

Review of studies on routine-based interventions in early childhood in terms of bibliometric features

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Suggested Citation:

Guldag, O. & Turan, F. (2025). Review of studies on routine-based interventions in early childhood in terms of bibliometric features. *Cypriot Journal of Educational Science*, 20(1), 1-15. <https://doi.org/10.18844/cjes.v20i1.9686>

Received from November 10, 2024; revised from December 12, 2024; accepted from January 20, 2025.

Selection and peer review under the responsibility of Prof. Dr. Hafize Keser, Ankara University, Turkey (retired)

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iThenticate Similarity Rate: 3%

Abstract

The aim of this study is to examine the studies on routine-based interventions in terms of bibliometric characteristics. In this study, which was designed in accordance with the descriptive scanning model, the Web of Science (WoS) database was used as a data source and the studies were scanned by selecting 'all fields' with the keywords 'routine-based intervention and early childhood'. While determining the inclusion criteria, no time restriction was made, it was paid attention that the research was conducted in the field of education, that it was published in English, that the sample included children in early childhood and/or their families, and 87 studies were included accordingly. Although bibliometric analysis tools have been diversified, VOSviewer 1.6.20 package program and open-source R software were used in this study, and biblioshiny program, which provides an interface in the bibliometric package program, was also used. According to the results obtained, studies on routine-based interventions; the oldest was published in 2000 and the newest in 2023. When the categories of the studies were examined, it was seen that they were most frequently conducted in the fields of 'special education', 'educational research', 'developmental psychology'. It was determined that the studies were most frequently published in the United States of America and the most citations were made to the studies in this country. In addition, keywords, co-author links regarding the co-operation of the authors and detailed information about the most cited studies as well as suggestions for future research were presented to the relevant researchers.

Keywords: Early childhood, routine-based intervention, bibliometric analysis, VOSviewer

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1. INTRODUCTION

Collaborating with caregivers to incorporate intervention into daily activities and routines in natural settings is one of the recommended practices for children with special needs in early childhood (Brown & Woods, 2016). During quality early intervention practices, specialists support primary caregivers to learn how to provide these intervention opportunities in their daily routines to support their children's learning and development (Salisbury et al., 2018). Routine-based interventions that help children develop developmental skills in daily activities, support caregivers in implementing strategies, and ensure the development of skills of both children and caregivers are considered as natural environment interventions (Windsor, Woods, Kaiser, Snyder, & Salisbury, 2019). Routine-based teaching, which is addressed together with family-centred teaching plans for the first time in the literature, is defined by McWilliam (2010) as one of the approaches that focuses on achieving functional outcomes by providing children with learning opportunities in naturally occurring contexts, i.e. daily routines, i.e. focusing on the child's independence, social relationships with others and parents' satisfaction with routines, and requires systematic cooperation and collaboration to set functional goals and implement service plans with the family.

By focusing on the child's daily routines, early intervention specialists and teachers use these routines as a tool to understand, plan and assess what activities the child regularly participates in, what he/she can do in these routines, and what skills he/she needs to learn in order to be successful in terms of independence, participation and social relations in each routine (McWilliam, Casey, & Sims, 2009; McWilliam, 2012). In this context, determining the skills that are appropriate for the child's performance and the teaching process and determining the goals for them is one of the points to be considered in this process, and while preparing the child's plan, the goals should be understandable, observable, measurable and generalisable in a natural context that supports home, school or institutional routines, determined according to the priorities of the family (Boavida, Aguiar & McWilliam, 2014).

In the literature, it is seen that there are research findings on the effective use of routine-based instruction and interventions in various study groups and fields. In a study aiming to compare a traditional home visit-based traditional programme and a routine-based early intervention programme focusing on the developmental areas of children with developmental delay or at risk, it was found that the routine-based intervention group made faster progress in self-care functions and independence in social functions in the first three months and at the six-month follow-up (Hwang, Chao, & Liu, 2013). As emphasised by Almeida et al. (2011), the learning process in early childhood is not limited to intensive interventions once or twice a week for a certain hour, but rather requires continuous and daily learning in which the main provider provides emotional comfort during routine moments of the child.

In the literature, studies aiming to create structured and familiar routines to support children's learning processes in general education as well as in special education are found. Haines et al. (2013) examined the effectiveness of a home-based intervention aimed at improving home routines known to be associated with childhood obesity in a sample of young children from low-income, racial and ethnic minority families, and found an increase in sleep duration, a greater reduction in TV viewing on weekend days, and a decrease in body mass index in participants receiving the intervention compared to the control group. In addition to these, the telepractice method, which makes it possible to provide remote services in health, education and other fields, is now coming to the fore in routine-based research. In a study conducted by Akemoğlu, Laroue, Kudeseý, and Stahlman (2022), a self-directed, internet-based, distance learning programme was evaluated to teach evidence-based intervention techniques to children with developmental delay, and it was found that after self-education and distance coaching, parents used natural communication teaching strategies at higher rates and accurately, children initiated more communicative actions and increased the number of single and multi-word responses when parents used time delay from natural communication teaching strategies. Therefore, in future educational research, it is important to examine studies on routine-based interventions in determining appropriate learning

strategies to support both children with special needs and children with normal development in various fields. In the literature, while systematically examining studies on routine-based teaching approaches for children with developmental disabilities (Ergin & Diken, 2019) and language-focused interventions for young children with culturally and linguistically diverse backgrounds (Larson et al., 2020), studies based on natural routines were identified, but no research was found in which a general evaluation of studies on routine-based interventions was conducted. In parallel with this, our study aimed to examine the studies on routine-based interventions in terms of bibliometric characteristics. Bibliometric analysis reveals which topics are studied more in research on routine-based interventions, the structure, impact, trends and collaborations of scientific literature. Depending on the main objective, the following sub-objectives will be analysed:

- How is the distribution of routine-based intervention studies in early childhood according to years and number of citations?
- How is the distribution of the most contributing authors and co-author network structure in routine-based intervention studies in early childhood?
- What is the distribution of the most relevant journals and contributing countries in routine-based intervention studies in early childhood?
- What is the distribution of countries according to citations in routine-based intervention studies in early childhood?
- What is the distribution of the most relevant institutions in routine-based intervention studies in early childhood?
- What is the distribution of the most frequently used keywords in routine-based intervention studies in early childhood according to years?
- How were the keyword links used in routine-based intervention studies in early childhood realised?

2. METHODS AND MATERIALS

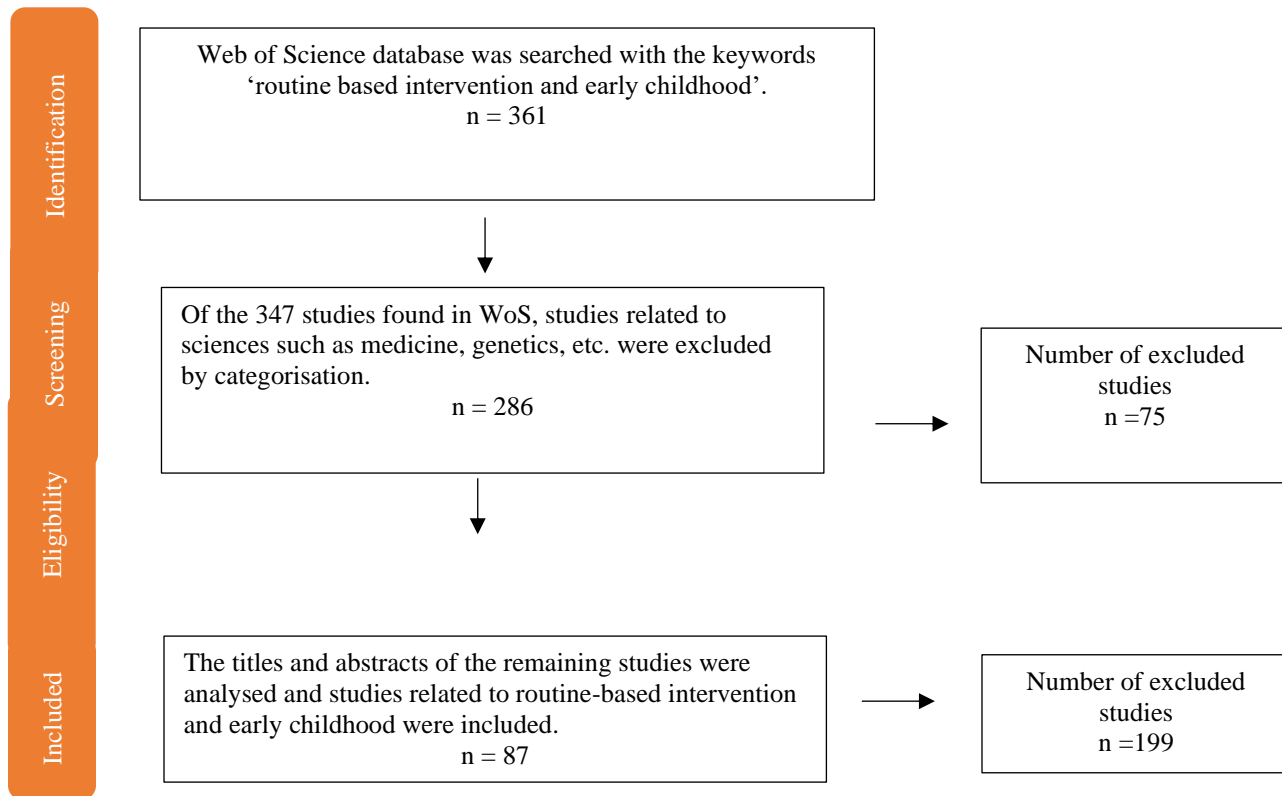
This study, which examines the studies on routine-based interventions in early childhood in terms of bibliometric characteristics, was prepared in accordance with the descriptive survey model, which is one of the quantitative methods. Karasar (2020) defines the survey model as research that aims to describe a situation that has existed in the past or continues to exist as it exists.

2.1. Data Collection Tool and Process

Web of Science (WoS) was used as the data source for bibliometric analysis. According to Guo (2022), the WoS database is a globally recognised database reflecting the level of scientific research and is accepted as the world's most authoritative scientific literature index tool that can provide research results considered important in the field of science. In the process of determining the studies to be included in the search, firstly, a search was made on 12.01.2024 by selecting 'all fields' with the keywords 'routine based intervention and early childhood', and 347 results were found in the search. When analysed according to categories, studies in the field of medicine were excluded and 222 studies were obtained as a result. The titles and abstracts of these studies were analysed, and a total of 87 studies including routine-based studies in early childhood were included in the study.

Figure 1

The Workflow for the Screening and Inclusion Process



We found 73 journal articles, 1 book chapter, 6 early access studies, 1 bibliography, 5 reviews and 1 early access review in 53 sources (books, journals), with the oldest being 2000 and the most recent being 2023. When the categories of the studies are examined, it is seen that most of the studies are in the field of special education (32), educational research (20), developmental psychology (16), paediatrics (9), rehabilitation (8), educational psychology (6). The average of the citations of the analysed studies in the literature is 17,99. The number of references to other publications in the analysed studies was 4126. It is seen that the studies were written by 297 authors using 337 keywords. It is also seen that there are 9 studies with a single author and the number of co-authors per document is 3.71. Finally, the percentage of international publications co-authored by the authors was found to be 17.24%. Descriptive information about the bibliographic data of the studies included in the study is presented in Table 1.

Table 1

Descriptive Information About the Analysed Studies

Descriptive information	Results
Time range	2000:2023
Sources (Books, magazines...)	53
Documents	87
Annual growth rate %	11,41
Average age of documents	7,48
Average citations per document	17,99
References	4126
Document contents	

Key words	337
Authors	297
Number of single authored documents	9
Author collaborations	
Co-authorship per document	3,71
International co-authorship %	17,24
Document types	
Article	73
Article; book chapter	1
Article; early access	6
Bibliography	1
Review	5
Review; early access	1

2.2. Data Analysis

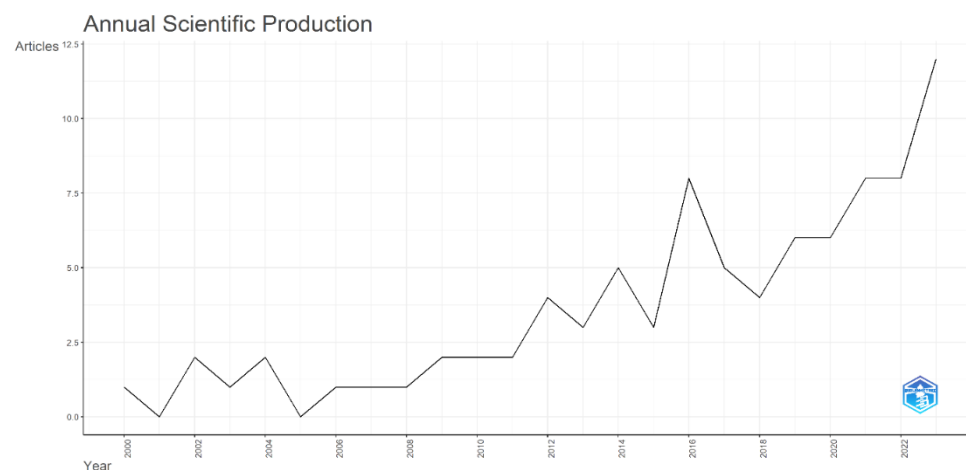
Bibliometric analysis method was used to analyse the data obtained in parallel with the research aim. Bibliometric analysis helps to summarise large amounts of bibliometric data (such as publication and citation units) to present the state of the intellectual structure of a research field or subject and emerging trends (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021). Bibliometric analysis is an analytical method that is used to obtain formal and quantitative data on the current situation in a particular field and facilitates the follow-up of academic trends through visualisation software and differs from systematic literature review (Dirik, Eryilmaz, & Erhan, 2023). Although bibliometric analysis tools have been diversified, VOSviewer 1.6.20 package programme and open source R software were used in this study, and the biblioshiny programme, which provides an interface in the bibliometric package programme, was also used. By using these programmes, publication years, number of citations, related journals, related authors, distribution of scientific production according to countries, frequently used keywords, co-authorship analyses and other various analyses were included.

3. Results

The analysis findings obtained in the study are presented in this section. Firstly, Figure 2 shows the scientific production of studies on routine-based interventions in early childhood according to years, and the WoS database was not filtered according to years.

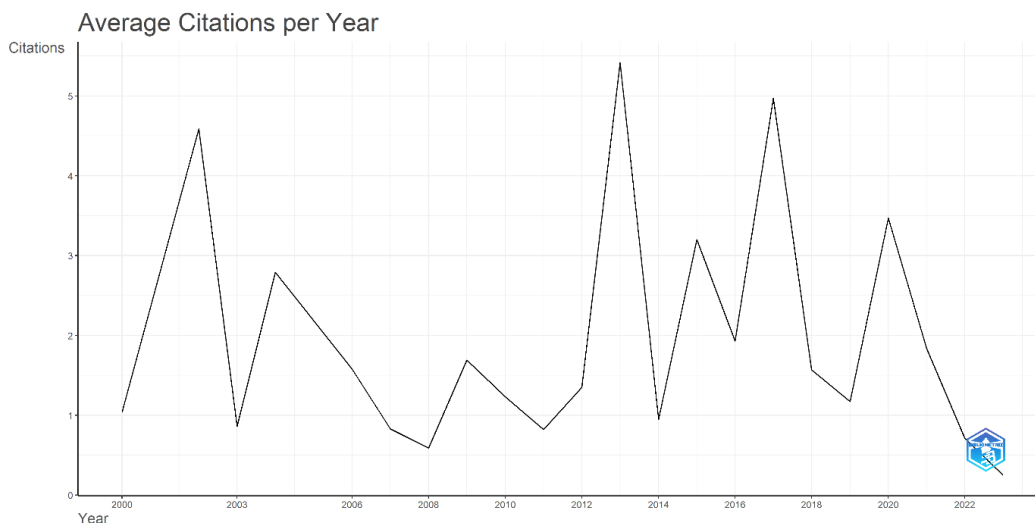
Figure 2

Distribution of Annual Scientific Production



According to Figure 2, the first document was found in 2000, in some years (2001, 2005) there were no publications in this database, and a steady progress was made between 2006-2008. However, although there were decreases between 2008-2018, the number of publications increased after the decreases and showed progress. It was determined that the most frequent publication in the WoS database was in 2023 (n= 12).

Figure 3
Average Citation Distribution



In Figure 3, the distribution of the average number of citations of the publications obtained from the WoS database is presented. According to this figure, it is seen that the average citations were high in 2002 when the first publications were seen. 2013 was the most cited year with an average of 5.4 citations, and after this year, a decrease in average citations was observed. After 2014, average citations increased and decreased in various years between 0 and 5. By 2022, the average number of citations decreased.

Figure 4
Distribution of the Most Cited Publications Globally

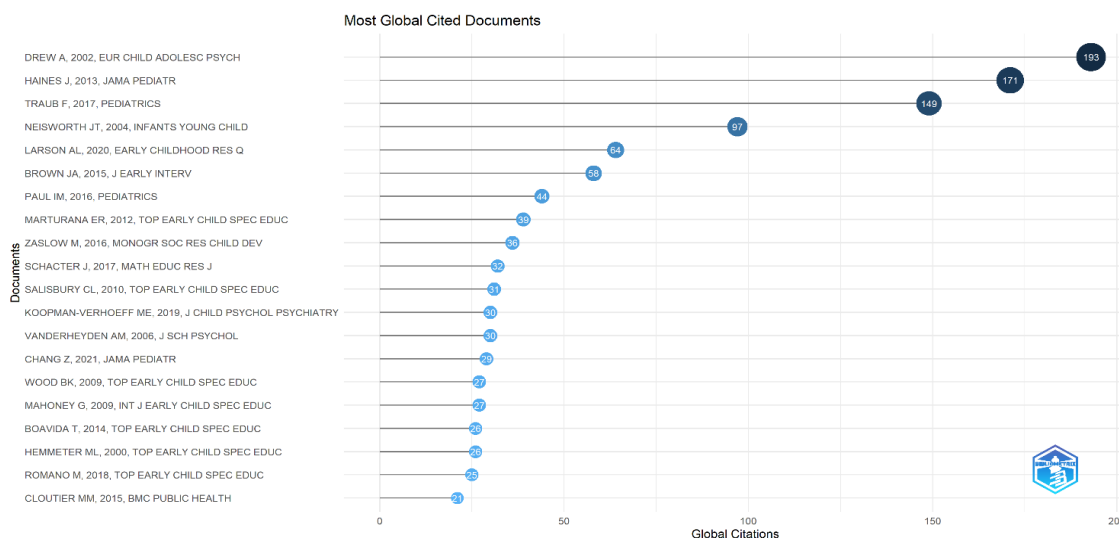


Figure 4 shows the top 20 most cited studies globally indexed in the WoS database. According to this figure, it is seen that the most cited study with 193 citations is the study by Drew et al. in 2002. This is followed by the study

by Haines et al. in 2013 with 171 citations. The third most frequently cited study is the study by Traub and Boynton-Jarrett in 2017 with 149 citations. Detailed information about the subjects and journals of the top 10 most cited studies mentioned here are presented in Table 2.

Table 2

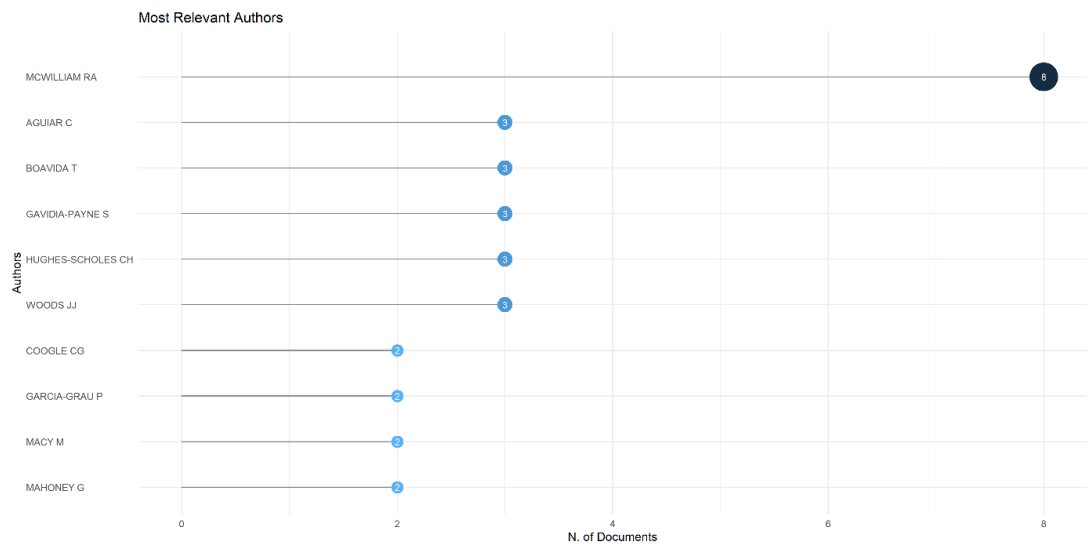
Information on the 10 Most Cited Studies Globally

1. Author, year of publication	Title of the study	Journal of publication	Total number of citations
Drew, A., Baird, G., Baron-Cohen, S., Cox, A., Slonims, V., Wheelwright, S., & Charman, T. (2002).	A pilot randomised control trial of a parent training intervention for pre-school children with autism: Preliminary findings and methodological challenges	European Child & Adolescent Psychiatry	193
Haines, J., McDonald, J., O'Brien, A., Sherry, B., Bottino, C. J., Schmidt, M. E., & Taveras, E. M. (2013)	Healthy habits, happy homes: randomized trial to improve household routines for obesity prevention among preschool-aged children	JAMA pediatrics,	171
Traub, F., & Boynton-Jarrett, R. (2017)	Modifiable resilience factors to childhood adversity for clinical pediatric practice	Pediatrics	149
Neisworth, J. T., & Bagnato, S. J. (2004)	The mismeasure of young children: The authentic assessment alternative	Infants & Young Children	97
Larson, A. L., Cycyk, L. M., Carta, J. J., Hammer, C. S., Baralt, M., Uchikoshi, Y., & Wood, C. (2020)	A systematic review of language-focused interventions for young children from culturally and linguistically diverse backgrounds	Early Childhood Research Quarterly	64
Brown, J. A., & Woods, J. J. (2015)	Effects of a triadic parent-implemented home-based communication intervention for toddlers	Journal of Early Intervention	58
Paul, I. M., Savage, J. S., Anzman-Frasca, S., Marini, M. E., Mindell, J. A., & Birch, L. L. (2016)	INSIGHT responsive parenting intervention and infant sleep	Pediatrics	44
Marturana, E. R., & Woods, J. J. (2012)	Technology-supported performance-based feedback for early intervention home visiting	Topics in Early Childhood Special Education	39
Zaslow, M., Anderson, R., Redd, Z., Wessel, J., Daneri, P., Green, K., & Martinez-Beck, I. (2016)	I. Quality thresholds, features, and dosage in early care and education: Introduction and literature review	Monographs of the Society for Research in Child Development	36
Schacter, J., & Jo, B. (2017)	Improving preschoolers' mathematics achievement with tablets: A randomized controlled trial	Mathematics Education Research Journal	32

As presented in Table 2, the most cited study in the WoS database with 193 citations worldwide is 'A pilot randomised control trial of a parent training intervention for pre-school children with autism: Preliminary findings and methodological challenges'. In this study, a pilot randomised controlled trial of a parent training intervention for the development of joint attention skills and joint action routines for pre-school children with autism was conducted and preliminary findings and methodological challenges were shared. This study was published in the journal *European Child & Adolescent Psychiatry*. Another study with the highest number of citations is the article titled 'Healthy habits, happy homes: randomised trial to improve household routines for obesity prevention among preschool-aged children' published by Haines et al., in 2013 with 171 citations. In this study published in *JAMA pediatrics*, a randomised trial on an intervention prepared to improve home routines in the prevention of obesity in early periods was presented. The third most cited study is 'Modifiable resilience factors to childhood adversity for clinical paediatric practice' by Traub and Boynton-Jarrett (2017), published in *Pediatrics* with 149 citations. Among these factors, teaching parents the importance of good self-care skills and consistent home routines is emphasised. Other most cited studies involving routines in early childhood included parent-implemented home-based communication interventions (Brown & Woods, 2015), responsive parenting

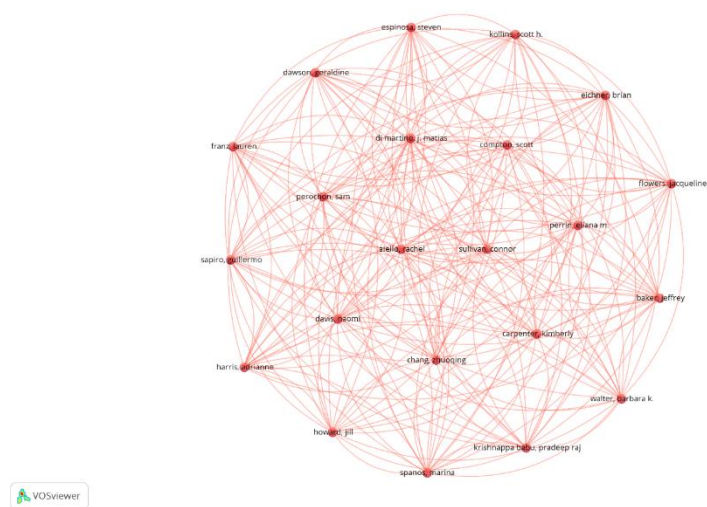
intervention and infant sleep (Paul et al., 2016), technology-assisted performance-based feedback during home visits in early intervention (Marturana & Woods, 2012), and improving preschoolers' maths achievement with tablets (Schacter & Jo, 2017).

Figure 5
Distribution of Relevant Authors



The distribution of relevant authors who published studies on routine-based interventions in early childhood is presented in Figure 5. Accordingly, the top 5 most relevant authors were McWilliam (8 publications), Aguiar C. (3 publications), Boavida T. (3 publications), Gavidia-Payne S. (3 publications) and Hughes-Scholes C. H. (3 publications). The co-authorship analysis of the authors on the subject is given in Figure 6.

Figure 6
Co-author links for co-operation of authors



According to the co-authorship analysis of the authors given in Figure 6, the criteria of at least 1 publication and at least 1 citation were selected to identify the most connected and most collaborating authors, and a network map was created. According to this network map; in the analysis made among the names with the most

connections between them, 22 authors merged in a single cluster and a total of 231 connections were found. The first five of the 22 most connected authors were found as Aiello R., Baker J., Carpenter K., Chang Z., Compton S. Each of the 22 most linked authors has a total of 21-unit links. It is also seen that the most cited authors presented in Table 2 (Drew et al. with 193 citations, Haines et al. with 171 citations and Traub and Boynton-Jarrett with 149 citations) are not among the most linked authors.

Figure 7
Distribution of the Most Relevant Journals

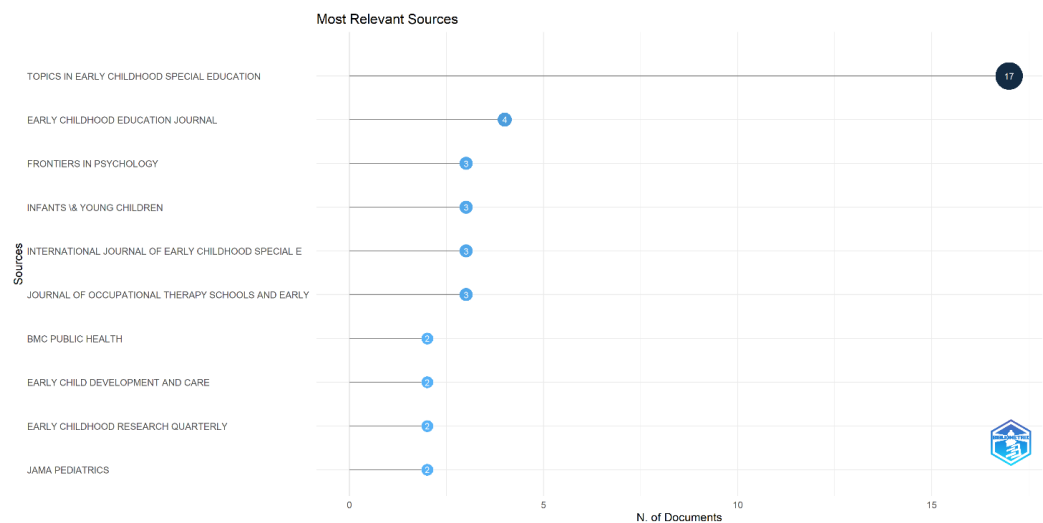
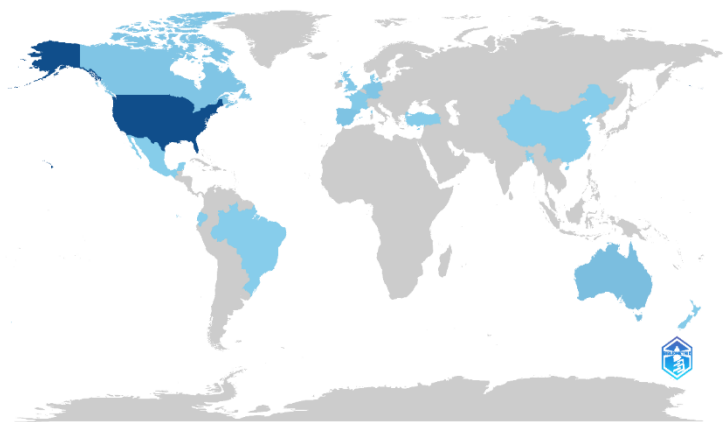


Figure 7 shows the ranking of the most relevant journals in the field of routine-based intervention in early childhood. The 5 journals with the most publications on this topic are Topics in Early Childhood Special Education (17 publications), Early Childhood Education Journal (4 publications), Frontiers in Psychology (3 publications), Infants & Young Children (3 publications), International Journal of Early Childhood Special Education (3 publications).

Figure 8
Distribution of Countries According to Scientific

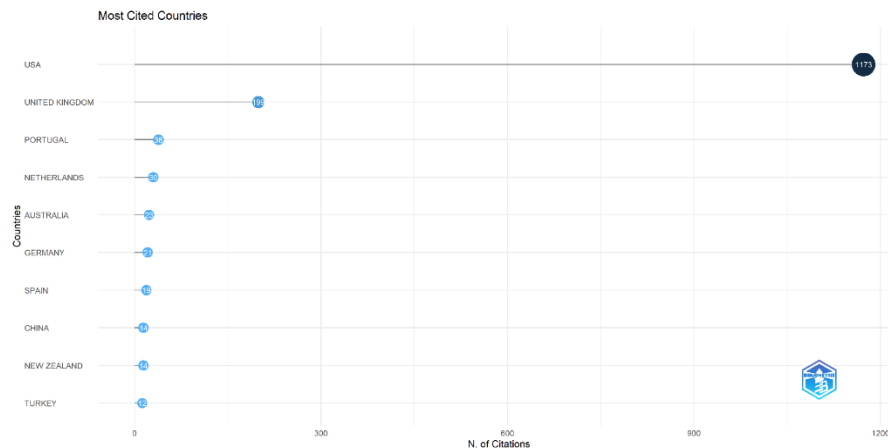
Country Scientific Production



The countries where routine-based intervention studies in early childhood are published are given in Figure 8, and

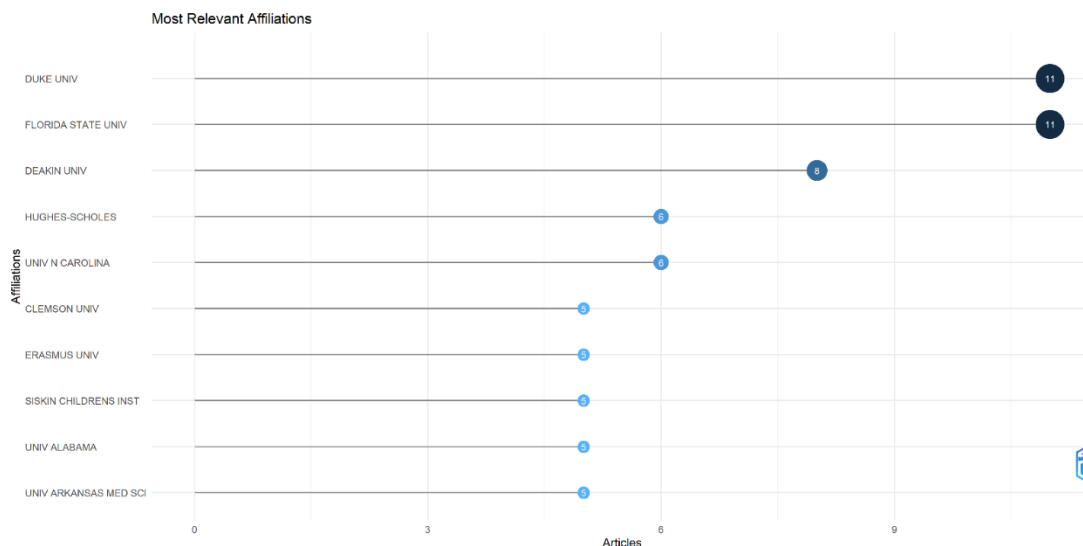
accordingly, it was observed that the most frequent publication was made in the United States of America. Scientific productions on the basis of routine in early childhood interventions were also observed in Spain, Portugal, Canada, Germany, the United Kingdom, France, the Netherlands and Turkey.

Figure 9
Distribution of Countries According to Citations



In Figure 9, the citations given to publications according to countries are analysed and it is seen that the most citations are given to the studies published in the United States of America with 1173 citations. With 199 citations, studies published in the United Kingdom ranked second, with 38 citations, studies published in Portugal ranked third, and with 12 citations, studies published in Turkey ranked 10th.

Figure 10
Distribution According to the Most Relevant Affiliations



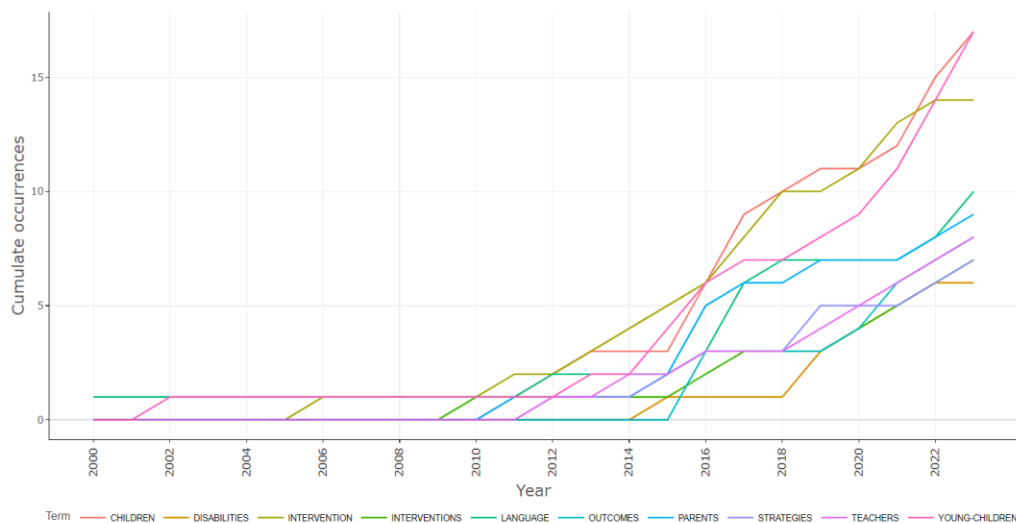
The affiliations where interventions on routines in early childhood are studied are given in Figure 9. According to Figure 10, the first two institutions are Duke University (11 publications) and Florida State University (11 publications) in the United States of America. The third institution with the most frequent publications on the examined topic is Deakin University in Australia (8 publications).

Figure 11
Frequently Used Keywords



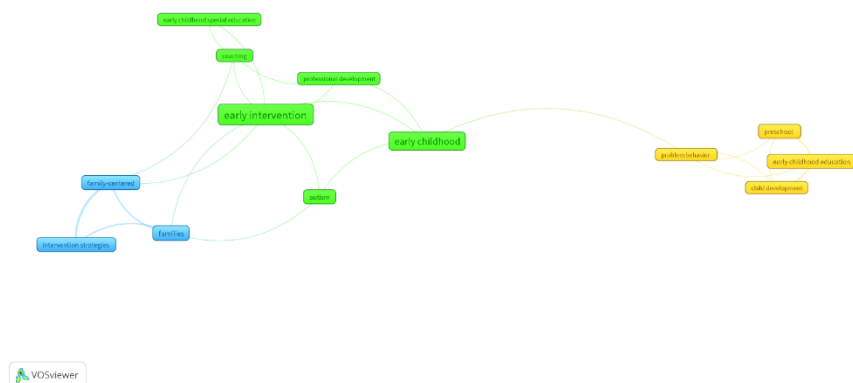
Figure 11 presents the keywords frequently used in the studies analysed. The top 10 keywords are ‘children’, ‘young children’, ‘intervention’, ‘language’, ‘parents’, ‘outcomes’, ‘teachers’, ‘interventions’, ‘strategies’ and ‘barriers’. The following less frequently used keywords are ‘early intervention’, ‘implementation’, ‘programme’, ‘education’, ‘preschool children’, ‘quality’, ‘autism’, ‘communication’ and ‘daily routines’. Data on the frequency of use of these keywords over time are given in Figure 12.

Figure 12
Distribution of Keywords According to Years



According to Figure 12, which presents the distribution of the keywords used in the analysed studies according to years, the keywords 'child', 'parents', 'strategies', 'teachers' are the keywords that started to be used after 2010s and increased in frequency in the following years. The word 'disability' has been used since 2014 and its use has increased over the years. Since 2005, the word 'intervention' has been used frequently until today by showing a continuous increase. Until 2011, the use of the word 'language', which was seen in the studies once a year until 2011, started to be seen more frequently over the years.

Figure 13
Keyword Links



The co-existence of the most frequently used keywords in the intervention studies on routines in early childhood is presented in Figure 13, and it is seen that the strongest words in terms of total connection strength are 'early intervention', 'early childhood' and 'early childhood education'. As a result of the analysis made with 13 link units that were seen at least 3 times and a relationship was detected between them, 3 clusters emerged, 23 links and 29 link strengths were detected. In the first cluster, the five keywords with the highest connection and total connection strength are 'autism', 'coaching', 'early childhood', 'special education in early childhood', 'early intervention'. In the second cluster, the four keywords with the highest connection strength are 'child development', 'early childhood education', 'preschool' and 'behavioural problems. Finally, the common keywords in the third cluster are 'families', 'family-centred' and 'intervention strategies.

2. CONCLUSION AND DISCUSSION

In this study, it was aimed to analyse the studies on routine-based interventions in early childhood in terms of bibliometric characteristics. The studies in the field related to this subject were analysed in terms of publication years, citation information, authors, affiliations, journals in which they were published and keywords. According to the findings, it was determined that the first publication on the subject was published in 2000. It is seen that routine-based teaching was first addressed in the literature with family-centred teaching plans, and this teaching emerged by integrating the McWilliam model and the individualised inclusion model in natural environments (Ergin & Diken, 2019). With the influence of Bronfenbrenner's (1997) bioecological model, the idea that all the contexts in which children develop should be carefully examined and that other systems interact with each other on the systems in which the child is located, scientific research in these years emphasises that the opportunity to shape the developmental course and learning of children is related to the adults in the child's life (McWilliam, 2016).

According to the findings obtained from the WoS database, 2013 was found to be the most cited year, and after this year, a decrease was observed in the average citations. It can be said that the diversification of teaching methods today has a role in the decrease in interest in routine-based teaching over time. It can be said that technology integration plays a major role especially in the field of education and educators use technology to create more effective learning environments by taking into account individual differences, learning abilities and learning environments (Dickinson & Bass, 2020), and that this method provides students with personalised learning opportunities and allows them to learn at their own pace (Elvan & Mutlubaş, 2020). Although a limited number of studies have been directed towards this method, studies have started to be conducted on the provision

of routine-based intervention services through internet technology (Akemoğlu et al., 2022; Akemoğlu et al., 2020; Meadan et al., 2016). In this way, it is thought that routine-based teaching can become adaptable for some situations and groups, and thus may play a role in increasing the interest in this method.

When the ten most cited studies globally are examined, in parallel with the purpose of our study, most of the study groups targeted preschool children (Drew et al., 2002; Schacter & Jo, 2017), families were included in education and intervention programmes (Brown & Woods, 2015; Paul et al, 2016), many of which were conducted with randomised controlled trial method, examining the integration of technology-based interventions in children's education and development processes (Marturana & Woods, 2012), healthy habits and home routines (Haines et al., 2013), and authentic and performance evaluation methods (Neisworth & Bagnato, 2004). Considering these studies, it is seen that routine-based interventions can be used not only in special education but also in general education in various subjects. With various nature-based teaching approaches such as natural context-based language teaching, basic response teaching, demand-modelling and wait-time teaching in special education (Woods et al., 2004), supporting learning in daily activities in early childhood education (Cunha, Major, Alves, & Coroado, 2022), realising routines about healthy living within certain activities (Haines et al, 2013), in the creation of daily routines and planning learning goals in the classroom (Golubović, Đorđević, Ilić, & Nikolašević, 2022) and in the family environment, the use of routines in the creation of daily life routines to support the development of the child is considered as an effective method (Spagnola & Fiese 2007).

The top five authors who most frequently published research on routine-based interventions in early childhood were McWilliam R. A. (USA), Aguiar C. (Portugal), Boavida T. (USA), Gavidia-Payne S. (Australia) and Hughes-Scholes C. H. (Australia). However, according to the co-authorship analysis of the authors, it was seen that the first five of the most connected and most collaborating authors were Aiello R., Baker J., Carpenter K., Chang Z. and Compton S., and the authors who were cited the most were not among the most connected authors. It was found that these studies were mostly published in *Topics in Early Childhood Special Education*, which is a peer-reviewed academic journal of SAGE Publications publishing articles in the field of education. When we look at the countries where routine-based intervention studies are published, it is noteworthy that most of the publications are made in the United States of America, these studies are frequently studied at Duke University and Florida State University, and the studies conducted in the United States of America receive the most citations. It is thought that the United States of America leads these studies due to the presence of leading universities and research institutions worldwide.

In order to make inferences about which topics are popular in the research fields and which aspects the research focuses on, the keywords frequently used in routine-based intervention research were analyzed and it was determined that “child”, “young children”, “intervention”, “language”, “parents”, “outcomes”, “teachers”, “interventions”, “strategies” and “barriers” were used. It is also noteworthy that the keywords “children”, “parents”, “strategies” and “teachers” were frequently used starting from the 2010s and increasing in the following years, while the keyword “intervention”, which has been used since 2005, has shown a continuous increase and has been frequently used until today. The frequent use of the keyword “parents” reveals that parental involvement is taken into consideration in research (Hinton et al., 2024) and the importance of training and supporting parents in terms of the sustainability of successful intervention programs. The prominence of the keyword “teachers” indicates that studies have been conducted on the role of teachers in intervention processes and that attention has been paid to these processes and the strategies teachers use to support children's language and social-emotional development. Teachers' planning and implementation of vocabulary instruction during routine activities to develop children's vocabulary provides opportunities to teach children new words during classroom routines (Rahn, Storie, & Coogle, 2023). When the co-occurrence of keywords was analyzed, it was seen that the words “early intervention”, “early childhood” and “early childhood education” were frequently used together. It reflects that research has focused on various intervention methods and strategies to support children's development, and that there is an increased interest in the design and implementation of effective programs, especially in the field of education and development.

Our study has some limitations. First, routine-based interventions are considered for both early childhood and older age groups. Therefore, in future studies, studies conducted in this field without age or period limitations can be considered more comprehensively. In addition, a database limitation was made in identifying the studies and only the Web of Science database was used. In future studies, the use of different databases may expand the

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scope of the research.

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