Europe	11	9	45	4.09	5.00	4	6

Malaysia	Asia	9	6	75	8.33	12.50	4	8
Singapore	Asia	9	9	71	7.89	7.89	5	8

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

The Co-Authorship by Authors, Institutions, and Countries Actively Contributes to the Childcare Research Publications

The quick and ongoing increase in international collaboration evidenced by co-authorships shows that the underlying social organisation involved in scientific knowledge creation has shifted because most public expenditures are invested with the objective of increasing national capacities, this shift has significant implications for management and policy (Leydesdorff et al., 2014). The researchers seek collaborators who can help advance their study, whether they are conational or not, as scientific activities self-organize in response to the frontiers of knowledge. Meanwhile, the institutions that organise and fund these activities are less adaptable: science-governing organisations are likely to develop at a slower pace than the activities they oversee, where the quick rate of change within the science system toward collaboration, internationalisation, and multidisciplinary linkages poses a challenge to them, and means these developments present serious concerns for the social and political systems that support them (Leydesdorff et al., 2014).

The VOSviewer software was used to visualize authors with minimum of 1 productivity document and without a total citation, as shown in Figure 4. Each of the circles on the map represents a different author. Due to name overlap, certain names may not be displayed. Closed circles indicated active authors of tight scientific collaboration. Based on the dataset, 155 authors with 48 undefined authors have published articles related to the childcare subject since 1930.

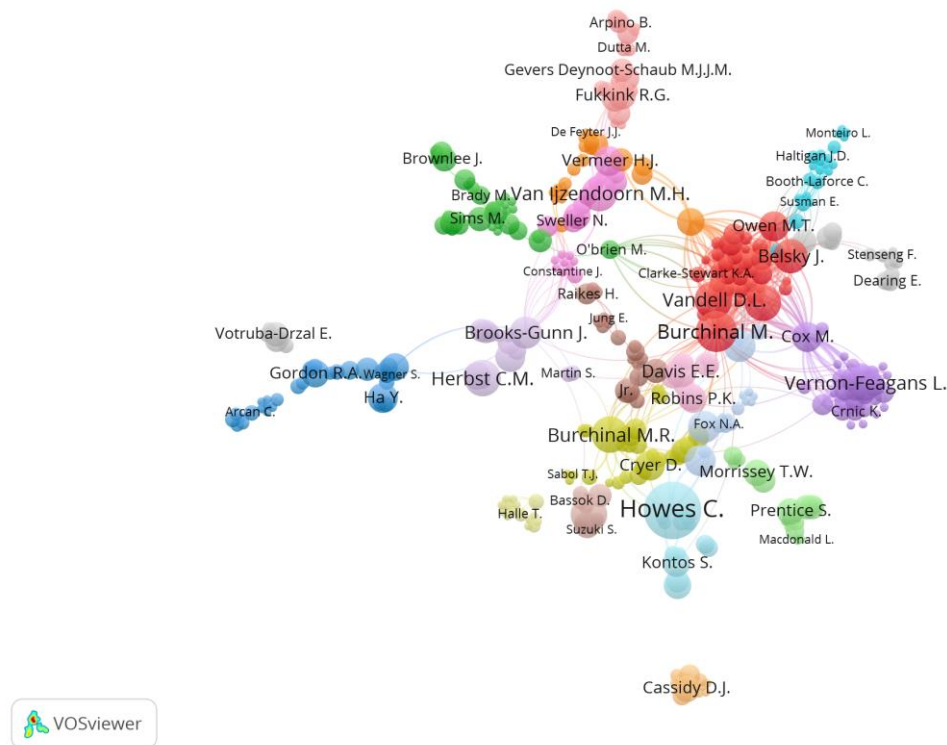


Figure 4: Network visualization map of the co-authorship by authors

Note: Unit of analysis = Authors; Counting method: Full counting; Minimum number of documents of an author = 1; Minimum number of citations of an author = 0

Furthermore, the network visualization map of the co-authorship, with the unit of analysis of an organization, full counting method, with 5 as the minimum number of documents of an organization as illustrated in Figure 5.

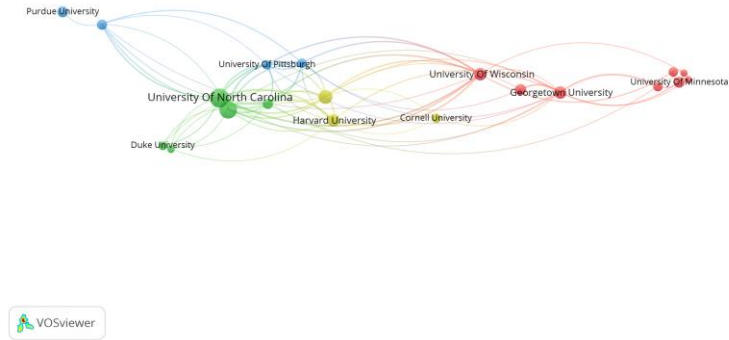


Figure 5: Network visualization map of the co-authorship by institution

Note: Unit of analysis = Organization; Counting method: Full counting; Minimum number of documents of an organization = 5; Minimum number of citations of an organization = 0

In the same way, the network visualization map of the co-authorship, with full counting method, where the unit of analysis of countries, with 5 minimum number of documents of a country as in Figure 6. In the same way, with 5 minimum number of documents by the country, Figure 7 shows the network visualization map of the citation by country. Both Figure 6 and 7 explains that the United States is the most productive country related to childcare publication research articles in terms of co-authorship and citations as well.

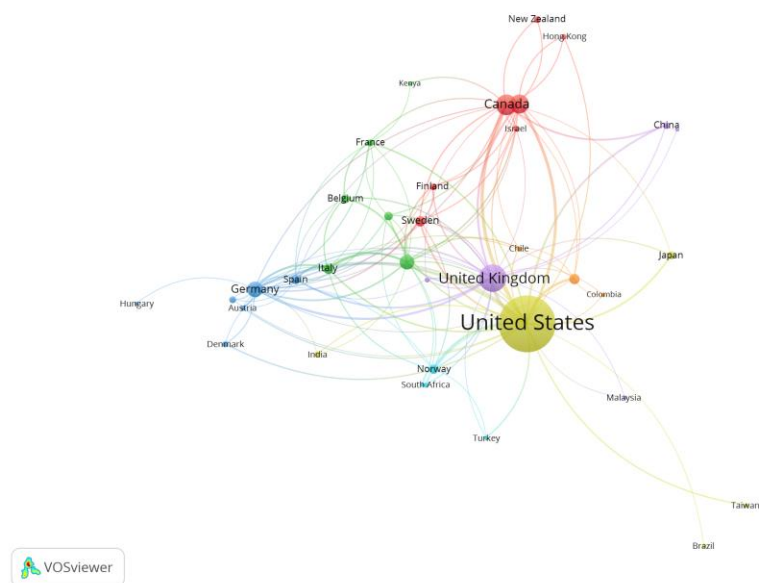


Figure 6: Network visualization map of the co-authorship by countries

Note: Unit of analysis = Countries; Counting method: Full counting; Minimum number of documents of a country = 5; Minimum number of citations of a country = 0

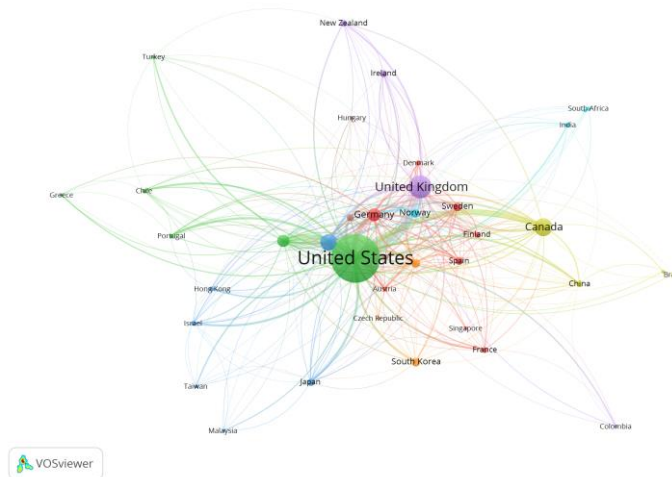


Figure 7: Network visualization map of the citation by countries

Note: Minimum number of documents of country = 5; Minimum number of citations of country = 0

Malaysia: The childcare publication and impact

In Malaysia, the publications as shown in Table 11. There are nine publications in Malaysia on childcare to date. When looking at the Malaysian publication, the majority with the h-index 1 with a limited number of citations, and three of the publications are without the citations yet. Complementary to this, the article's publication based on the Malaysian affiliation is not listed even in the most productive publications and even in the most citations articles until date.

In terms of the co-authorship among the authors in Malaysia, Figure 8 explains the visualization map among these nine publications. The red colour shows that they are in the same cluster among the 41 authors. However, only 21 authors are connected among them, and the remaining are not connected to each other.

In Figure 9, visualize the keywords that have been used among these nine publications with a total of 33 keywords. However, there is no cluster among them was developed. The only cluster that appears in red colour with 8 items of the childcare center, childcare centers, childcare trainees, childminders, early childhood education, encompassing economic, financial factors, and personal values. The remaining 25 keywords (affective skills, bounds testing approach, child care, childcare availability, childcare center management, cognitive skills, communication skills, early childcare, early childhood curriculum, early childhood workforce readiness, educationists, facility and satisfaction, female labor force participation, fertility, granger causality, policy, professionalism, quality assurance, quality care, quality childcare, quality improvement accreditation system (QIAS), safety assurance, training, work conditions) are not interconnected to each other.

Thus, it shows that the childcare research articles in Malaysia are still limited, without the widely coverage. There is a broad space of the research area opportunity to be explored by Malaysian researchers for the benefits of the childcare industry development and its sustainability.

Table 11: Malaysian Childcare Publication based on the Author Affiliation

Authors	Title	Source title	TC	h
Aziz et al. (2021)	Issues in operating childcare centers in Malaysia	International Journal of Evaluation and Research in Education	N/A	N/A
Omar, R. et al.	A successful career in early childhood education: a focus on personal values of	Review of International Geographical Education	N/A	N/A

(2021)	childcare trainees	Online		
Taha, H. et al. (2020)	Malaysian early childcare and childhood education (ECCE) curriculum: Perspectives of Malaysian ECCE educationists	Asia-Pacific Journal of Research in Early Childhood Education	2	1
Foong et al. (2018)	Private sector early child care and education in Malaysia: Workforce readiness for further education	Kajian Malaysia	11	1
Sulaiman, Y. et al. (2017)	A conceptual paper on safety and quality assurance model in Malaysian child care centres	International Journal of Economic Research	N/A	N/A
Hanafi (2015)	The childcare center: How to ensure quality childcare practices	Asian Social Science	2	1
Lee & Lee (2014)	Childcare availability, fertility and female labor force participation in Japan	Journal of the Japanese and International Economies	27	1
Chiam (2008)	Child Care in Malaysia: Then and now	International Journal of Child Care and Education Policy	11	1
Hossain et al. (2005)	Mothers' and fathers' childcare involvement with young children in rural families in Malaysia	International Journal of Psychology	22	1

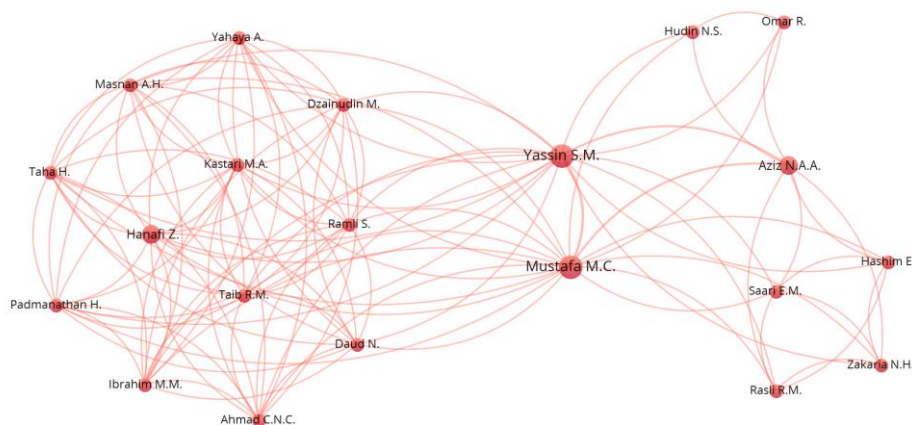


Figure 8: Network visualization map for Malaysia co-authorship

Note: Unit of analysis = Authors; Counting method: Full counting; Minimum number of documents of an author = 1; Minimum number of citations of an author = 0

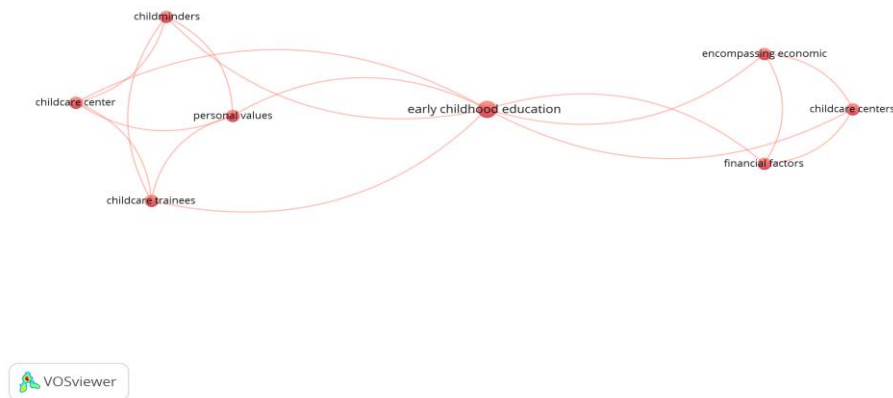


Figure 9: Network visualization map of the keywords in Malaysia

DISCUSSION AND CONCLUSION

In terms of the knowledge structure based on the author's keywords in childcare research, 3778 keywords have been used by the publication, and the most popular keywords are child care, human, article, childcare, and child. In total, there are twelve different clusters in childcare research publications that initially show the vast and broader area of childcare research has been explored. Furthermore, in terms of the publication's trends, the childcare research subject has an increasing pattern and popularity, and it was started in the 1930s with the highest publications in 2021, worldwide.

The top childcare research journals that actively publish articles related to childcare research were Early Childhood Research Quarterly, The Child Care Quarterly, the Children and Youth Services Review, and the Early Education and Development, and were published by leading publishers globally, such as Elsevier, Taylor & Francis, Wiley-Blackwell, Springer Nature, and SAGE.

Overall, there are 61128 citations, with 671.74 citations per year and 20.22 citations per paper for 3023 documents of publications retrieved from the Scopus database. The most cited article is "The relation of preschool childcare quality to children's cognitive and social developmental trajectories through second grade" (655 citations, 32.75 citations per year).

Furthermore, the researchers from the University of California, University of Virginia, Georgetown University, Harvard University, Arizona State University, Columbia University, University of Minnesota Twin Cities, University of Alabama, and the University of Texas are among the most productive authors in the field of childcare research. Howes, C., Burchinal, M., Phillips, D., Vandell, D.L., and McCartney, K. was the most productive authors. Overall, it was led by the United States and followed by the United Kingdom and Canada.

In Malaysia, only nine publications with a limited number of citations, and there are 33 keywords used shown the childcare research articles in Malaysia are still little, and need further exploration among researchers for the benefits of the childcare industry development, especially for its stakeholder's sustainability. The findings emphasize the significance of childcare research in promoting national childcare development for the benefit of children. Given the importance of childcare institutions' concern for the emotional and physical development of children, childcare practitioners must be aware of their obligations.

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