Chonlawat Chariyalertsak
Sports Science,
Multidisciplinary and
Interdisciplinary School,
Chiang Mai University, Chiang
Mai, Thailand

Jirakrit Leelarungrayub
1. Sports Science,
Multidisciplinary and
Interdisciplinary School,
Chiang Mai University,
Chiang Mai, Thailand
2. Department of Physical
Therapy, Faculty of
Associated Medical Sciences,
Chiang Mai University,
Chiang Mai, Thailand

Araya Yankai
Department of Physical
Therapy, Faculty of Associated
Medical Sciences, Chiang Mai
University, Chiang Mai,
Thailand

Jakkrit Klaphajone
Department of Rehabilitation
Medicine, Faculty of Medicine,
Chaing Mai University, Chiang
Mai, Thailand

Corresponding Author:
Jirakrit Leelarungrayub
1. Sports Science,
Multidisciplinary and
Interdisciplinary School,
Chiang Mai University,
Chiang Mai, Thailand
2. Department of Physical
Therapy, Faculty of
Associated Medical Sciences,
Chiang Mai University,
Chiang Mai, Thailand

Knowledge discovery from data mining analysis on motor-cognitive training for sports science: SCOPUS-databased bibliometric tool

Chonlawat Chariyalertsak, Jirakrit Leelarungrayub, Araya Yankai and Jakkrit Klaphajone

DOI: https://doi.org/10.33545/26647559.2024.v6.i1b.116

Abstract
This study employed the search phrase "Motor-Cognitive Training" to obtain pertinent English publications published between 2012 and 2024 in the SCOPUS database. The bibliometric algorithm was executed using the RStudio software. The data analysis encompassed several steps, including pre-processing, data transformation, and normalization using Salton's Cosine technique. Additionally, co-occurrence word analysis, Treemap visualization, clustering, and trend topic identification were performed using the Walktrap and Kamada-Kawai algorithms. A total of 171 papers from 93 journals were presented. The most frequently occurring words were human (121), cognition (106), exercise (75), gait (42), walking (33), quality of life (26), physical activity (24), motor performance (21), training (18), reaction time (16), task performance (14), postural balance (12), and fitness (11), among others. The Treemap displayed the results of research studies on various interventions such as randomized controlled trial (n=24, 10%), controlled trial (n=19, 8%), cognitive training (n=14, 6%), motor-cognitive training (n=10, 4%), Tai Chi (n=10, 4%), dual-task training (n=4, 2%), exercise training (n=4, 2%), and combined training (n=3, 1%). These interventions were studied concerning different diseases including Parkinson's disease (n=8, 3%), mild neurocognitive disorders (n=4, 2%), neurocognitive disorder (n=6, 2%), cognitive impairment (n=5, 2%), and chronic stroke (n=2, 1%). The outcomes measured included physical activity (n=6, 2%), cognitive functions (n=3, 1%), cognitive motor (n=2, 1%), and cognitive performance (n=4, 2%). That can be classified into two dominant clusters. The trend topics were started in aged stroke with resistance training, postural balance, body equilibrium with endurance training, and then trend topics on exercise, cognitive rehabilitation, exergaming, and cognitive performance in human with pilot study or controlled study design were studied. The knowledge discovery from previous research studies is related to "Motor-cognitive training" indicating dual-task or combined training with cognitive rehabilitation and exercise on motor performance and cognition in the controlled study design.

Keywords: Clustering, data mining, knowledge discovery, motor-cognitive training

Introduction
Sports performance in all athletes must have different skills, such as flexibility, strength, endurance, powers, and agility. Many sports also need the best balance skills during movement and alternative direction [1] or restoring a stable position [2]. Both static and dynamic balance require a combination of visual, vestibular, and proprioceptive inputs to produce an efficient response to control the body within its base of support. However, dynamic balance is believed to be more challenging because it requires an extra ability to maintain equilibrium during a transition from a dynamic to a static state [3]. According to Davlin (2004), athletes have better dynamic balance compared to non-athletes [4]. Additionally, motor activity such as standing on one leg or walking, along with cognitive tasks, plays a crucial role in sports, as stated by Maki and McIlroy [5]. Therefore, previous studies have found it difficult to study the combination of cognitive and balance tasks, as highlighted by previous evidence [6-8]. Regrettably, the decline in performance has been previously attributed to constraints in the assessment of cognitive processing capacity [9]. Some prior studies demonstrated that raising the difficulty level in cognitive activities has a consistent and adverse effect on postural control [10]. Prior research indicated that the capacity to engage in multitasking, which involves carrying out both physical and cognitive activities concurrently, can be improved through training in dual-task situations [11]. Furthermore, this ability can be maintained or enhanced in older persons who are in good health [12].

Previous studies have shown that the bibliometrics tool may be used effectively in the field of sports studies [13] and can generate valuable information from datasets [14]. This study aimed to extract data from research publications in the SCOPUS database from 2010 to 2024 using the phrase "Motor-cognitive training". We then performed text data mining analysis to investigate published evidence, co-occurrences, clustering, and identify research trends.

Materials and Methods
This study entails performing a data mining analysis utilizing a Bibliometric tool in the Rstudio Software (version 4.3.2). Rstudio Software is a widely utilized software program for accessing diverse databases such as PubMed and SCOPUS [15]. This study aimed to examine the distribution of data, formation of clusters in networks, and the emergence of new topics in research between 2010 and 2024 using the SCOPUS

database. SCOPUS was chosen over Google Scholar due to its greater precision and better control over the referenced publications and indexing process [16]. Due to its accessibility and comprehensive coverage of peer-reviewed academic literature, the Scopus database was the most suitable choice for conducting the investigation [17]. The search inclusion parameters were limited to English papers that specifically focused on the keywords "Motor-cognitive training". The exclusion criteria included several types of publications, such as letters, reports, conferences, proceedings, and review data. The data analysis was performed utilizing a Bibliometric tool, adhering to the methods outlined in a previous study [18]. Aria and Cuccurullo depict a set of five consecutive phases in Figure 1 [19]. The stages involved in this procedure are data collection, selection of units to be analyzed, data processing, normalization, and data visualization and network clustering analysis.
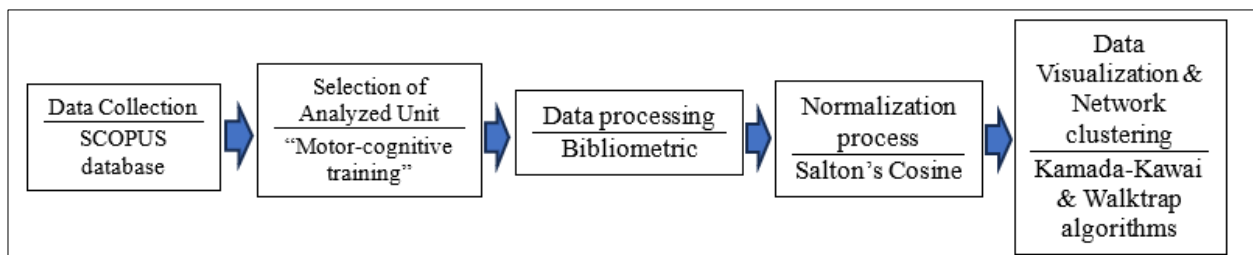

Fig 1: Five steps of data analysis processing; data collection, selection, analysis processing, normalization, and data visualization [20]

During phases I and II, we collected data on research publications related to "Motor-cognitive training" from the SCOPUS database. Prior to doing Bibliometric analysis in Step III, the citation, bibliographic, abstract, and keyword data from English articles were exported to a CSV file and subsequently imported into the Bibliometric tool within RStudio Software. The next phase entailed conducting bibliometric analysis to identify sources, documents, and the most frequently occurring words. Subsequently, network approaches, clustering, and factorial analysis techniques were implemented. The bibliometric study employed Salton's Cosine normalizing approach in Step IV, along with network clustering and trend topic analysis [21]. The Walktrap distance algorithm, developed by Con and Latapy in 2005 was used for these challenges [22]. The Kamada-Kawai layout algorithm, was developed by Kamada and Kawai [23] and later

improved by Wichaisri and Sopadang [20]. These visualizations include network clustering mapping, Treemap, and trend line.

Results
Distribution on Articles, Journal, Author, and Global Cited Documents
The SCOPUS database was used to analyze a collection of 171 research publications from 93 journals that focused on the topic of "Motor-cognitive training". The articles were published between 2012 and 2024. The results indicate that the number of published articles in each year from 2012 to 2024 are as follows: 2012 (n=2), 2013 (n=2), 2014 (n=3), 2015 (n=3), 2016 (n=4), 2017 (n=2), 2018 (n=6), 2019 (n=8), 2020 (n=25), 2021 (n=28), 2022 (n=33), 2023 (n=48), and 2024 (n=7) (Figure 2).
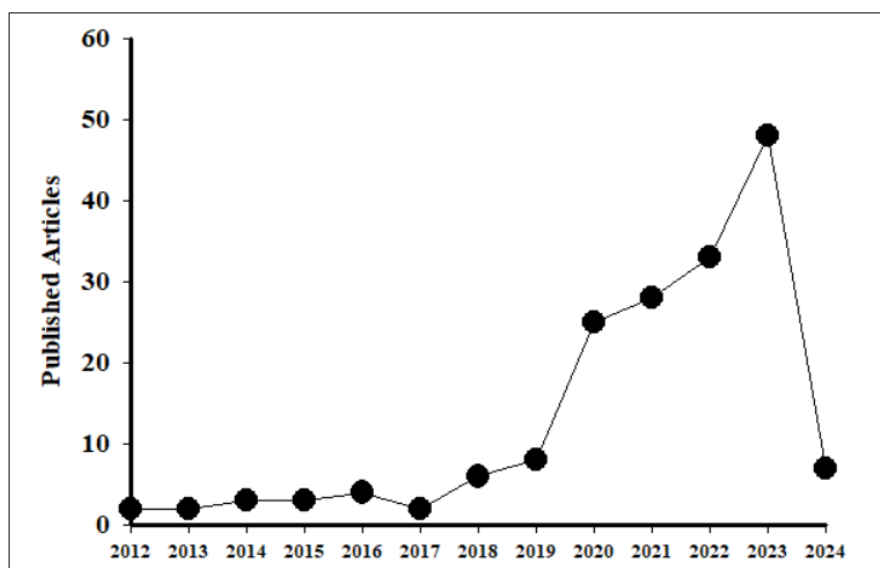

Fig 2: The number of published articles between 2012 to 2024 on "Motor-cognitive training"

The top twenty journals with the highest number of published articles were Frontiers in Aging Neuroscience (n=20), Brain Sciences (n=13), Frontiers in Psychology (n=7), BMC Geriatrics (n=6), International Journal of Environmental Research and Public Health (n=6), Frontiers in Human Neurosciences (n=4), Digital Health (n=3), European Review of Aging and Physical Activity (n=3), Frontiers in Medicine (n=3), Frontiers in Public Health (n=3), Psychology of Sport and Exercise (n=3), Scientific Reports (n=3), Trials (n=3), American Journal of Dance Therapy (n=2), Applied Sciences (n=2), BMJ Open (n=2), Frontiers in Physiology (n=2), Games and Health Journal (n=2), and Geroscience (n=2), etc (Figure 3).
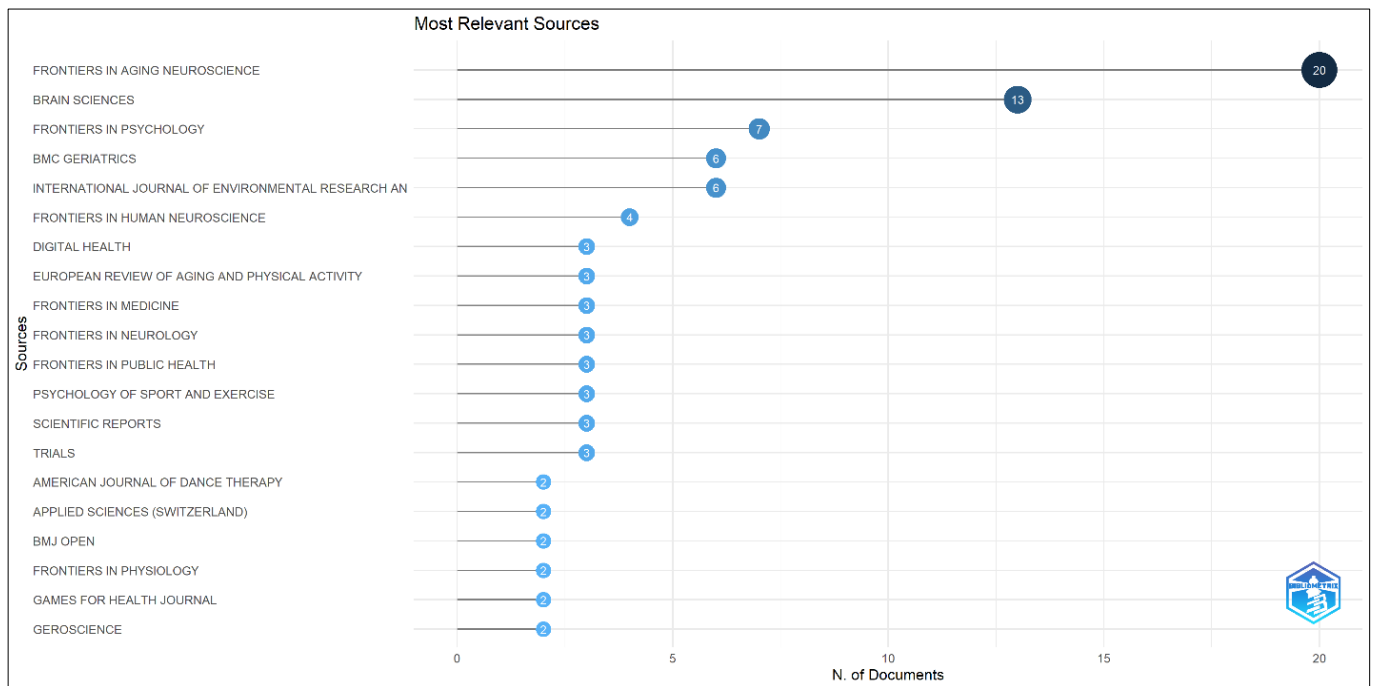

Fig 3: Most twenty relevant sources from "Motor-cognitive training" publication in SCOPUS database.

The authors with the most significant contributions to the top twenty articles were De Bruin Ed (n=27), Herold F (10), Muller NG (n=7), Guimaraes B (n=6), Kwan RYC (n=6), Zhang Y (n=6), Giannouli E (n=6), Hamacher D (n=5), Manser P (n=5), Schattin A (n=5), Zou L (n=5), Gronwald T (n=4), Martin-Niedecken AL (n=4), Schega L(n=4), Schmidt M(n=4), Seinsche J (n=4), Yu Q (n=4), Zhang J (n=4), Adcock M (n=3), Benzing V(n=3), Carpinella I (n=3), Chuang I-C (n=3), De Jong J (n=3), Dumoulin C(n=3), and Ferrarin M(n=3), etc.

The document analysis revealed that the most frequently cited documents in various fields were as follows: J Sport Exercise Psychology (252 citations), Physiotherapy (236 citations), Front Aging Neurosci (103 citations), Front Psychol (99 citations), BMC Geriatr (83 citations), Games Health J (64 citations), Front Med (64 citations), Front Psychol (57 citations), Med Internet Res (55 citations), Geriatr Gerontol Int (51 citations), Dev Neurorehabilitation (49 citations), Restor Neurol Neurosci (47 citations), Rehabil Res Dev (45 citations), Int Revsport Exerc Psychol (41 citations), Brain SCI-a (35 citations), Clin Rehabil (32 citations), Stroke Rehabil (32 citations), Brain SCI (31 citations), Contemp Educ Psychol (30 citations), and Female Pelvic Med Reconstr Surg (30 citations), among others.

Most-Frequent words analysis: A comprehensive analysis of 171 publications with the specific search terms "Mortot-cognitive training" yielded a grand total of 1,063 references. The subdisciplines were represented using Salton's Cosine and Kamada-Kawai algorithms. Figure 4 and 5 present the most frequent words; human (n=121,7%), female (n=110, 6%), male (n=108, 6%), cognition (n=106, 6%), aged (n=104, 6%), article (n=103, 6%), controlled study (n=83, 5%), exercise (n=75, 4%), humans (n=64, 4%), adult (n=57, 3%), human experiment (n=46, 3%), clinical article (n=45, 3%), randomized controlled trial (n=44, 3%), gait (n=42, 2%), walking (n=33, 2%), middle aged (n=31, 2%), executive function (n=30, 2%), quality of life (n=26, 2%), Parkinson disease (n=25, 1%), and physiology (n=25,1%), physical activity (n=24, 1%). Cognitive defect (n=22, 1%), motor performance (n=21, 1%), major clinical study (n=18, 1%), training (n=18, 1%), pilot study (n=17, 1%), reaction time (n=16, 1%), aging (n=16, 1%) body equilibrium (n=16, 1%), reaction time (n=16, 1%), exercise therapy (n=15, 1%), kinesiotherapy (n=15, 1%), virtual reality (n=14, 1%), attention (n=14, 1%), procedures (n=14, 1%), walking speed (n=14, 1%), task performance (n=14, 1%), young adult (n=13, 1%), psychomotor performance (n=12, 1%), Tai Chi (n=12, 1%), postural balance (n=12, 1%), psychology (n=12, 1%), adolescent (n=11,1%), brain (n=11, 1%), cross-section study (n=11, 1%), fitness (n=11, 1%), fitness (n=11, 1%), follow up (n=11, 1%), and stroop test (n=11, 1%), respectively.
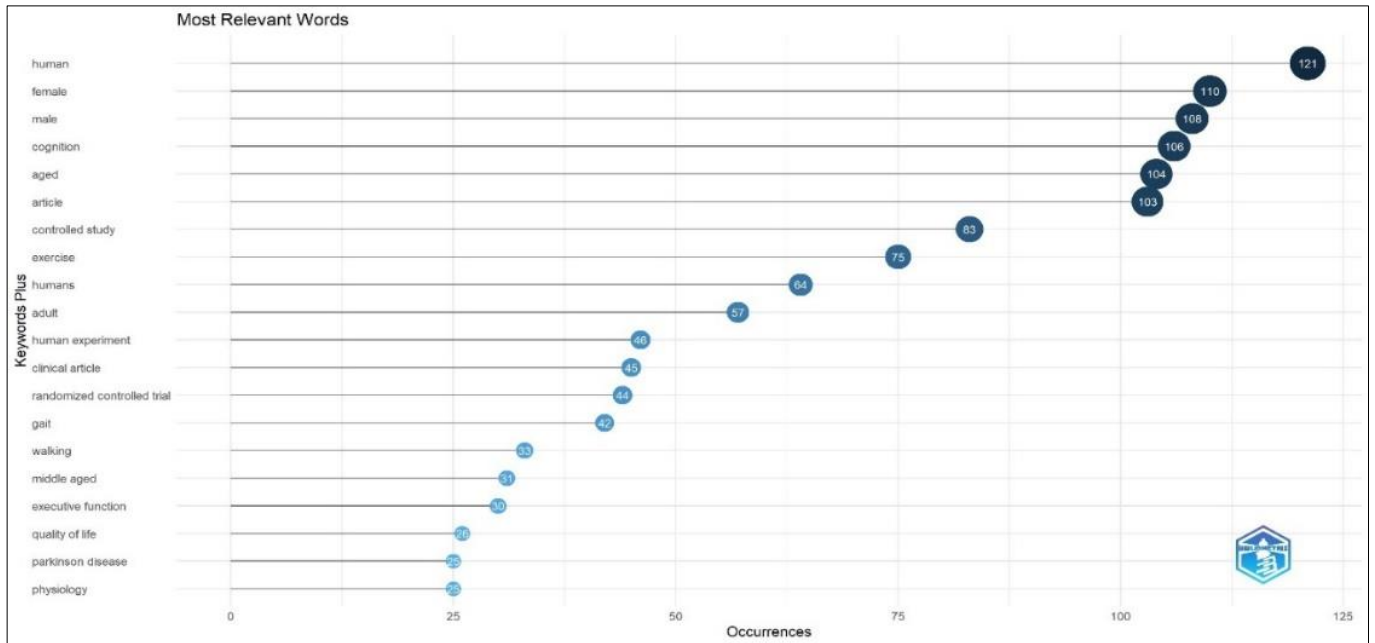
Fig 4: Most of the twenty relevant words in the 171 published articles from "Motor-cognitive training" cited in SCOPUS database.
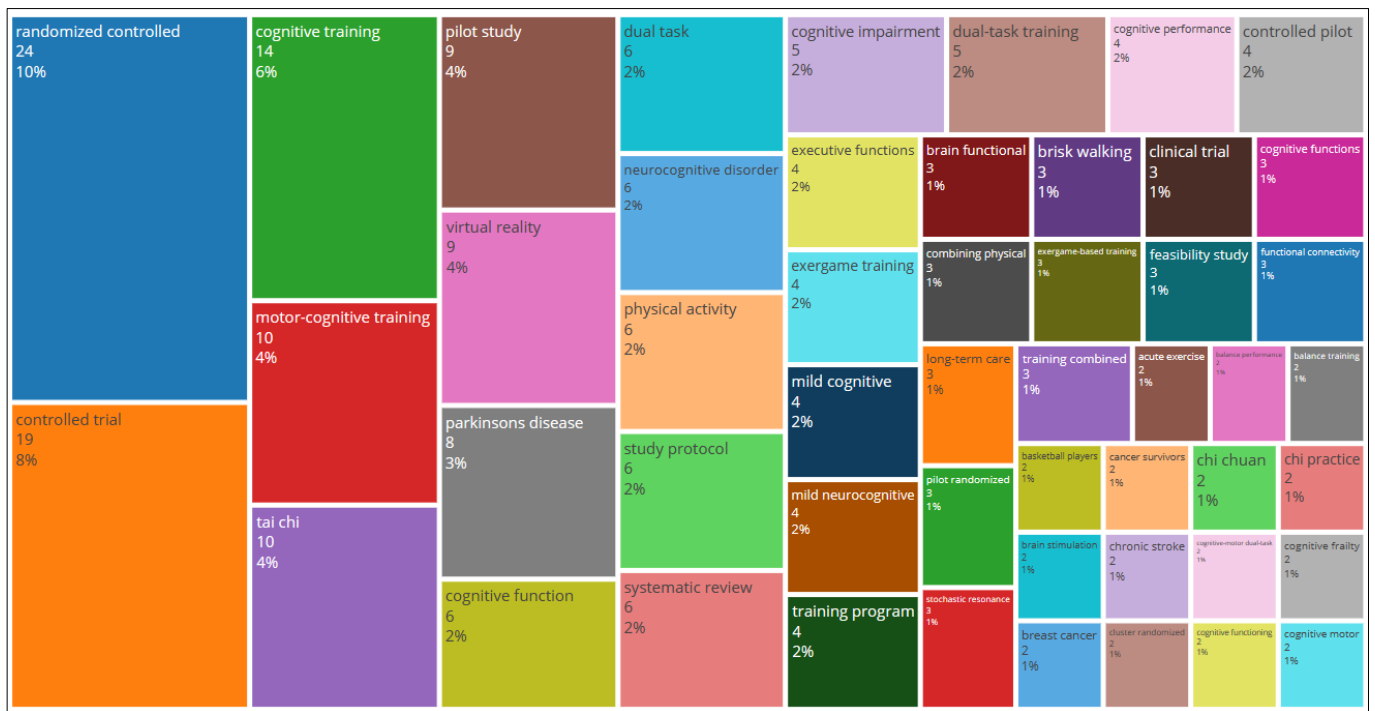

Fig 5: Treemap of most of the all-relevant words in the 171 published articles from "Motor-cognitive training" cited in SCOPUS database.

Network Approach and Words Clustering Analysis

After applying the Walktrap method to the co-occurrence network and doing clustering analysis, the results were visualized in Figure 4 using the Kamada & Kawai Network Layout. The co-occurrence network analysis resulted in 50 principal entries, which may be classified into two separate clusters, as shown in Table 1, Figure 6, and Figure 7.

Table 1: Network Clustering from Network Approach Analysis.

| Network Clustering	Entries
1	Human, female, male, cognition, aged, article, controlled study, exercise, humans, adults, human experiment, clinical article, randomized controlled trial, walking, middle aged, executive function, quality of life, physiology, physical activity, cognitive defect, motor performance, major clinical study, training, outcome assessment, pilot study, working memory, aging, reaction time, virtual reality, attention, task performance, walking speed, young adult, memory, psychology, tai chi, adolescent, brain, cross-sectional study, fitness, follow up, stroop test
2	Gait, Parkinson disease, body equilibrium, exercise therapy, kinesiotherapy, procedures, postural balance, psychomotor performance,
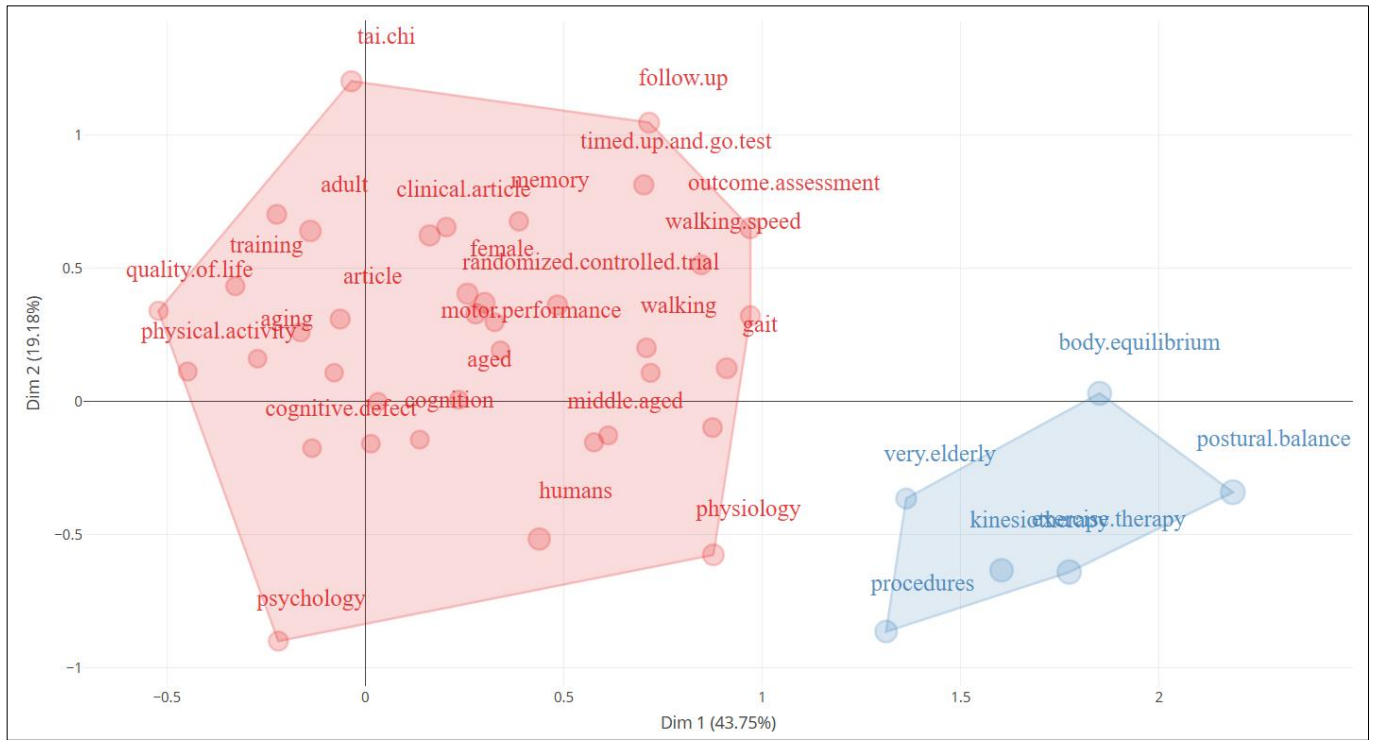
Fig 6: Word Mapping factorial analysis from 50 entities in 171 published articles between 2014 to 2023.
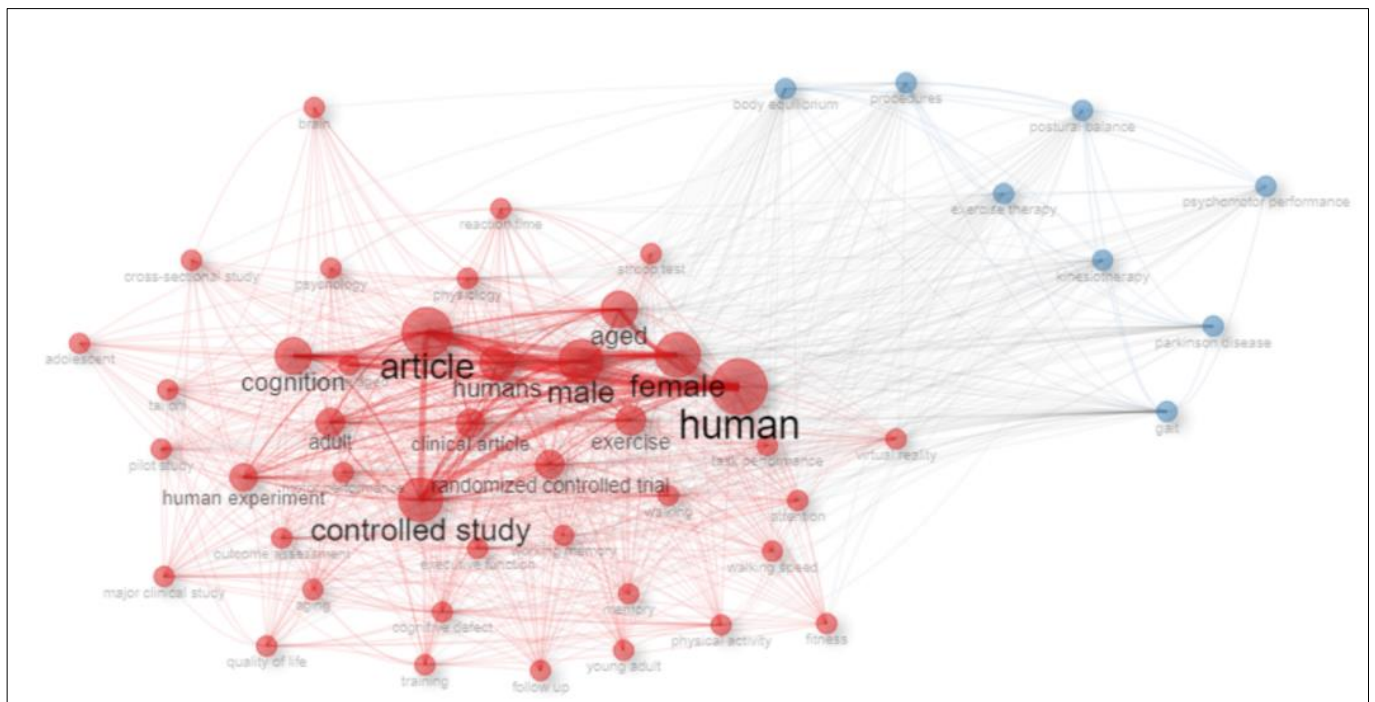

Fig 7: Co-occurrence Network from Network Approach Analysis.

Trend Topics Analysis

The trend topics in Figure 8 that were investigated between 2014 and 2023 included stroke (2014 to 2016), resistance training (2014 to 2021), aged (2015 to 2018), psychomotor performance (2017 to 2020), postural balance (2015 to 2020), endurance training (2019 to 2020), motor performance (2019 to 2023), executive function (2020 to 2023), middle aged (2018 to 2022), male (2020 to 2022), female (2019 to 2022), human (2020 to 2023), controlled study (2020 to 2023), pilot study (2020 to 2023), cognition (2020 to 2023), exergaming (2023), and cognitive rehabilitation (2023).
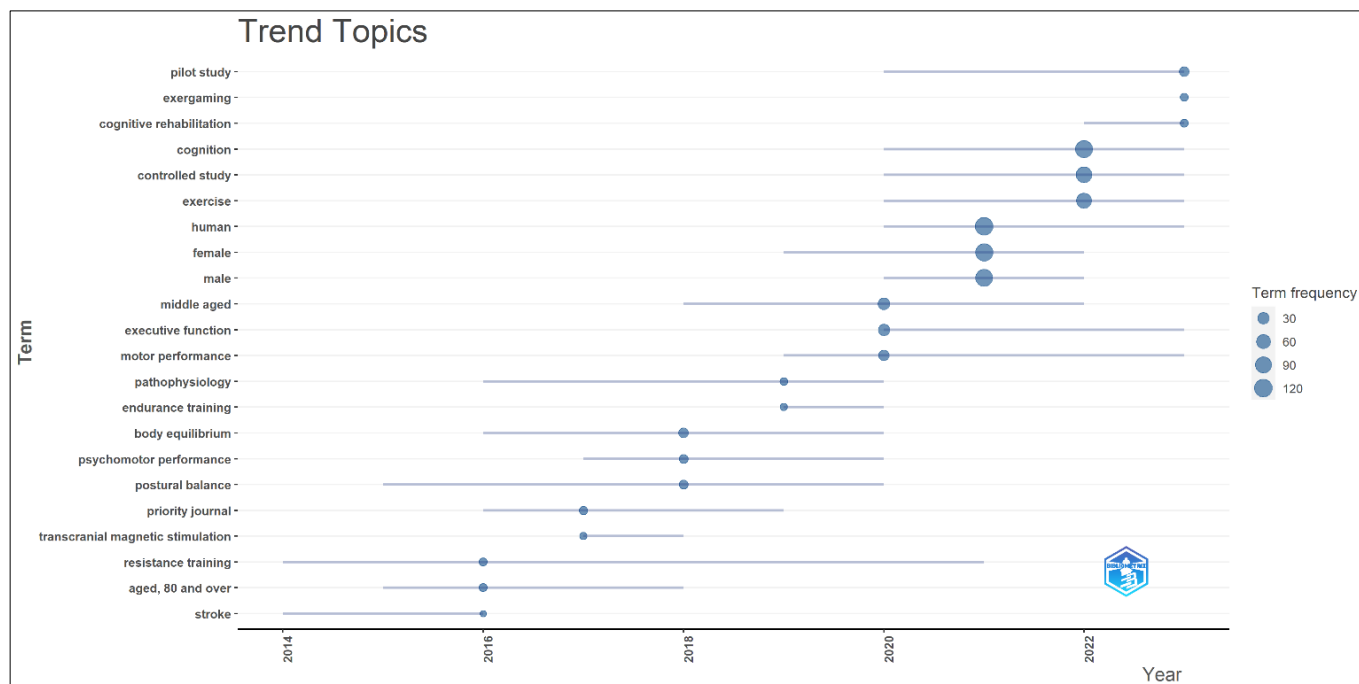
Fig 8: Trend topics from the words' frequency over time from 2014 to 2023.

Discussion

Bibliometric tool

This study showcases the findings obtained through data mining analysis conducted on the domains of motor-cognitive training in the field of sports. The bibliometric technique was utilized in this study, offering benefits in terms of cost-effectiveness, time efficiency, and quality [24]. Previously, this tool has become popular in the field of business studies due to its technological progress, widespread availability, and ease of use, similar to other programs as VOSviewer [25]. Moreover, this approach enables the detection of knowledge deficiencies and the examination of potential areas for future investigation or research, as well as the determination of the anticipated contributions to novel distinctions [14, 26]. This tool applies to a diverse variety of datasets that include both quantitative and qualitative analysis. The data can be retrieved via the SCOPUS database, as referenced by Kokol [27] and Sapountzoglou [28]. When compared to other methods like qualitative analysis through Meta-analysis and Systematic literature review, this tool offers distinct advantages. A bibliometric tool is a program that is valuable for conducting data mining analysis.

Insufficient previous study exists regarding the relationship between data citation and this specific result. The choice to use Cosine normalization in this study was influenced by previous research that found Salton's cosine to be similar to Person's cosine, which was used to investigate potential co-citation in a library context [29].

Moreover, Luukkonen and co-workers argued that it remained the most efficient measure for describing the vector space obtained from the occurrence matrix of absolute data [30]. The study employed the Kamada-Kawai architecture to generate a visualization of network mapping. The edges were assigned weights based on their distance, as explained in the preceding article on network clustering analysis using the Walktrap algorithm with distance [23]. The study centers on the Kamada-Kawai layout visualization, a commonly employed force-directed method for graph drawing that incorporates reflected symmetry [31].

The correlation networks and clustering in this study are consistent with the previous findings reported [32,33]. Waltman

and Van Eck have widely used the network clustering algorithm as a network structure in several study topics [34]. The Louvain algorithm is a fundamental unsupervised learning technique, which may be compared to other algorithms such as Edge, Fast Greedy, Eigenvector, Infomap, Label Propagation, and Louvain [35]. Nevertheless, it is highly compatible with a substantial dataset. The Walktrap technique is an enhanced clustering method that employs a hierarchical agglomerative process. The methodology employed in this investigation is founded on the principle of a short-distance random walk approach, as originally suggested by Pons and Latapy [36]. The Walktrap approach is commonly selected in RStudio and bibliometric analysis because of the small dataset and sparse network. The Walktrap method was selected for network clustering in this study. Prior research on different approaches has depended on characteristics such as modularity, processing speed, and the composition of cluster members. Prior literature has suggested using frequency analysis, co-occurring frequency analysis, and centrality analysis. The study discovered the two primary network clusters by analyzing the co-occurrences found in 171 published publications. The study's findings indicate that the main keywords mentioned in the SCOPUS database were "Motor-cognitive training." This discovery provides evidence for the idea of a substantial possibility of co-occurrence in future studies in the field of sports science, as confirmed by previous research undertaken by.

Network clustering and most frequency words

The analysis of 171 research articles revealed that the subdisciplines most commonly employed were human, female, male, cognition, aged, article, controlled study, exercise, humans, adult, human experiment, clinical article, randomized controlled trial, gait, walking, middle aged, executive function, quality of life, Parkinson disease, and physiology, physical activity, cognitive defect, motor performance, major clinical study, training, pilot study, reaction time, aging, body equilibrium, reaction time, exercise therapy, kinesiotherapy, virtual reality, attention, procedures, walking speed, task performance, young adult,

psychomotor performance, Tai Chi, postural balance, psychology, adolescent, brain, cross-section study, fitness, fitness, follow up, and stroop test, respectively. Both clusters were primarily identified using the Walktrap distance technique [36], which was also employed in the hierarchical clustering model [10]. This technique, along with other algorithms such as Infomap, Label, Multilevel, and Springlass algorithms has been utilized to detect communities in both big and small networks by employing random walks between nodes. Clustering analysis is a method used in quantitative research to group observations based on their characteristics and establish distinct profiles for different roles and responsibilities [37].

Based on the findings, the two most prominent clusters are associated with motor-cognitive training. The previous research designs focused on two main areas. Firstly, they examined the effects of motor-cognitive training combined with exercise on various aspects such as quality of life, physical activity, motor performance, psychology, attention, task performance, walking speeds, reaction time, memory, fitness, and executive function. These studies involved participants of different age groups, including humans of all ages, adolescents, older adults, middle-aged individuals, and young adults. The research followed clinical study protocols, including randomized controlled trials or controlled study designs. Secondly, the research explored the effects of motor-cognitive training combined with exercise therapy or kinesiotherapy specifically in individuals with Parkinson's disease. The evaluation focused on body equilibrium, postural balance, psychomotor performance, and gait in this population.

Trend topics of motor-cognitive training
The study presented the trend research topics in stroke, resistance training, aged individuals, psychomotor performance, postural balance, endurance training, motor performance, executive function, middle-aged individuals, males, females, humans, controlled studies, pilot studies, cognition, exergaming, and cognitive rehabilitation since 2014. In 2019, a meta-analysis of Rezola-Pardo and co-workers reported the effects of motor-cognitive training on cognitive function, movement function, and walking speeds were compared to those of a prior study [38]. A systematic analysis by McGuinness conducted in 2023 has shown the efficacy of home-based interventions utilizing exergames in improving physical and cognitive skills in older adults [39-40]. Additionally, another evaluation of 11 published studies in 2023 found that exergames were beneficial for individuals with Parkinson's disease [41]. Consequently, the utilization of bibliometric method for data analysis in this study revealed a continuous upward trend from 2014 to 2023, highlighting a future knowledge gap.

Limitation of study
The data for this study were obtained from the SCOPUS database, English literature, and scholarly research publications focusing on the keyword "Motor-cognitive training". This study did not include other works that are currently being reviewed for publication, which may influence the results in the future. Therefore, it is crucial to continuously research to acquire reliable data. Furthermore, this method incorporates data mining analysis, namely text data mining, and clustering using computational algorithms. Consequently, no statistically quantitative results were reported. However, these findings can serve as motivation for future research on the quantitative study design regarding motor-cognitive training among athletes.

Conclusion
The existing literature on "Motor-cognitive training" suggests that there has been a growing interest in studying dual-task or combined training involving cognitive rehabilitation and exercise. These studies have focused on motor performance, cognition, and have utilized controlled study designs. This research trend has been observed from 2019 to 2023. The results of this research support a previous study that proposes the possible utilization of machine learning (ML) and data mining analytical methods in the domain of sports analysis, specifically in forecasting player performance and other aspects of sports science in the coming years [41].

Conflict of Interest
The authors declare no conflict of interest.

References
1. O'Sullivan SB, Schmitz TJ, Fulk GD. Physical Rehabilitation, 6th edition. FA Davis Company, Philadelphia; c2014. p. 108-109.
2. Winter DA, Patla AE, Frank JS. Assessment of balance control in humans. Med Prog Technol. 1990;16(1-2):31-51.
3. Ross SE, Guskiewicz KM. Examination of static and dynamic postural stability in individuals with functionally stable and unstable ankles. Clin J Sport Med. 2004;14(6):332-338. DOI:10.1097/00042752-200411000-00002.
4. Davlin CD. Dynamic balance in high level athletes. Percept Mot Skills. 2004;98(3 Pt 2):1171-1176. DOI:10.2466/pms.98.3c.1171-1176.
5. Maki BE, McIlroy WE. Cognitive demands and cortical control of human balance-recovery reactions. J Neural Transm. 2007;114(10):1279-1296. DOI:10.1007/s00702-007-0764-y.
6. Albertsen I, Ghedira M, Gracies JM, Hutin E. Postural stability in young healthy subjects - Impact of reduced base of support, visual deprivation, dual tasking. J Electromyogr Kinesiol; c2017, 33. DOI:10.1016/j.jelekin.2017.01.005.
7. Papegaaij S, Hortobágyi T. Age-related changes in the neural control of standing balance. In: Locomotion and Posture in Older Adults: The Role of Aging and Movement Disorders; c2017. p. 427-444.
8. Ruffieux J, Mouthon A, Keller M, Mouthon M, Annoni JM, Taube W. Balance training reduces brain activity during motor simulation of a challenging balance task in older adults: an fMRI study. Front Behav Neurosci. 2018;12:10. DOI:10.3389/fnbeh.2018.00010.
9. Wickens C. Multiple resources and mental workload. Hum Factors. 2008;50:449-455. DOI:10.1518/001872008X288394.
10. Brusco M, Steinley D, Watts AL. Improving the walktrap algorithm using K-means clustering. Multivar Behav Res; c2024. DOI:10.1080/00273171.2023.2254746.
11. Resch JE, May B, Tomporowski PD, Ferrara MS. Balance performance with a cognitive task: a continuation of the dual-task testing paradigm. J Athl Train. 2011;46(2):170-175. DOI:10.4085/1062-6050-46.2.170.
12. Li K, Roudaia E, Lussier M, Bherer L, Leroux A, McKinley P. Benefits of cognitive dual-task training on

balance performance in healthy older adults. J Gerontol Ser A Biol Sci Med Sci. 2010;65A:1344-1352. DOI:10.1093/gerona/glq151.

13. Hanief YN. Bibliometric analysis of sports studies. J Sport Area. 2021;6(2):263-274.

14. Gaviria-Marin M, Merigo JM, Popa S. Twenty years of the Journal of Knowledge Management: A bibliometric analysis. J Knowl Manag. 2018;22(8):1655-1687.

15. Zhang G, Qin Y, Liu S, Chen X, Zhang W. Bibliometric analysis of research trends and topic area in traditional Chinese medicine therapy for lymphoma. Pharm Biol. 2024;62(1):13-21.

16. Dinic BM, Jevremov T. Trends in research related to the dark triad: a bibliometric analysis. Curr Psychol. 2021;40(7):3206-3215.

17. Mongeon P, Paul-Hus A. The Journal coverage of web of science and Scopus: a comparative analysis. Scientometrics. 2016;106(1):213-228.

18. Cobo MJ, Lopez-Herrera AG, Herrera-Viedma E, Herrera F. Science mapping software tools; review, analysis, and cooperative study among tools. J Amer Soc Inf Sci Technol. 2011;62(7):1382-1402.

19. Aria M, Cuccurullo C. bibliometrix: An R-tool for comprehensive science mapping analysis. J Inform. 2017;11(4):959-975.

20. Wichaisri S, Sapadang A. Trends and Future Directions in Sustainable Development. Sustain Develop. 2018;26(1):1-17.

21. Salton G, McHill MJ. Introduction to Modern Information Retrieval, McGraw-Hill, Auckland; c1983.

22. Con P, Latapy M. Computing Communities in Large Networks Using Random Walks. Comp Inf Sci; c2005. p. 284-293.

23. Kamada T, Kawai S. An algorithm for drawing general undirected graphs. Infor Process Lett. 1989;49(1112):7-15.

24. Heradio R, Perez-Morag H, Fernandez-Amoro D, Cabrerizo FJ, Herrera-Viedma E. A bibliometric analysis of 20 years of research on software product lines. Infor Soft Technol. 2016;72:1-15.

25. Khan MA, Pattnaik D, Ashraf R, Ali I, Kumar S, Donthu N. Value of special issues in the Journal of Business Research: A bibliometric analysis. J Bus Res. 2021;125:295-313.

26. Donthu N, Kumar S, Mukherjee D, Pandey N, Lim WM. How to conduct a bibliometric analysis: An overview and guidelines. J Bus Res. 2021;133:285-296.

27. Kokol L, Vosner HB, Zavrsnik J. Application of bibliometrics in medicine; a historical analysis. Health Info Libr J. 2020;38(2):125-138.

28. Sapountzoglou N. A bibliometric analysis of risk management methods in the space sector. J Space Saf Eng. 2023;10(1):13-21.

29. Leydesdorff L. On the Normalization and Visualization of Author Co-citation Data: Salton's Cosine versus the Jaccard Index. J Amer Soc Infor Sci Technol. 2008;59(1):77-85.

30. Luukkonen T, Tijssen R, Persson O, Sivertsen G. The measurement of international scientific collaboration. Scientometrics, Amsterdam. 1993;28(1):15-36.

31. Kobourov SG. Force-directed drawing algorithms, in Handbook of graph drawing and visualization, CRC press; c2013.

32. Lee Y, Lee Y, Seong J, Stanescu A, Hwang T, Hwang CS. Analysis of GIS Research Trends in the U.S. with AAG Conference Presentations from 2000-2019. Geogr J Korea. 2019;53(4):495-508.

33. Kang GJ, Ewing-Nelson SR, Mackey L, Schlitt JT, Marathe A, Abbas KM, et al. Semantic network analysis of vaccine sentiment in online social media. Vaccine. 2017;35(29):3621-3638.

34. Wang S, Koopman R. They are clustering articles based on semantic similarity. Scientometrics. 2017;111(2):1017-1031.

35. Pons P, Latapy M. Computing communities in large networks using random walks. In: International Symposium on Computer and Information Sciences. Springer, Berlin, Heidelberg; c2005. p. 284-293.

36. Migliore AA, Rossi-Lamastra C, Tagliaro C. Are workspaces gender neutral? A literature review and a research agenda. Build Res Infor. 2022;50(8):924-948.

37. Rezola-Pardo C, Arrieta H, Gil SM, Zarrazquin I, Yanguas JJ, López MA, et al. Comparison between multicomponent and simultaneous dual-task exercise interventions in long-term nursing home residents: the Ageing-ONDUAL-TASK randomized controlled study. Age Ageing. 2019;48(6):817-823.

38. McGuinness A, Malone S, Hughes B, Collins K. Physical activity and physiological profiles of elite international female field hockey players across the quarters of competitive match play. J Strength Cond Res. 2019;33(9):2513-2522.

39. Seinsche J, De Bruin ED, Hinrichs T, Giannouli E. Effects of home-based interventions using exergames on physical and cognitive functions in community-dwelling older adults: a PRISMA-P-compliant protocol for a systematic review. Front Public Health. 2023;11:1291120.

40. Johansson H, Fokerts AK, Hammarstrom I, Kalbe E, Leaby B. Effects of motor-cognitive training on dual-task performance in people with Parkinson's disease: a systematic review and meta-analysis. J Neurol. 2023;270(6):2890-2907.

41. Wang P, Liu J, Liao B. Prediction of sports performance and analysis of influencing factors based on machine learning and big data statistics. J Sen. 2022;2022(6):1-9.