

RESEARCH ARTICLE

Adapted Physical Education for Autism Spectrum Disorder: A Bibliography Analysis in Publication 2001-2023

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Abstract

This study chose the Pubmed database (one of the world's leading databases) as the research sample and data source to be used in the bibliometric analysis. The research sample of 143 articles was published following keyword search conditions. To explore and identify key thematic areas as well as emerging topics using keyword co-occurrence analysis. To support the visualization and analysis process of the data obtained, the Vosviewer application is used. The results of this study show that APE for ASD is a research field that still needs development, this is seen from the productivity in publications ranging from 2001 to 2023, whose publication range is still below 85 articles per five years. In the visualization section, the density of high keywords is presented in 5 clusters, namely: (1) disorder; (2) service; (3) quality; (4); student (5) intervention. Bibliometric analysis in the form of mapping this analysis provides conveyance to the public regarding the pattern of publication development in the field of APE for ASD. With these findings, it helping make a multi-year research roadmap. Furthermore, it contributes to further next research, namely such as: 1) The need for holistic research on the dimensions of disorder, service, quality, and student that cluster; and, 2) the need for in-depth research focusing on one or more of the themes that are still rarely studied. such as motor skills, eating, COVID, autistic adult, Emily, home, depression, mother, care, and autistic individual

Keywords

Adapted Physical Education, Autism Spectrum Disorder, Bibliography, VOSviewer

INTRODUCTION

Adaptive physical education (APE) can include students who are not identified by the school in a particular regional unit (eg: applied at

the subdistrict, district, provincial, up to national levels. APE is intended for persons with disabilities stipulated in law. People with disabilities in question are those who have unique needs that require a tailor-made program. such groups may include learners who have limitations

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due to injury or other medical conditions; those with low fitness (including unusually thin or obese), inadequate motor development, or low skills; or those with poor functional posture. These learners may require individually designed programming to meet unique goals and objectives (Martin, 2014; Winnick & Porretta, 2017).

APE with disabilities of a certain age requires intervention services due to delays in cognitive, physical, communication, and social & emotional development. that is diagnosed as having a high likelihood of causing developmental delays (Kaloka et al., 2019; Winnick & Porretta, 2017). Although APE can be intended for several age levels with unique needs, one of the emphases of adaptive physical education is on children with Autism Spectrum Disorder (ASD). ASD is those who experience emotional and behavioral barriers, and communication and are accompanied by certain other conditions (Phytanza et al., 2023; Phytanza & Burhaein, 2019). The general characteristics of autistic children are as follows (American Psychiatric Association, 2013): (1) Continuous deficits in communication and social interaction in various situations throughout life, from birth to the present; (2) Limited patterns of repetitive behavior, interests, or activities as indicated by at least two of the following statements on history from birth to present; (3) symptoms must be present early in development (although they may not fully manifest until social demands exceed limited capacity, or maybe hidden by strategies learned later in life); (4) Symptoms cause clinically significant obstacles to current social, occupational, or other important areas of functioning.

Disability with ASD barriers has certain differences compared to those with intellectual disabilities (intellectual disabilities) or intellectual development disorders. Intellectual impairment and autism are possible and possible because these obstacle conditions occur simultaneously in ABK individuals (American Psychiatric Association, 2013; Phytanza et al., 2021). To make a concomitant comorbid diagnosis between autism and intellectual impairment, it is necessary to analyze social communication at the level of development of disability in general.

Several writings related to ASD in APE, one of which is the writing of Bodnar et al. (2020) which reviews literature studies related to the structure and influence of intervention programs. His writing used scientific study methods in 2000-2019 on the effect of implementing PE programs papers). The publication year range used is 2001-2023.

Research Design

To get the metadata of the article, researchers searched for the phrase in the PubMed

for children with ASD, participants generally varied in age, level of functional ability, and intelligence quotient. Short trial duration (8-14 weeks); The frequency of intervention is not the same, training sessions last 45-60 minutes. Sports activities with proven effectiveness are swimming as well as water games, running, walking, imitating horse riding, elements of yoga, and oriental martial (Bodnar et al., 2020; Phytanza et al., 2022).

Next is Hortal-Quesada & Sanchis-Sanchis (2022) related to the study of physical education literature in elementary school ASD. The results obtained suggest the implementation of cooperative learning strategies to increase their participation; introduction of psychomotor activities, as well as team, play to reduce stereotyped behavior, improve behavior and emotional control, and foster social and communicative skills; and provide tasks and games aimed at developing basic motor skills as well as coordination abilities to improve motor skills (Hortal-Quesada & Sanchis-Sanchis, 2022).

Therefore, one of the gaps that will be developed as well as the reason why this research was conducted by reviewing extensively related to APE in ASD. The research process focused on the following research questions: (1) how is the APE for ASD children viewed from the publication map? (2) What is interesting for academics in terms of thematic areas? and (3) What topics are often written about in publications?

MATERIALS AND METHODS

Source

This study chose the Pubmed database (one of the world's leading databases) as the research sample and data source to be used in the bibliometric analysis. In order to approach action to implement the framework Helsinki Statement, one of the key activities that build capacity is to build research capacity. It says, "Efforts should be made to share expertise and allow access to quality data and technical assistance across sectors." (WHO, 2014).

Data was collected on May 10, 2023, using keywords in the title of the article "Physical education autism spectrum disorder". Researchers managed to get the publication of scientific papers amounting to one hundred and forty-three (143

database on May 10, 2023, which included a Title Search for "physical education autism spectrum disorder". There are 143 publications indexed by PubMed. The tracing procedure is presented in Figure 1.

This study used bibliometric analysis using publication mapping and keyword co-occurrence analysis, which is a type of co-word analysis (Kaparathi, 2005). Researchers map search results from Publish or Perish then perform inputs in VOSViewer, apply keyword co-occurrence analysis to determine publication trends, and drill down into the main theme or topics that appear in the publication.

At the data presentation stage, the researcher visualized it assisted by an application, namely

Vosviewer. This application was developed by researchers affiliated in Leiden University (van Eck & Waltman, 2010). Researchers use several parameters in VOSViewer in obtaining article metadata, including 1) Type of analysis (Co-occurrence analysis), 2) Unit of analysis (All keywords), 3) Calculation method (Full counting), and 4) the Minimum number of authors documents (10 documents).

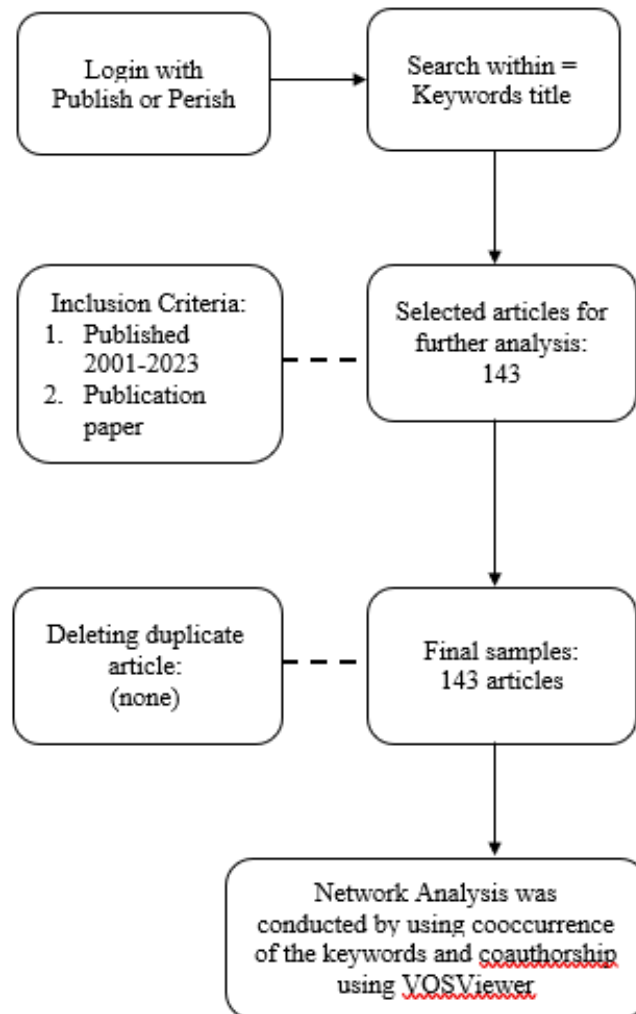


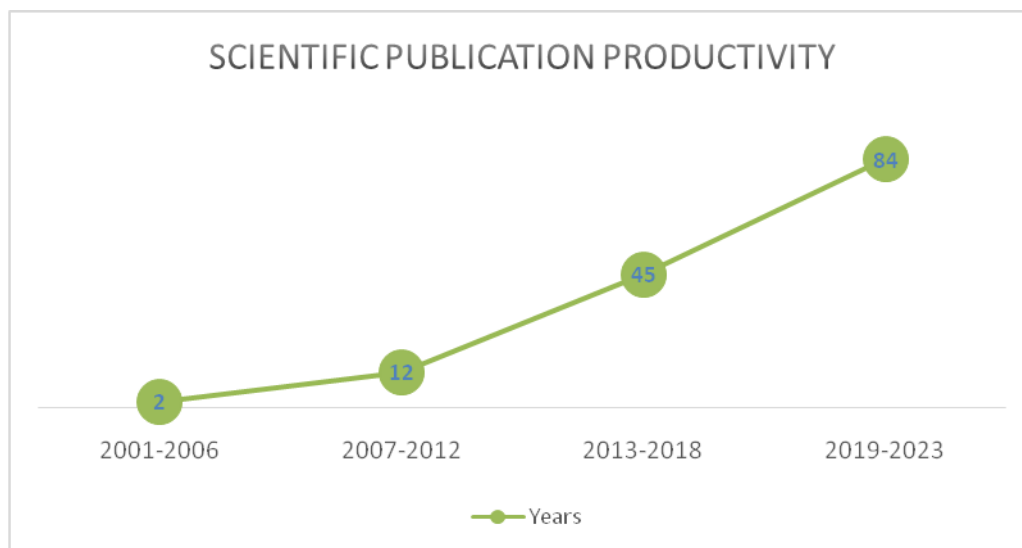
Figure 1. Search design of article metadata

RESULTS

APE for ASD was reviewed by Publication Map

Search for article publications with the title and keywords "physical education autism spectrum disorder" published in the range of 2001-2023 (22 years). In 2021-2006 with the discovery of two scientific article publications.

There was an increase in 2007-2012 of 12 articles. From 2013-2018 there was also an increase in the use of around 45 published articles. The peak of the increase is in the 2019-2023 period with 84 scientific article publications. The dynamics of change (range of years) in the number of publications can be seen in Figure 2.

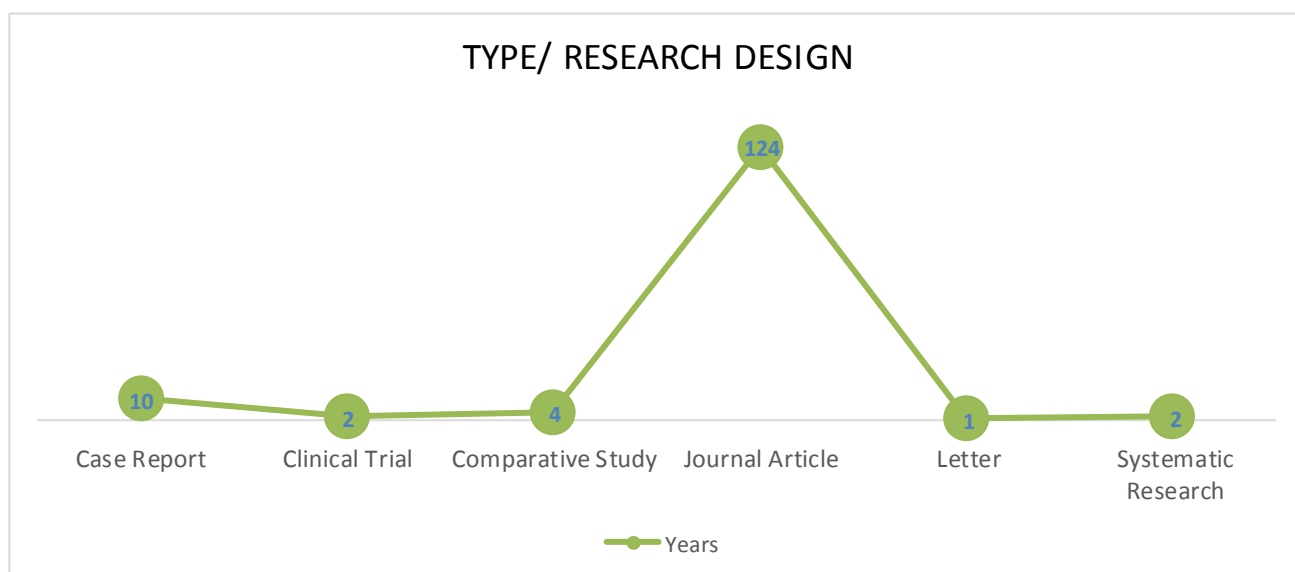


Source: Research data taken from pubmed database by publish or perish

Figure 2. Productivity from the Publication of Scientific Papers Entitled “Physical Education Autism Spectrum Disorder” from 2001-2023.

From the publications recorded, there are several types/research designs from 143 publications used in assessing the APE field for ASD in the Pubmed database. Case study There are about 10 articles on this research design. 2 articles using clinical trial research design. Furthermore, about 4 articles use the type of

comparative study. The majority of article types are journal articles, namely 124 publication articles. In type letter, there is 1 article, and the last is with type/design, namely systematic research a number of two article publications. More details can be seen in more details as in Figure 3.



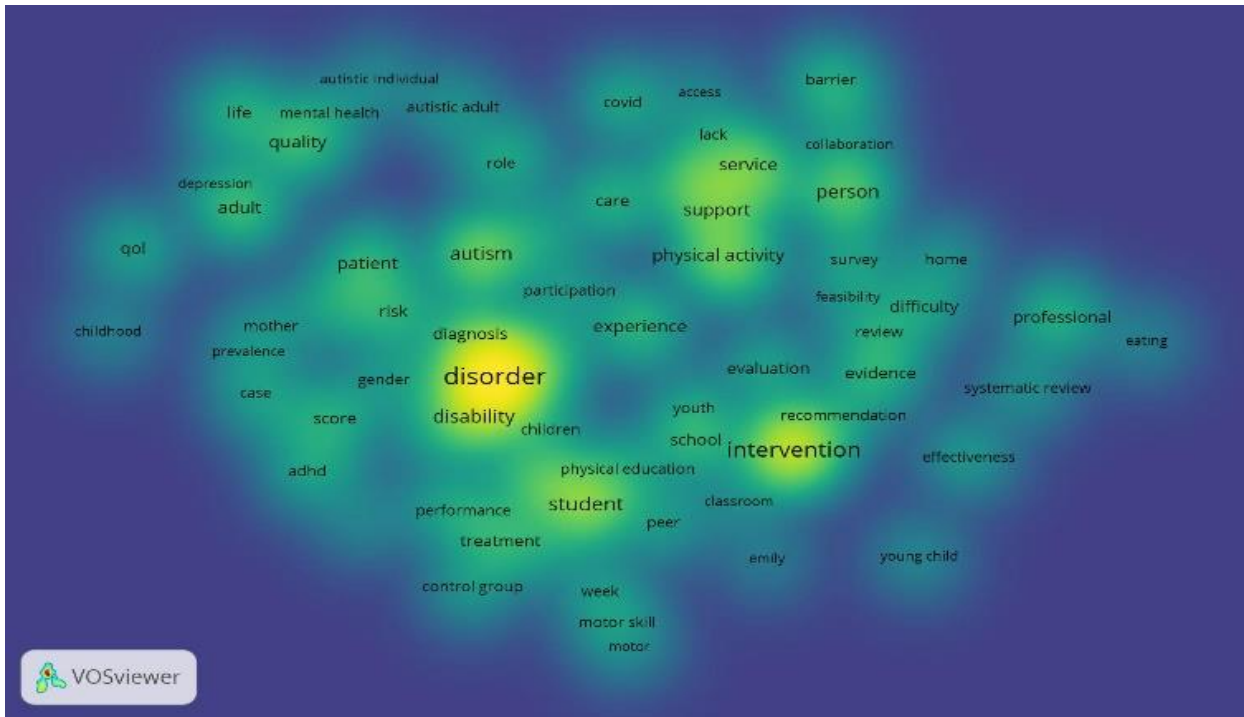
Source: Research data taken from pubmed database by publish or perish

Figure 3. Type/ research design entitled “Physical Education Autism Spectrum Disorder” from 2001-2023.

APE for ASD as Thematic Cluster

The results of data visualization using Vosviewer analyze keywords that appear dominant from search keywords, namely

"physical education autism spectrum disorder". VosViewer analysis on the dense keyword density visualization section is presented in Figure 4.

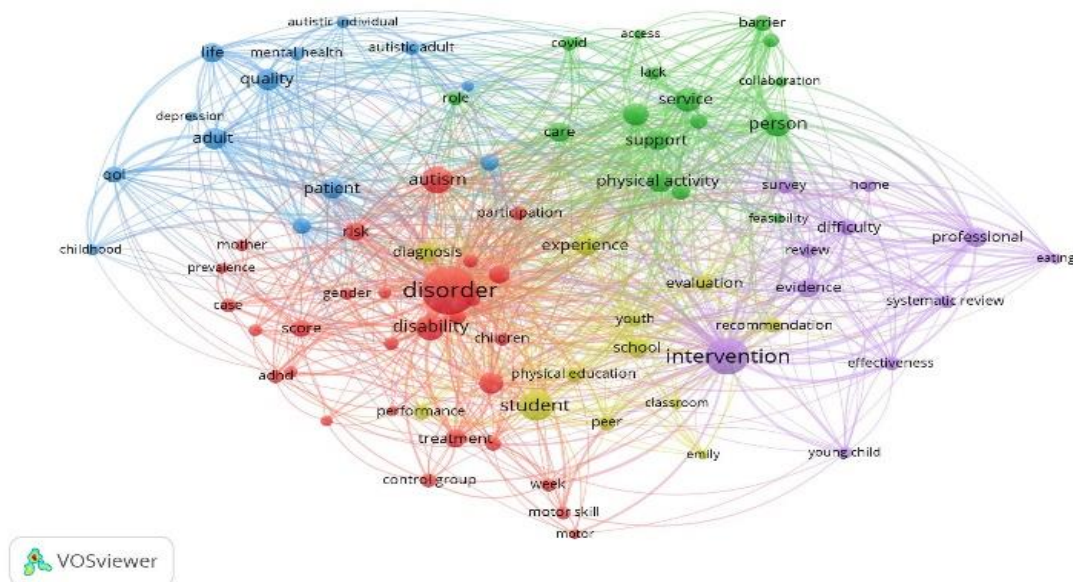


Source: Research Data Vosviewer

Figure 4. The item density visualization of high keywords

From the results of the co-occurrence analysis, it can be observed that the keywords seen as high frequency will form a thematic

cluster in the field of Physical Education that is adapted to ASD. The groups are shown in detail as shown in Figure 5.



Source: Research Data Vosview

Figure 5. High-frequency keyword emergence network in "physical education for ASD"

The analysis output keywords can be seen that have been grouped based on their relevance, this is presented in Figure 5. The relationship between keywords will be higher (closer) if followed by the proximity of these keywords. The

line that appears between the keywords is a manifestation of a higher (closer) correlation. Then the circle on the keyword that is getting bigger, refers to the meaning that the keyword appears bigger in the publication.

The visualization in Figure 5 can be identified into 5 thematic clusters. These five clusters are in Table 1, namely: (1) disorder; (2)

service; (3) quality; (4) student; (5) intervention. Bolded keywords are those with the highest number of occurrence frequencies

Table 1. High-frequency keyword groups related to ape publications for ASD

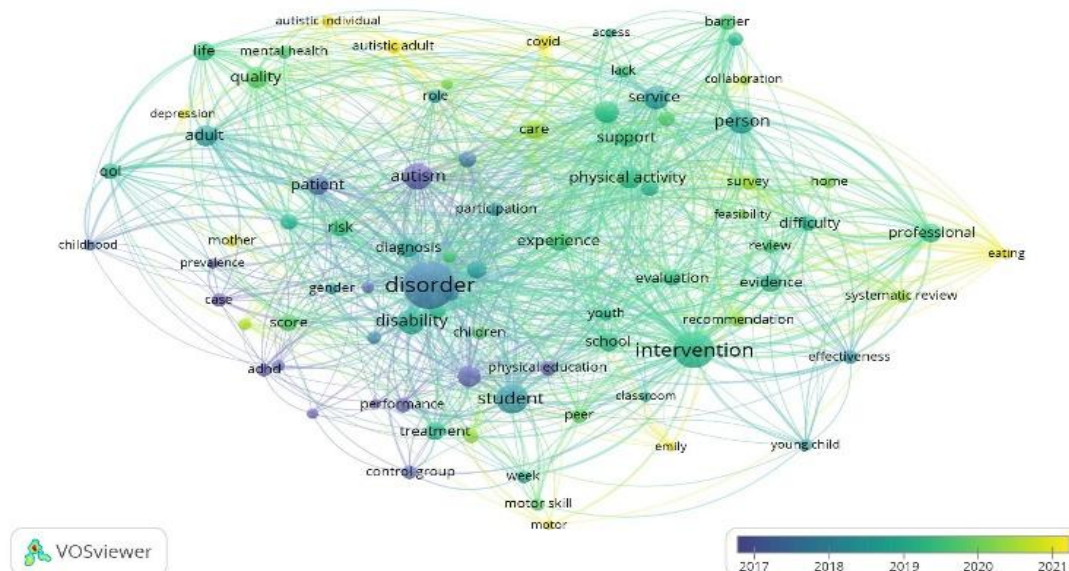
Cluster	Number of keywords (items)	Keywords
Cluster 1/Disorder/ Red	29	(1) activity, (2) ADHD, (3) association, (4) autistic deficit hyperactivity disorder, (5) autism, (6) autistic spectrum disorder, (7) boy, (8) case, (9) children, (10) control group, (11) disability, (12) disorder, (13) gender, (14) intellectual disability, (15) language, (16) month, (17) mother, (18) motor, (19) motor skill, (20) participation, (21) prevalence, (22) risk, (23) score, (24) severity, (25) significant difference, (26) therapy, (27) treatment, (28) type, and (29) week
Cluster 2/service/green	17	(1) access, (2) area, (3) autism spectrum, (4) barrier, (5) care, (6) collaboration, (7) covid, (8) family, (9) feasibility, (10) lack, (11) pandemic, (12) person, (13) physical activity, (14) role, (15) service, (16) support, and (17) technology
Cluster 3/quality/blue	13	(1) adult, (2) autistic adult, (3) autistic individual, (4) childhood, (5) clinician, (6) depression, (7) exercise, (8) life, (9) mental health, (10) patient, (11) QOL, (12) quality, and (13) relationship.
Cluster 4/student/yellow	12	(1) classroom, (2) diagnosis, (3) emily, (4) evaluation, (5) experience, (6) peer, (7) performance, (8) physical education, (9) recommendation, (10) school, (11) student, and (11) youth.
Cluster 5/intervention/purple	11	(1) difficulty, (2) eating, (3) effective, (4) evidence, (5) home, (6) intervention, (7) professional, (8) review, (9) survey, (10) systematic review, and (11) young child.

Source: Research Data Vosviewer

Appearing Topic: APE for ASD

The output of data analysis using Vosviewer as shown in Figure 6 can be visualized with at least three colors. The colors include yellow, green, and blue. This visualization shows a different meaning according to the color. The blue color indicates the initial period of the year of publication. Next, the visualization of the transition from green to yellow color gives the meaning of the final year of publication. The overlay visualization means the dominance of the

latest publication update keywords, which is visualized by the yellow color which is located in the cluster 5 area (on the right side of the map) and cluster 3 (placed on the top side of the map). Intermediate novelty publications are in clusters 2 and 4 (on the middle side of the map) and cluster 3 (on the left side of the map) visualized in green. While cluster 1 classifies keywords with the earliest average published year visualized in dark blue.



Source: Research Data Vosviewer

Figure 6. Average year of publication with high-frequency keywords in "APE on ASD" publications

DISCUSSION

The bibliometric approach is the focus of this research, which aims to map and analyze published data in the field of APE in ASD. The publication data of 143 papers were then analyzed using Vosviewer, which then provided the output of five thematic clusters. Co-occurrence analysis is used in order to determine these clusters.

The focus of the first cluster theme is disorder. The definition of disorder is a symptom at a certain level with the involvement of physiological conditions, impaired physiological function, abnormal behavior, and stress that occurs continuously or even massively.(American Psychological Association, 2023c).Based on the analysis of findings from the disorder cluster, several keywords were found as follows: (1) activity, (2) ADHD, (3) association, (4) autistic deficit hyperactivity disorder, (5) autism, (6) autistic spectrum disorder, (7) boy, (8) case, (9) children, (10) control group, (11) disability, (12) disorder, (13) gender, (14) intellectual disability, (15) language, (16) month, (17) mother, (18) motor, (19) motor skill, (20) participation, (21) prevalence, (22) risk, (23) score, (24) severity, (25) significant difference, (26) therapy, (27) treatment, (28) type, and (29) week.

The second cluster is service. Services are defined as certain systems that provide the needs of certain communities, groups, or individuals that

are organized by the government or non-government (private parties).(Oxford University Press, 2023a).Based on the analysis of findings from the service cluster, several keywords related to (1) access, (2) area, (3) autism spectrum, (4) barrier, (5) care, (6) collaboration, (7) covid, (8) family, (9) feasibility, (10) lack, (11) pandemic, (12) person, (13) physical activity, (14) role, (15) service, (16) support, and (17) technology.

The third cluster is quality. Quality means the characteristics or features of the origin of something, both physically and abstractly (American Psychological Association, 2023b). Based on the analysis of findings from the Quality cluster, there are several keywords related to (1) adult, (2) autistic adult, (3) autistic individual, (4) childhood, (5) clinician, (6) depression, (7) exercise, (8) life, (9) mental health, (10) patient, (11) QOL, (12) quality, and (13) relationship.

The fourth cluster is a student. A student is someone who studies at a college or university, or sometimes at a school (Oxford University Press, 2023b). Based on the analysis of findings from the student cluster, keywords related to (1) classroom, (2) diagnosis, (3) Emily, (4)evaluation, (5) experience, (6) peer, (7) performance, (8) physical education, (9) recommendation, (10) school, (11) student, and (11) youth.

The fifth cluster is intervention. Intervention is defined as certain actions in order to change a process that has previously been running with the aim of changing in the direction as planned or the goal of a process change (American Psychological Association, 2023a). Based on the analysis of findings from the intervention cluster, keywords related to (1) difficulty, (2) eating, (3) effective, (4) evidence, (5) home, (6) intervention, (7) professional, (8) review, (9) survey, (10) systematic review, and (11) young child.

Conclusion

This study provides findings that the field of study of APE for ASD requires further research steps in efforts to develop this field, this is seen from the productivity in publications between 2001 to 2023, whose publication range is still below 85 articles per five years. In the visualization section, the density of high keywords is presented in 5 clusters, namely: (1) disorder; (2) service; (3) quality; (4); student; (5) intervention. Bibliometric analysis in the form of mapping provides conveyance to the public regarding the pattern of publication development in the field of APE for ASD. With these findings, it contributes to further research, namely: 1) The need for holistic research on the dimensions of disorder, service, quality, and student; and, 2) In-depth research needs to focus on one or more themes that are still rarely studied such as motor skills, eating, covid, autistic adult, Emily, home, depression, mother, care, and autistic individual.

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Conflict of Interest

We declare that this article we wrote has no involvement in any particular conflict of interest.

Ethics Statement

The writing of this article has gone through all ethical procedures related to the academic realm.

Authors Contribution

First author: problem formulation, methodology, data collection, data analysis, discussion, and article writing. Second author: methodology, data collection, data analysis,

discussion, and article writing. Third author: methodology, data analysis, and discussion. Fourth author: methodology, data analysis, and discussion. While the contribution of the fifth author is the same as the fourth author.

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