



Mapping Pattern of Locomotor Basic Movement Research

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Abstract

This study aims to map the development of research on fundamental locomotor skills within physical education learning over the past decade and to identify existing research gaps. A systematic review method was employed, supported by Publish or Perish software and bibliometric analysis using VOSviewer. Articles were searched from 2012 to 2022 using the keyword “learn basic locomotor movements,” resulting in 2,136 records. The selection and screening process followed the PRISMA protocol, yielding 41 eligible articles. The findings indicate that learning models are the most dominant topic within FMS research, whereas comprehensive investigations of locomotor skills remain limited. Of the 41 articles reviewed, only 18 (43.90%) addressed six locomotor skills, one article (2.44%) covered eight aspects, and none examined all nine locomotor skills (running, jumping, walking, leaping, galloping, sliding, rolling, skipping, hopping). These results highlight a substantial need to develop complete locomotor skill-based learning, particularly for children aged 5–7 years who are in a critical stage of motor development. This study provides an evidence-based foundation for creating more targeted motor intervention programs to support children’s movement competence.

Keywords: Locomotor Skills, FMS, Physical Education, Bibliometric Analysis, Systematic Review

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A. Introduction

Fundamental motor skills (FMS) play a crucial role in improving students' motor skills. These skills are positively associated with children's active participation in physical activities and sports (Baharudin, 2016; Zulfikar et al., 2021). Therefore, the FMS program is needed to support children's motor development needs, increase daily physical activity, and provide health benefits during the early school years (Joonyoung Lee, Thao Zhang, 2020; Lisa et al., 2017).

The important role of fundamental movement has been demonstrated in research conducted in Singapore. The results showed that children who received physical education from an early age experienced delayed motor maturity compared to children who received adequate physical activity from an early age (Mukherjee et al., 2017).

In learning basic gross motor skills, there are three main aspects: locomotor, non-locomotor, and manipulative movements. However, this study focuses on basic locomotor movements because this type of movement has a significant impact on the development of a child's sensory system, health, physical fitness, object control, increased physical activity, and contributes to a reduced risk of obesity (Ackerley et al., 2016; Bolger et al., 2021; Hassan, 2022; Jiménez et al., 2016; Lee et al., 2020; Lisa et al., 2017; Pitchford et al., 2022). Therefore (Melvin Chung et al., 2021) emphasizes the importance of finding new approaches to supporting children's motor development. One effective approach is through play activities, as it can encourage children to participate more actively in various forms of physical activity.

Basic locomotor movement skills include various types of movements such as: *walking, running, jumping and landing, leaping, hopping, galloping, sliding, skipping, rolling* dan *climbing* (Adams et al., 2018; Anton Komaini, 2018; Healy et

al., 2021; Melvin Chung et al., 2021). Another opinion also states that rolling is also a form of basic locomotor movement (Newell, 2020).

Based on the results of this study, it can be concluded that basic locomotor movements are a fundamental aspect of children's motor development that requires continued in-depth study. Given the rapid growth of research related to FMS in recent years, a comprehensive mapping of studies on basic locomotor movements is needed to identify directions, trends, and existing research gaps. Through this mapping, it is hoped that a comprehensive picture of the development of basic locomotor movement studies can be obtained, which can then serve as the basis for developing more effective physical education programs and motor interventions based on scientific evidence (evidence-based practice).

B. Methods

This study employed a systematic review method. Data collection was conducted using the Publish or Perish application, which was used to search for articles from various sources such as Scimago, Crossref, Google Scholar, Scopus, PubMed, and ResearchGate. The articles searched were those published between January 2012 and December 2022, with the primary keyword "learn basic locomotor movements".

After collecting the articles, the researchers conducted a bibliometric analysis using the VOSviewer application. This application helps map keywords, frequently occurring research topics, and the relationships between themes that have been extensively researched previously.

To ensure the article selection process is more focused and valid, this research follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) stages of (Lucas et al., 2016). Through this method, the article screening process starts from identification, checking eligibility, to determining articles that truly

match the research objectives.

This study focuses on nine types of basic locomotor movements: running, jumping, walking, leaping, galloping, sliding, rolling, skipping, and hopping. All of these movements were analyzed to determine whether the learning activities reported in various articles included and taught all aspects of these basic locomotor movements, and whether their application was relevant to everyday life.

C. Result and Discussion

Result

A data search using the Publish or Perish application found 2,136 articles related to basic locomotor movements. This search was conducted using the keyword "learn basic locomotor movements." This number indicates that this topic has been widely discussed in previous research.

After the articles were collected, the next step was to map the data using bibliometric analysis using the VOSviewer application version 1.6.20. This mapping aimed to identify relationships between topics, the most frequently occurring keywords, and emerging research patterns in the field of basic locomotor movement..

From this process, VOSviewer then produces a visual representation in the form of a map showing keyword clusters and their interrelationships. This visualization helps researchers understand the direction of previous research and determine a more appropriate focus. The resulting visual representation is as follows:

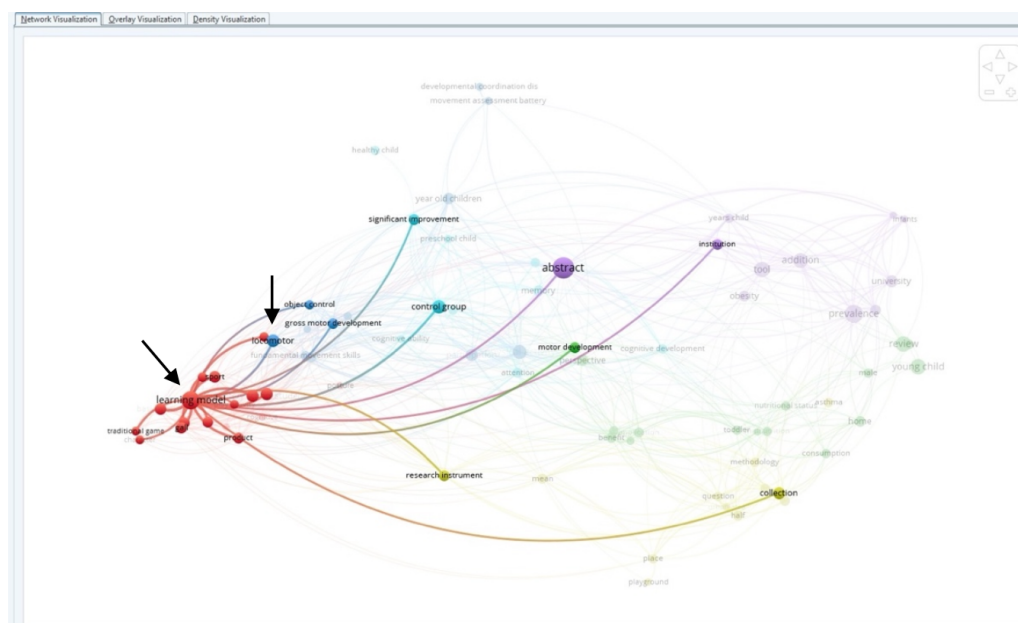


Figure 1. Bibliometric Analysis with Network Visualization Observation

Source: Vosviewer Application

The network visualization results show that the topic of learning models is the most dominant theme, indicated by the deep red color and large circles indicating high research frequency. In contrast, the topic of basic locomotor movements appears to

have received less research, as evidenced by the lighter color and smaller circle size..

The differences in color and size of these circles indicate that research on basic locomotor movements is still limited compared to research on learning

models. To more clearly see the number and development of research related to basic locomotor movements, the analysis was then continued with an overlay

visualization that displays the distribution of research by time.

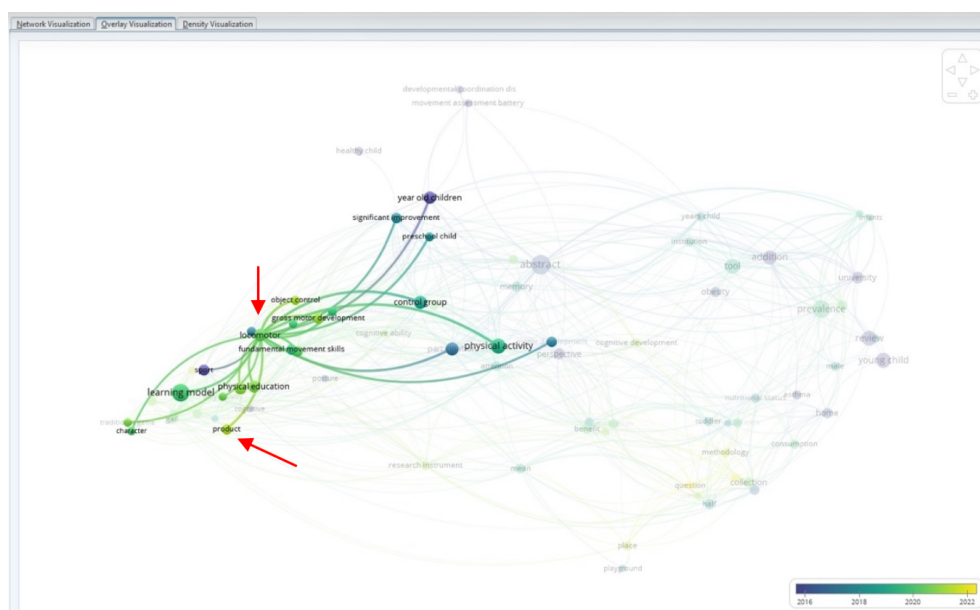


Figure 2. Bibliometric Analysis with Overlay Visualization Observation
Source: Vosviewer Application

Based on the overlay visualization results, it appears that research related to basic locomotor movements has the potential for novelty, as indicated by the appearance of the keyword "product." A brighter green color in the visualization indicates a high level of novelty, consistent with the year range indicator displayed.

Although the topic of basic locomotor movements has been researched previously, further analysis of the content of each article is necessary to assess its

suitability to the focus of the research being developed. This assessment is important to determine the extent to which the current research title is similar to or different from previous research, thereby confirming its novelty.

To gain a deeper understanding, the next step is to conduct a systematic review using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method, with the following results:

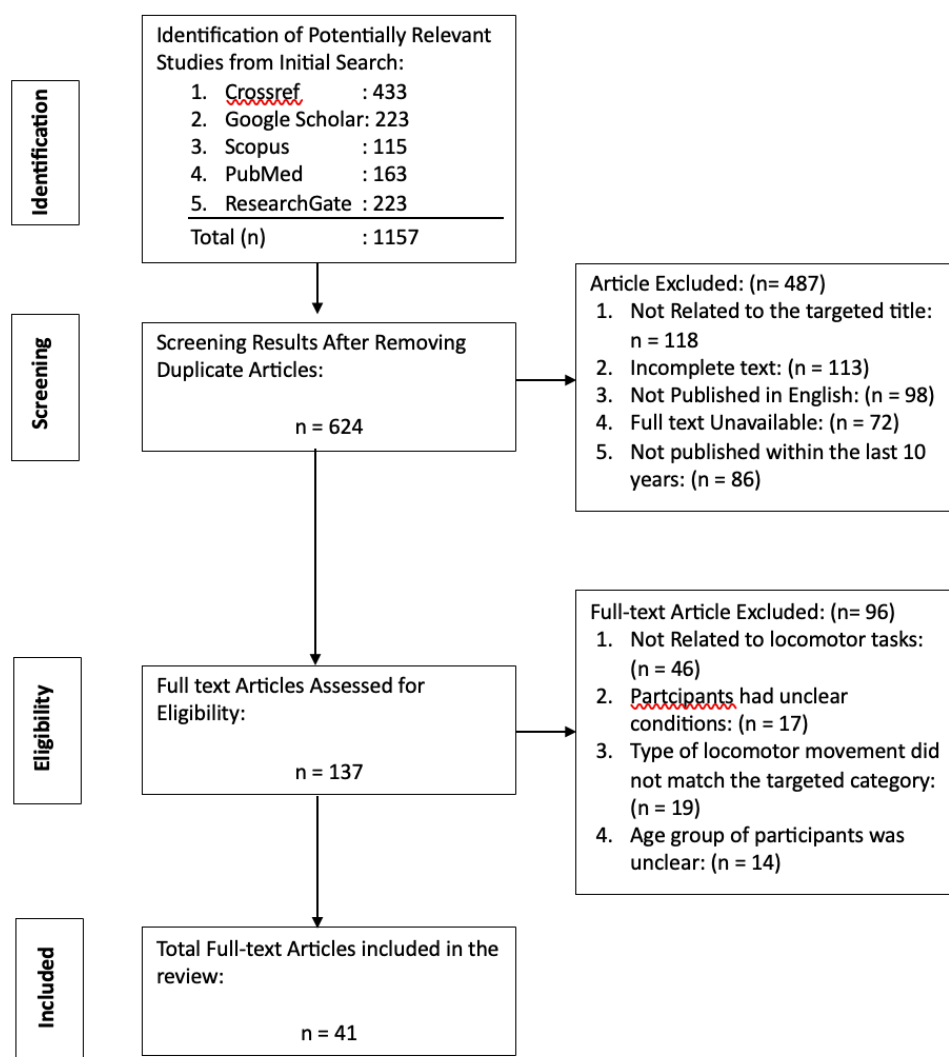


Figure 3: Design for Identification and Selection of Studies for Review
Source: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Design, (Lucas et al., 2016)

Based on the results of the systematic review conducted on 41 articles that have been reviewed using the PRISMA method above, it was found that there were 18 articles or 43.90% of articles that fulfilled the 6 aspects of basic locomotor movement activities used.

Meanwhile, only 1 article or 2.44% covered the 8 types of basic locomotor movements that were studied and 0% of articles discussed basic locomotor movements as a whole.

This means that there is currently a need to develop

fundamental movement learning activities, particularly locomotor skills, covering nine fundamental movement aspects: running, jumping, walking, leaping, galloping, sliding, rolling, skipping, and hopping. This is because the studies conducted above have not yet fully addressed these aspects. This is crucial because these fundamental movements significantly influence development into adulthood. However, research on these nine fundamental locomotor movement aspects has not been fully addressed. This can be seen in the table below:

Table 1 Percentage of Completion of Basic Movement Activities Performed in Each Article

Number of Locomotor Movements in Each Article	Frekuensi	Relative Frequency (%)
1	1	2,44%
2	3	7,32%
3	8	19,51%
4	2	4,88%
5	6	14,63%
6	18	43,90%
7	2	4,88%
8	1	2,44%
9	0	0,00%
Total	41	100%

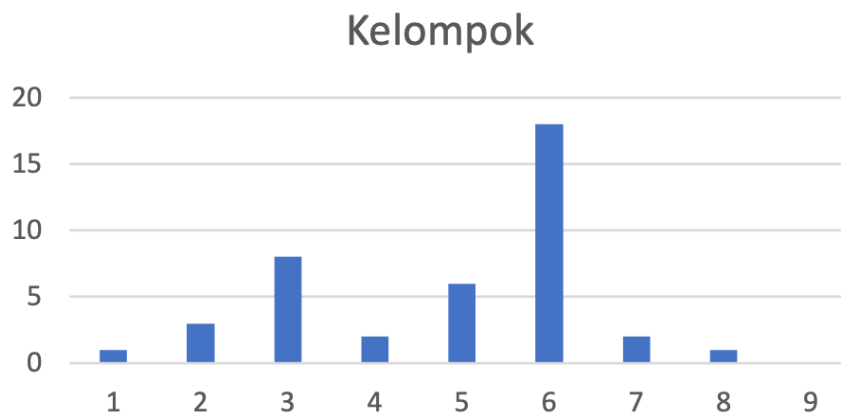


Figure 4 Data on Basic Movement Activity Groups in Each Article

Discussion

The study results show that the development of basic locomotor movements is still very minimal in learning activities. Of all the articles analyzed, only one article (2.44%) covered almost all aspects of locomotor movements, and only 21 articles examined locomotor movements with above-average coverage.

In general, the focus of discussion in these articles remains on child developmental readiness, environmental influences, motor activity in children with special needs, and comparisons of motor skills with related indicators. This is also evident in the research methods used, which are primarily analytical, experimental, and descriptive studies..

Thus, it can be concluded that there

has been no research specifically developing basic locomotor movement learning activities based on nine main aspects. Furthermore, the 5–7 year age range, a crucial transitional period in children's motor development, has also not been made a focus of research.

In fact, motor skills are skills that can be acquired through learning and experience (Dlis, 2018; Iivonen et al., 2016). Besides that (de Waal, 2019) also explained that basic motor skills in preschool children aged 5 to 6 years correlated significantly with their academic performance.

D. Conclusion

The development of basic locomotor movements in learning is still very limited,

with only a few studies discussing it comprehensively. The focus of existing studies is still limited to child development, the environment, children with special needs, and comparisons of motor skills. There is no research that specifically develops learning activities based on the nine aspects of locomotor movements, nor does it focus on children aged 5–7 years, even though this age is a crucial phase of motor development. These findings indicate the need for more focused research to develop locomotor movement learning in children, considering that basic motor skills play a crucial role in their learning process and academic development.

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F. Conflict of Interest

no conflict of interest

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