

From recreation to research: A bibliometric and conceptual mapping of pickleball science (2016–2026)

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ABSTRACT

Pickleball has experienced explosive global growth, yet its scientific literature remains fragmented. This study presents the first comprehensive bibliometric analysis of pickleball research, aiming to map publication trends, collaboration networks, and thematic structures while proposing a conceptual framework for the field. Using PRISMA guidelines, we retrieved 285 documents from Scopus, PubMed, and ScienceDirect (2016–February 2026) and analysed them using Biblioshiny (R). Results reveal an exponential publication surge, particularly after 2024, with the United States dominating productivity (172 publications, 443 citations). Research bifurcates into a dual scientific paradigm: health promotion (psychosocial benefits, well-being, social capital) versus injury risk (fractures, sprains, falls in older adults). The conceptual framework we introduce integrates these axes across population demographics and research domains. Thematic analysis identifies serious leisure, ageing, and injury epidemiology as dominant clusters, yet methodological limitations—predominantly cross-sectional designs and lack of experimental studies persist. We propose a future research agenda emphasizing randomized controlled trials, biomechanical investigations, and international collaboration. This study provides a knowledge map for researchers, practitioners, and policymakers, positioning pickleball as a model for understanding how recreational activities transition into established research domains.

Keywords: bibliometrics; pickleball; sport science trends; ageing; injury epidemiology; serious leisure.

Cite this article as:

Daulay, D. A. A., Tuasikal, A. R. S., Hariyanto, A., Daulay, B., Fajar, M. C., Wulandari, F. Y., Ali, S. K. S., Ayubi, N., & Rizki, A. Z. (2026). From recreation to research: A bibliometric and conceptual mapping of pickleball science (2016–2026). *Journal of Human Sport and Exercise*, 21(4), 1321-1335. <https://doi.org/10.55860/nckdht31>

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Submitted for publication May 11, 2026.

Accepted for publication June 28, 2026.

Published August 19, 2026.

[Journal of Human Sport and Exercise](#). ISSN 1988-5202.

©Asociación Española de Análisis del Rendimiento Deportivo. Alicante. Spain.

doi: <https://doi.org/10.55860/nckdht31>

INTRODUCTION

Pickleball, a composite racquet sport integrating elements of table tennis, badminton, and tennis, has emerged as one of the fastest-growing physical activities globally. Played with a perforated plastic ball on a smaller court (13.41 × 6.1 m) compared to traditional tennis, the sport is characterized by slower ball speeds and simplified technical execution, making it accessible to individuals across diverse age groups and fitness levels (Lauxtermann & Stubbs, 2025). The Sport & Fitness Industry Association reported a 223.5% increase in U.S. pickleball participation from 2020 to 2023, with an estimated 36.5 million players nationally, while the two largest age brackets, those over 55 years and those aged 18–34 years, comprise 19.8% and 18.5% of participants, respectively (Lee et al., 2025). This remarkable growth trajectory has positioned pickleball not merely as a recreational phenomenon but as a significant subject of scientific inquiry within sports science, physical education, public health, and gerontology.

The inclusive nature of pickleball, requiring no fundamental adaptations for participation, has catalysed research interest across multiple disciplinary domains (Weiss et al., 2021). In educational contexts, the sport's moderate tempo and simple game design have been investigated as pedagogical tools for developing fundamental movement skills, coordination, and student engagement in physical education curricula (Sun & Chen, 2024). Concurrently, within performance sport training, structured interventions have demonstrated significant improvements in forehand, backhand, serve mechanics, and overall skill acquisition among adolescent athletes (Moreno-Torres et al., 2025), indicating a progressive shift from descriptive accounts of gameplay toward systematic learning and training model development.

Beyond pedagogical and technical dimensions, a substantial body of literature has examined the biopsychosocial benefits of pickleball participation, particularly among older adult populations. A systematic review by Lauxtermann and Stubbs (2025) found that pickleball enhances subjective well-being, life satisfaction ($p < .05$), happiness ($r = .263$, $p < .001$), and social integration while reducing depressive symptoms ($r = -.23$, $p < .01$), especially in older adults (Chidiebere Anugwolu, 2025; Stroesser et al., 2024). Groundbreaking work by Heo et al. (2018) established that serious leisure commitment to pickleball is inversely associated with depression, with higher commitment levels correlating with lower depression scores. Furthermore, Kim et al. (2021) demonstrated that pickleball participation positively predicts happiness, with social capital, encompassing feelings of trust, safety, and neighbourhood connections, mediating this relationship. Qualitative research has further elucidated that pickleball fosters psychological well-being through mechanisms of autonomy, purpose, and positive social connections, with intermediate and advanced players prioritizing community and belonging over competitive outcomes.

Notwithstanding the proliferating body of pickleball literature, the knowledge landscape remains fragmented and lacks systematic bibliometric mapping. While bibliometric analysis has been extensively employed in sport science to identify research hotspots, thematic trends, scientific collaborations, and influential publications, no comprehensive study has applied this methodology to synthesize pickleball research development. This gap precludes a macro-level understanding of dominant research directions, saturated versus underexplored domains, and emerging frontiers requiring further investigation. Specifically, the absence of bibliometric mapping obscures critical insights regarding the temporal evolution of publication output, the geographic and institutional distribution of research activity, collaboration networks among authors and countries, and the conceptual structure of the field as revealed through keyword co-occurrence analysis.

This study addresses broader questions critical to understanding emerging sports science: (1) How do emerging sports evolve scientifically from recreational phenomena to established research domains? (2) How

do health-promotion and injury-risk narratives coexist and compete within a new sport's literature? (3) What can pickleball's scientific trajectory teach us about the transition of recreational activities into formal research fields?

Therefore, this study aims to conduct a comprehensive bibliometric analysis of pickleball research indexed in leading scientific databases (Scopus, PubMed, and ScienceDirect) from inception through February 2026. Using the PRISMA framework for systematic literature selection and employing R Studio with Biblioshiny for quantitative analysis, this study will: (1) characterize annual publication and citation trends; (2) identify the most productive journals, affiliations, and countries; (3) map scientific collaboration networks; (4) analyse keyword co-occurrence to delineate major research themes; and (5) synthesize findings from the most highly cited articles. Theoretically, this study will contribute a systematic knowledge map of pickleball research, address a critical bibliometric gap and provide a conceptual framework for understanding emerging sport science evolution. Practically, the findings will inform future research agendas, guide evidence-based intervention development for injury prevention and health promotion, and support policymakers and practitioners in optimizing pickleball as an inclusive, health-enhancing physical activity.

METHODS

The study uses the bibliometric methodology of analysis in three phases: (1) data collection, (2) data analysis, and (3) synthesis and presentation of results. Specifically, the data collection phase is guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, which involves literature identification, screening, eligibility assessment, and inclusion. Duplicates are deleted with Mendeley before the PRISMA pipeline starts. The cleaned dataset is then analysed in two stages. First, R studios for programming and then Biblioshiny are used to map the intellectual structure of the field. The combined outputs offer initial quantitative insights that guide subsequent detailed content analysis.

Data retrieval

Core Collection, which includes the Scopus, PubMed, and Science Direct databases from the beginning of publication to the present February 18, 2026. The database was chosen for its rigorous journal selection standards, comprehensive peer-review process, high data completeness, and clear citation linking, making it the platform of choice for bibliometric analysis and bibliographic knowledge graphs.

Table 1. The search strategy uses the comprehensive Boolean formula.

Database	Search strategy
Scopus	TITLE-ABS-KEY (pickleball)
Pubmed	("pickleball"[All Fields])
ScienceDirect	Title, abstract, or keywords: pickleball

Note. Search execution date: February 18, 2026 (all databases searched on the same day to ensure temporal consistency).

Study selection and screening process

The research selection was based on the following inclusion criteria: (1) original research articles, reviews, and notes focused on pickleball as the primary subject; (2) publication in English; and (3) availability of full bibliographic data (authors, affiliations, abstract, keywords, references). Studies are excluded if: (1) they are non-research publications (such as conference proceedings, book chapters, editorials, or reports) that lack original data; (2) they are duplicate publications; (3) they do not have complete bibliometric metadata; or (4) they are limited to abstracts only with no full-text access.

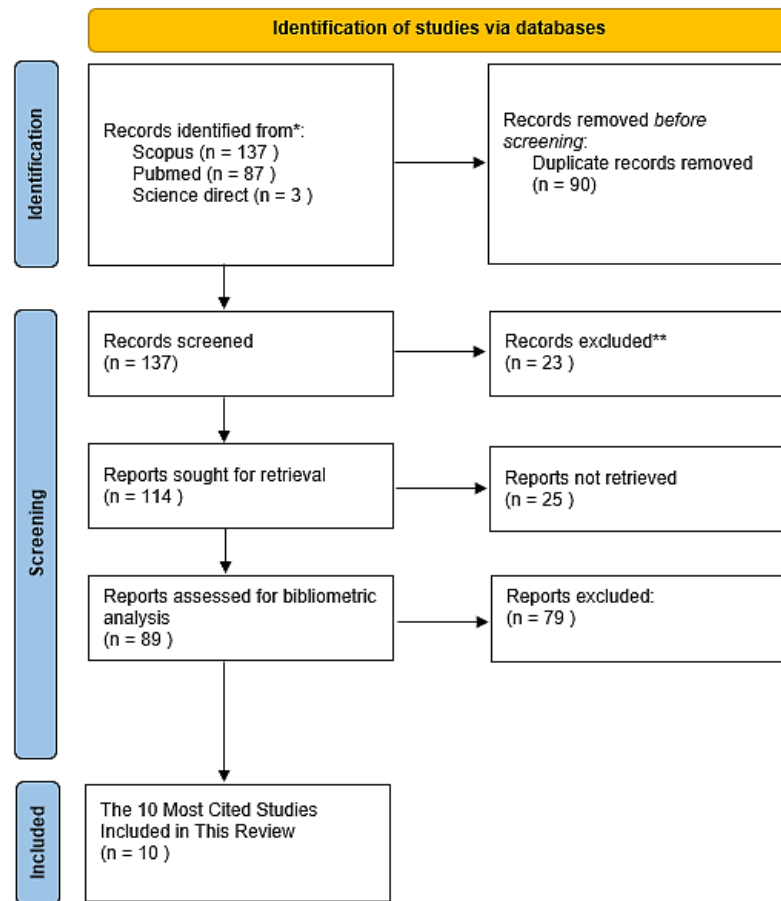


Figure 1. Prisma flow diagram.

Bibliometric analysis techniques

Bibliometric analysis was conducted using data from scientific publication sources to evaluate annual publication trends, average citation trends per year (MeanTCperYear) calculated as MeanTCperArt divided by CitableYears, as well as source impact metrics such as the H-index. The technique also includes mapping top affiliates, scientific production by country and time, as well as analysis of relevant keywords that stand out in a word cloud to illustrate the focus of the research.

RESULTS

Publication and citation trends

Data figure 2 or annual publication and citation trends reveal a dynamic growth trajectory in research output, starting modestly with just 1 article in 2016 and none in 2017, followed by a gradual increase to 2 articles in 2018 and 4 in 2019. Momentum built steadily through the early 2020s, with 6 articles in 2020, a slight dip to 4 in 2021, stabilization at 6 in 2022 and 4 in 2023, before surging dramatically to 14 articles in 2024 and an impressive peak of 45 in 2025. This pattern indicates accelerating scholarly interest, potentially driven by emerging research priorities in sports science or physical education, culminating in over a 45-fold increase from the initial year.

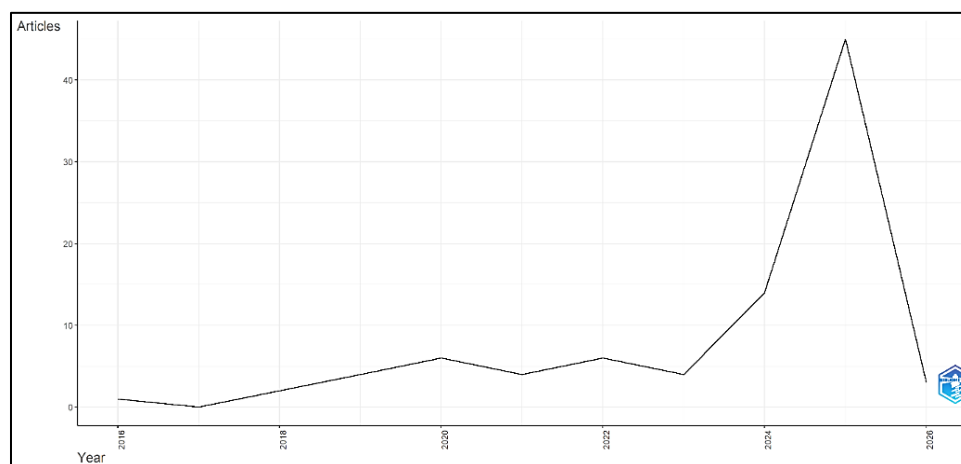


Figure 2. Annual publication and citation trends.

Citation impact

Figure 3 shows the trend of average citations per year (MeanTCperYear) for publications from different years. Citations per year reached the highest peak in the 2021 publication of 6.83 (from 41 total citations on 4 articles over 6 citable years), followed by 2020 (3.36) and 2018 (3.72). The trend declines generally after 2021, with recent years showing lower mean citation rates (2025: 0.44; 2026: 0.67). This pattern is expected given the shorter citation window for recent publications. Notably, early publications (e.g., 2016) had low citation accumulation (0.82), while the sharp increase in article numbers in 2024–2026 has not yet been matched by significant citation accumulation.

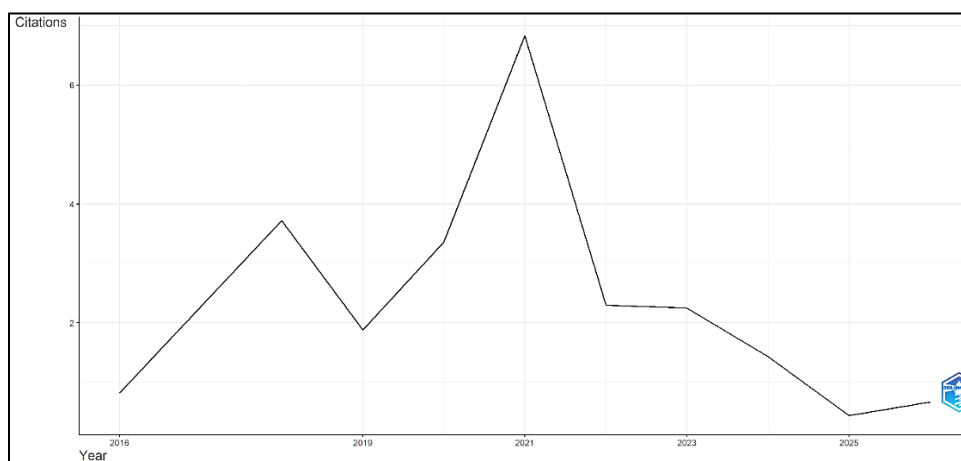


Figure 3. Average citations per year (MeanTCperYear).

Most relevant sources

Bibliometric analysis of publication sources shows that the Journal of Aging and Physical Activity dominates with the highest H-index of 4, supported by g-index 5, m-index 0.5, total citation (TC) 84 out of 5 publications since 2019, reflecting a strong local impact in the field of physical activity for the elderly. The Orthopaedic Journal of Sports Medicine follows with an H-index of 3, g-index 4, m-index 1, and TC 26 from 4 publications starting in 2024, signalling a significant influence in sports orthopaedics. Other journals such as the International Journal of Aging and Human Development and the Journal of Sports Sciences achieved an H-

index of 2 with low TC (8 and 7), respectively, while sources with an H-index of 1 such as the American Journal of Ophthalmology Case Reports and Arthroscopy, Sports Medicine, and Rehabilitation contributed a minimum TC (3-5) of recent publications (2024-2025), overall describing a portfolio of publications focused on sports medicine, Aging, and rehabilitation with a cumulative impact centred on Top journals.

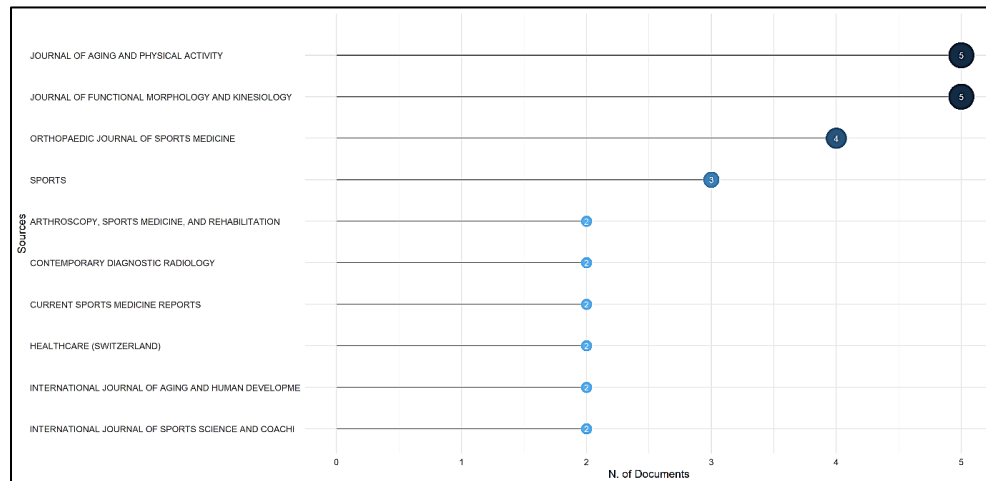


Figure 4. Most relevant sources.

Most relevant affiliations

The provided list highlights the most relevant affiliations based on their productivity in publishing articles, led by Yonsei University in South Korea with the highest output of 9 articles, followed closely by Marshall University in the United States with 6 articles. Several other prominent institutions tie or follow with notable contributions, including Florida State University, Moffitt Cancer Center, NC State University, and University of Nevada, each with 5 articles; while Asia University, University of Miami, University of Tennessee at Chattanooga, and Università degli Studi di Torino each produced 4 articles. This ranking underscores a strong representation from U.S.-based universities and research centres, alongside select international players like those from South Korea, Taiwan, and Italy, likely reflecting key contributors in fields such as sports science, physiology, or related research domains.

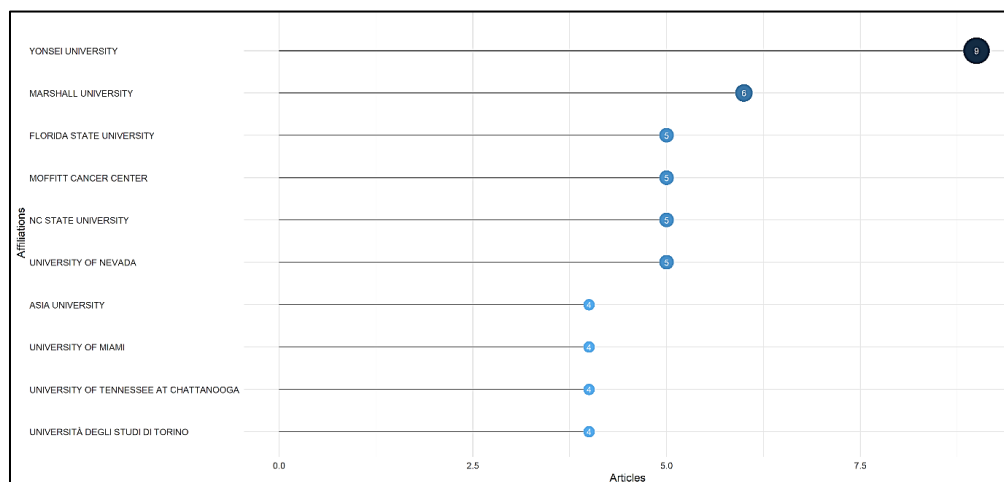


Figure 5. Most relevant affiliation.

Country scientific production

Data on country scientific production reveals a stark dominance by the United States, which leads with 172 publications, far surpassing all others and accounting for the vast majority of output. China and South Korea follow closely with 12 each, while Canada (9), Italy (8), and Spain (8) form a mid-tier group; the Philippines contributes 5, India and Japan 3 each, the Czech Republic 2, and Australia and France trail with just 1 apiece. This distribution underscores the USA's overwhelming influence in the field, likely driven by robust research funding and institutional capacity, contrasted by more modest contributions from emerging and European nations. Over time, the USA has dominated scientific article production in this dataset, starting with 2 articles in 2016 and surging dramatically to 172 by 2026, reflecting steady exponential growth that outpaces all others. South Korea follows with modest but consistent increases from 0 in 2016 to 12 in 2026, while Canada shows gradual rises from 0 to 9 articles over the same period. China emerges later, producing its first 4 articles in 2022 before reaching 12 by 2026, and both Italy and Spain enter the scene even later, with 0 articles until 2025 when each jumps to 8 by 2026. This trend highlights the USA's longstanding leadership, contrasted by emerging contributions from Asian and European countries in recent years.

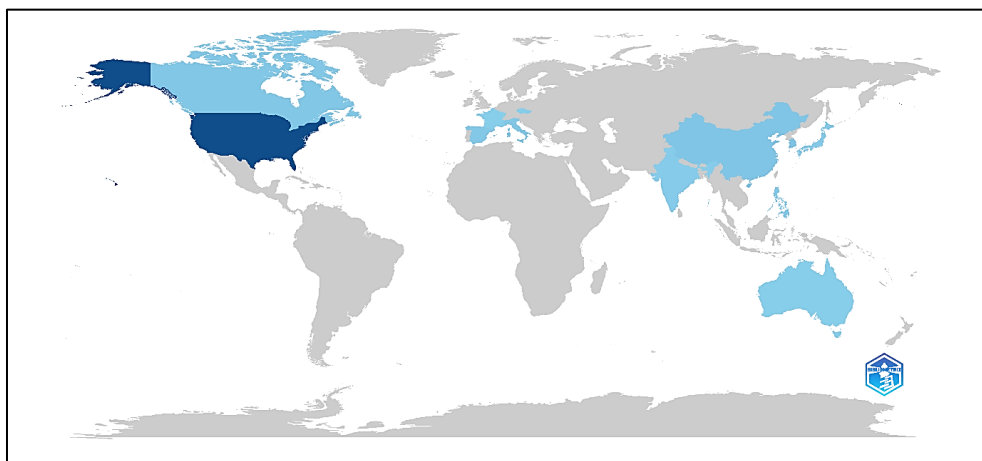


Figure 6. Country scientific production.

Most cited countries

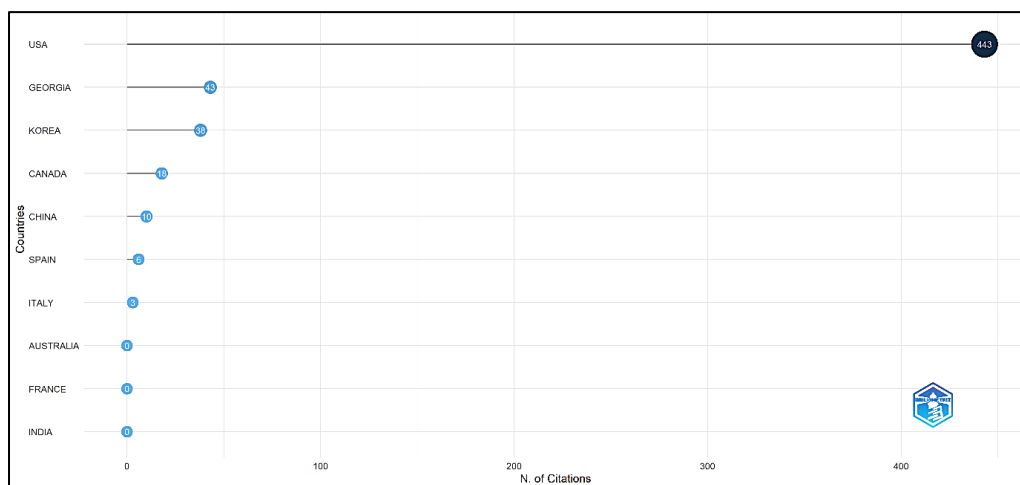


Figure 7. Most cited countries.

Figure 7 shows the dominance of the United States as the country with the highest total citations (TC) reaching 443, followed by an average citation per article of 8.10, reflecting the great influence of its research in related fields. Georgia stands out with a TC of 43 and an excellent citation average of 43.00 per article, signalling high quality despite low volume, while Korea (TC 38, average 6.30) and Canada (TC 18, average 6.00) also contribute significantly. China (TC 10, average 3.30), Spain (TC 6, average 2.00), and Italy (TC 3, average 1.50) showed moderate activity, while Australia, France, India, Japan, and the Philippines recorded zero citations, indicating minimal impact or publication from these countries in this dataset.

Keyword analysis and thematic clusters

The word cloud analysis reveals a strong emphasis on pickleball and human participants (each appearing 47 times), particularly male (36 occurrences) and female (33) adults (32) who are aged (32) or middle-aged (21), highlighting studies on demographics in this racket sport. References to sport injury (21 times) suggest a focus on injury risks or epidemiology, likely drawn from articles (35 mentions) reviewing humans (30) in pickleball contexts, painting a picture of research centred on adult players' health and safety across genders and age groups.



Figure 8. Word cloud in pickleball research.

Thematic cluster interpretation

1. Psychosocial well-being cluster: Serious leisure, happiness, life satisfaction, social capital, depression (centred on older adults).
2. Injury epidemiology cluster: Fractures, sprains, falls, emergency department, older adults, gender differences.
3. Participation and motivation cluster: Physical activity, motivation, skill mastery, competition, socialization.

This confirms the dual scientific paradigm identified in the narrative analysis.

Table 2 presents the 10 most frequently cited articles on the development of pickleball research, which mostly focused on the elderly population in the United States from 2017 to 2021, with lead authors such as Heo, Ryu, and colleagues dominating the top five. Initial research (2017–2018) explored the psychosocial benefits of pickleball for the elderly, showing that serious leisure significantly improved subjective well-being, life satisfaction, optimism, social integration, and reduced depression, while factors such as financial status or employment had less effect. Subsequent studies (2019–2021) revealed participation motives such as fitness, socialization, and mastery of techniques (more task-oriented than competitive), as well as the role of social

capital mediation in increasing happiness. However, the last four articles highlight the rapidly increasing risk of injury since 2013, especially in individuals aged 50 and older (90.9% of cases), with sprains/strains (28.7%), fractures (27.7%), and falls as the leading causes in the emergency department, even though pickleball is classified as low-impact compared to tennis or other racquet sports. Overall, the findings describe pickleball as a recreational activity that is psychosocially beneficial for the elderly but requires awareness of injuries from overuse or falls.

Table 2. Top 10 cited article development of Pickleball research.

No.	Author (Year)	Research objective	Study design	Sample	Main variables	Key findings
1	Heo et al. (2018)	To explore the relationship between serious leisure, financial status, loneliness, and subjective well-being (SWB) in older adults.	Quantitative, cross-sectional	153 older adults (≥50 years) participating in pickleball competitions in the southern US.	SWB (life satisfaction & positive aging experience), serious leisure, financial status, loneliness.	Serious leisure significantly predicted higher SWB. Financial status and loneliness were not significantly related to SWB.
2	(Casper & Jeon, 2019)	To examine the psychological relationship of older adults (≥55 years) toward pickleball regarding behavioural involvement and participation motivation.	Quantitative, cross-sectional (online survey)	690 active pickleball players in North Carolina, US.	Psychological Continuum Model (PCM), playing frequency, playing duration, and motivation (Competition, Diversion, Fitness, Skill Mastery, Socialization).	Fitness & Socialization were the main motivations. At the highest PCM level, Competition & Skill Mastery were rated higher. Higher playing frequency was associated with higher PCM level.
3	Heo et al. (2018)	To explore the relationship between depression, serious leisure, optimism, and social integration in older adult pickleball players.	Quantitative, cross-sectional	153 older adults (≥50 years) participating in pickleball tournaments.	Depression (Major Depression Inventory), serious leisure, optimism, and social integration.	Serious leisure was significantly inversely related to depression (higher commitment associated with lower depression). Optimism and social integration were not significant.
4	(Ryu et al., 2018)	To examine differences in psychosocial benefits (life satisfaction, optimism, social integration) based on demographic characteristics of older adult pickleball players.	Quantitative, cross-sectional	153 older adults (≥50 years) participating in pickleball tournaments.	Life satisfaction, optimism, social integration, age, gender, employment status, and marital status.	Life satisfaction differed significantly based on age and employment status (retirees had higher levels). Social integration was higher in women.
5	Buzzelli and Draper (2020)	To gain insight into the motivations and perceived benefits of pickleball participation in a predominantly older adult community.	Quantitative, cross-sectional (survey)	3,012 USAPA members, mean age 63.17 years.	Sport motivation (Sport Motivation Scale), task-ego orientation, and perceived benefits.	Participants were more task-oriented (personal mastery). "Competition" was cited as the highest benefit. Intrinsic motivation (mastering difficult techniques) was highest.
6	Forrester (2020)	To describe pickleball-related injuries treated in US EDs (2001-2017).	Descriptive, cross-sectional (NEISS data)	300 cases (national estimate of 19,012 injuries).	Patient characteristics, injury type, body part, and location of the incident.	Pickleball injuries increased sharply (2013-2017). Patients were predominantly older adults (90.9% ≥50 years, mean age 63 years). Common injuries: strain/sprain (28.7%) and fracture (27.7%).
7	Kim et al. (2021)	To explore the mediating role of social capital in the relationship between pickleball participation and happiness in older adults.	Quantitative, cross-sectional	208 participants in an international pickleball tournament (age 50-83 years).	Pickleball participation (serious leisure), social capital (cognitive & structural), happiness.	Pickleball participation positively predicted happiness. Social capital (trust/safety & neighbourhood connections) mediated this relationship.
8	Changstrom et al. (2022)	To analyse acute racquet and paddle sport injuries (including pickleball) treated in US EDs (2007-2016).	Descriptive epidemiology, cross-sectional (NEISS data)	7,723 cases (estimated 301,038 injuries) for all racquet sports. Pickleball cases are too few (<20).	Injury type, body part, gender, age, and sport.	Most common injuries: strain/sprain (39.8%). Males (60.3%) had more injuries. The lower extremity was most common (34%). Pickleball was not analysed due to too few cases.

9	Weiss et al. (2021)	To describe and compare non-fatal injuries in older adults (≥ 60 years) playing pickleball vs. tennis in US EDs (2010-2019).	Descriptive, cross-sectional (NEISS data)	429 pickleball cases (estimated 28,984) & 1,109 tennis cases (estimated 58,836) in older adults.	Annual injury trends, injury mechanism (fall), diagnosis, gender, and body part.	Older adult pickleball injuries increased rapidly, equal to tennis by 2018. Dominant mechanism: fall (63.3%). Women were 3.7x more likely to fracture (especially wrist), and men were 3.5x more likely to have a strain/sprain.
10	Webber et al. (2023)	To measure physical activity intensity (heart rate, steps, intensity) in recreational pickleball singles and doubles players in older adults.	Quantitative, cross-sectional	53 pickleball players (22 singles, 31 doubles), mean age 62.1 years.	Heart rate, activity intensity (accelerometer Freedson cut-points), cadence, steps per hour.	Singles and doubles pickleball are moderate-to-vigorous intensity activities (70-71% predicted maximum heart rate). Singles had higher steps per hour (3,322 vs 2,791). Doubles had longer played duration (106 vs 71 minutes).

Conceptual framework

Based on our synthesis, we propose a conceptual framework (Figure 9) that integrates the dual research axes, population demographics, and research domains. This model positions pickleball research along a risk-benefit continuum, with older adults as the primary population of interest, and identifies three intersecting research domains: (1) Psychosocial & Well-being Research, (2) Injury Epidemiology & Prevention, and (3) Participation & Performance Science. The framework highlights gaps where future research is needed (e.g., biomechanical studies, RCTs, cross-cultural comparisons).

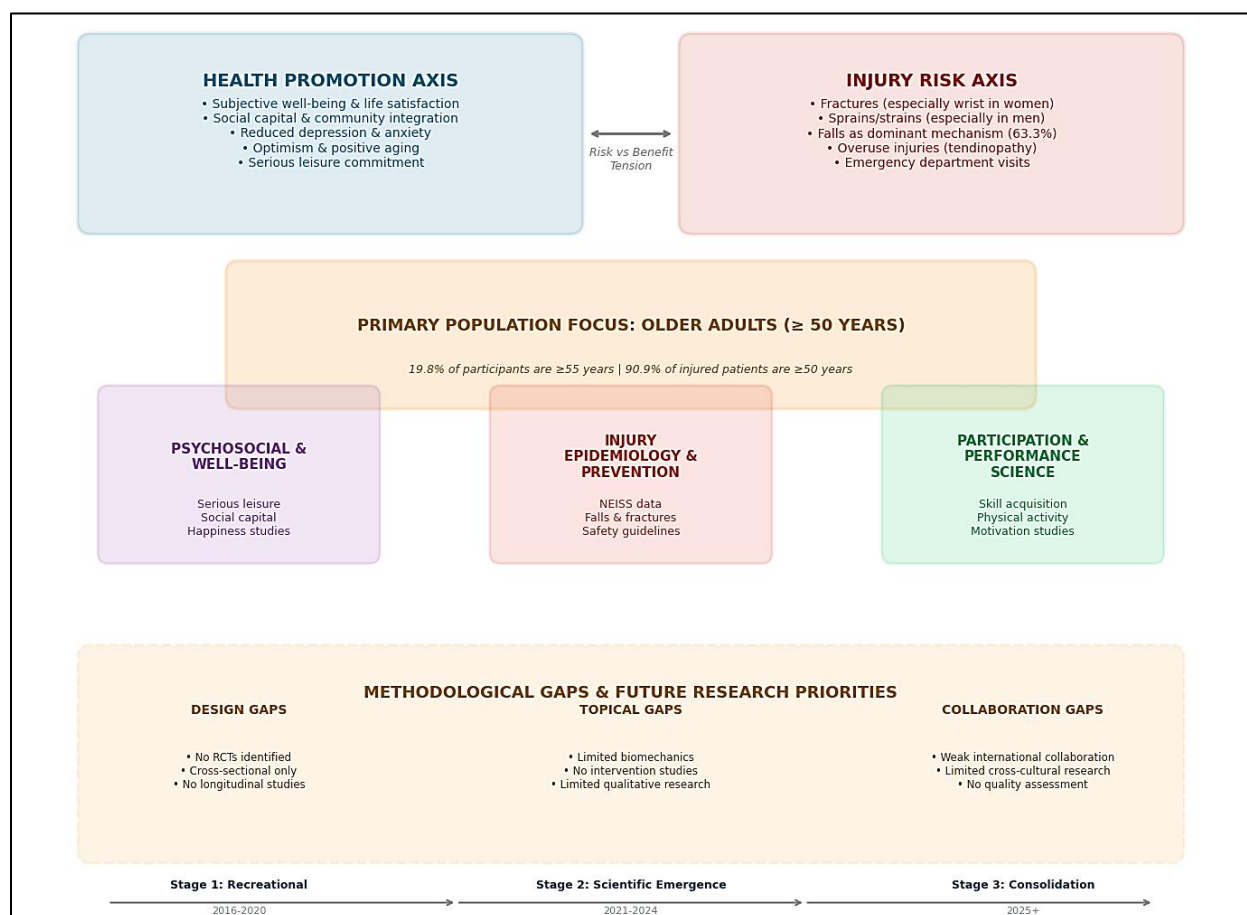


Figure 9. Conceptual framework of pickleball research evolution.

DISCUSSION

Dynamics of publication development and the impact of citations

The results of the bibliometric analysis show that publications on pickleball have increased significantly, especially since 2016, until its peak in 2025 (45 articles). A sharp surge after 2024 indicates that pickleball has transformed from a purely recreational activity to a serious topic of scientific study in sports science and physical education (Gupta, 2024). This pattern is in line with the growing popularity of sports post-COVID-19 pandemic, where people are looking more for outdoor physical activity that is easy to learn and has a low risk of injury (Sallis et al., 2023). Although the number of articles has soared, the average citations per year have actually decreased after 2021. This phenomenon is natural because the statistically younger documents have not had enough time to accumulate citations. However, these findings also indicate that recent research tends to be more diverse and dispersed, so that a very dominant work has not yet been formed that is a common reference (Specht & Crowston, 2022). In other words, the field of pickleball studies is still in the stage of forming a scientific paradigm, not in the consolidation phase.

U.S. dominance and limited global collaboration

The dominance of the United States (172 publications, 443 total citations) in the scientific map of pickleball is not surprising, given that the sport was born and developed rapidly in the country since the mid-20th century. The presence of Yonsei University (South Korea) as the highest-productivity affiliate is interesting, as it suggests that interest in pickleball has spilled over into Asia, likely driven by the active aging and elderly health programs that are a priority in developed countries. However, the still weak pattern of international collaboration indicates that pickleball research is still very local and dependent on the domestic context (Cerezuela et al., 2023). The lack of involvement of European countries (except Italy and Spain, which will only emerge in 2025–2026) and almost no contributions from Africa and Latin America indicate a large geographical gap. This opens up opportunities for cross-cultural research that compares pickleball's motivations, injury patterns, or psychosocial benefits in sociodemographically distinct populations.

Two main axes: Psychosocial benefits of the elderly versus risk of injury

The most substantive finding of this analysis is the existence of two complementary but contradictory axes of research. The first axis, dominated by the work of Heo, Ryu, Casper, and Kim (2017–2021), consistently shows that pickleball as serious leisure provides real psychosocial benefits for the elderly: improved subjective well-being, life satisfaction, optimism, social integration, and decreased depression. The mechanism of social capital mediation, in which participation in the pickleball community builds trust and support networks, is a key finding that strengthens the theory of activity in social gerontology. In contrast, the second axis, represented by Forrester (2020), Weiss (2021), and Changstrom (2021), highlights the alarming epidemiology of injury. Although pickleball is considered low-impact, data from the U.S. Emergency Department shows that 90.9% of injured patients are ≥ 50 years old, with fractures (especially wrist in women) and strains/sprains (in men) as the primary diagnoses, as well as the predominant fall mechanism (63.3%). Ironically, activities recommended for the health of the elderly actually carry a significant risk of acute injury. A clear research gap is the lack of intervention studies that test injury prevention programs (e.g., balance exercises, wrist strengthening, equipment modifications) in the elderly pickleball player population.

Generalizable lessons for emerging sports research

Beyond pickleball, our findings offer broader insights into how emerging sports transition into established research domains. We identify three generalizable stages: (1) Recreational phase – dominated by participation growth and descriptive studies; (2) Scientific emergence phase – marked by exponential publication growth, dual risk-benefit narratives, and dominant national productivity; (3) Consolidation phase

– characterized by international collaboration, experimental designs, and evidence-based guidelines. Pickleball currently sits between stages 2 and 3, offering a model for studying other emerging sports (e.g., padel, footgolf, esports). This framework can guide researchers, funders, and policymakers in anticipating research needs and fostering balanced scientific development.

Methodological gaps and future agendas

The majority of the highest-cited articles (top 10 articles) use survey-based or secondary data-driven cross-sectional quantitative design (NEISS). There were no long-term experimental or longitudinal studies on the list. This indicates that the scientific evidence on pickleball is currently still dominated by associative relationships, not causality. For example, it is not yet known for sure whether playing pickleball causes a decrease in depression or whether individuals with low levels of depression are more likely to participate. Similarly, biomechanical studies of the movement patterns that trigger overuse injuries (e.g., epicondylitis, rotator cuff tendinopathy) in elderly players are still very limited. The future research agenda should lead to: (1) randomized controlled trials (RCTs) for pickleball intervention programs on the mental health of the elderly, (2) prospective cohort studies of injury incidence and risk factors, and (3) multidisciplinary collaboration between sports scientists, physiotherapists, and epidemiologists to develop evidence-based safety guidelines. In addition, the keywords "*gender*" and "*adult*" that appear prominently in the word cloud confirm the need for more specific research on gender differences in motivation, injury patterns, and physiological responses to pickleball.

Theoretical implications

Our analysis contributes to sport science theory in three ways. First, it extends the serious leisure framework (Stebbins, 1992) by demonstrating how recreational commitment in later life generates measurable psychosocial outcomes, mediated by social capital. Second, it introduces a dual-paradigm model for emerging sports, where health benefits and injury risks coexist as competing narratives, shaping research agendas and public perception. Third, it proposes a lifecycle model of sport science evolution, providing a heuristic for understanding how recreational activities mature into formal research fields. These theoretical contributions have implications beyond pickleball, offering conceptual tools for analysing other rapidly growing physical activities.

Study limitations and practical implications

The study has some limitations that need to be acknowledged. First, the databases used are limited to Scopus, PubMed, and ScienceDirect, so publications from Google Scholar, the Web of Science (non-Medline index), or international conference proceedings are not included. Second, only English-language articles are analysed, potentially ignoring important findings from non-English-speaking countries such as Japan, Brazil, or Germany. Third, this analysis uses data up to February 2026, so that the current trends after that period are not captured. Fourth, the search strategy employed a single keyword ("*pickleball*"), which may have missed studies where pickleball is mentioned in passing or as a secondary topic. Fifth, grey literature (e.g., theses, government reports, industry white papers) was excluded, potentially overlooking valuable practice-based insights. Sixth, no quality assessment of included studies was performed, meaning that the bibliometric patterns may include studies of variable methodological rigor. Future bibliometric studies could address these limitations by incorporating multiple search terms, including non-English literature, and integrating quality appraisal. Nonetheless, the practical implications of this study are clear: for physical educators, pickleball can be integrated into the curriculum as an inclusive activity to teach motor skills as well as social values. For coaches and public health practitioners, elderly-specific training modules are required that include warm-ups, safe fall techniques, and wrist and lower extremity strengthening before play. For policymakers, these

results drive the need for pickleball court safety standards as well as national injury surveillance systems, such as NEISS, to be replicated in developing countries.

CONCLUSION

Based on the results of the bibliometric analysis that has been carried out, it can be concluded that research on pickleball has experienced very rapid growth, especially since 2016, until it reached its peak in 2025, which reflects the increasing global interest in this racquet sport post-pandemic. The dominance of the United States is highly visible in terms of the number of publications, citations, and affiliations, although international collaboration is still relatively weak, while the main focus of research is divided into two contradictory axes: on the one hand, pickleball has been shown to provide significant psychosocial benefits for the elderly as a form of serious leisure that improves subjective well-being, life satisfaction, and reduces depression; But on the other hand, this activity also carries a risk of injury that cannot be ignored, such as fractures (especially wrists in women), strains/sprains, and fall injuries that dominate emergency department visits in the population aged 50 years and above. Although the number of publications has soared, the average citations per year have actually decreased in recent publications due to the young age of the document, which is a natural pattern in the growing field of study. This study fills a bibliometric gap in the pickleball literature while recommending the need for more experimental and longitudinal studies, biomechanics research, injury prevention interventions, and strengthening international collaborations to mature this field of study going forward.

AUTHOR CONTRIBUTIONS

All authors meet the criteria for authorship in accordance with established ethical guidelines. Contributions are specified according to the CRediT (Contributor Roles Taxonomy) as follows: Conceptualization: Dio Alif Airlangga Daulay, Abdul Rachman Syam Tuasikal, Syed Kamaruzaman Syed Ali, Ainun Zulfikar Rizki. Methodology: Agus Hariyanto, Novadri Ayubi, Fifit Yeti Wulandari. Formal Analysis: Ainun Zulfikar Rizki, Muhammad Charis Fajar, Rene Mediana Babiera. Investigation: Dio Alif Airlangga Daulay, Basyaruddin Daulay, Fifit Yeti Wulandari. Data Curation: Basyaruddin Daulay, Muhammad Charis Fajar, Rene Mediana Babiera, Novadri Ayubi. Writing – Original Draft: Dio Alif Airlangga Daulay, Ainun Zulfikar Rizki, Basyaruddin Daulay. Writing – Review & Editing: Dio Alif Airlangga Daulay, Agus Hariyanto, Fifit Yeti Wulandari, Rene Mediana Babiera, Syed Kamaruzaman Syed Ali, Novadri Ayubi. Supervision: Abdul Rachman Syam Tuasikal, Syed Kamaruzaman Syed Ali.

All authors have critically reviewed and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

FUNDING

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this manuscript.

AI USE DISCLOSURE

In accordance with current publishing ethics and transparency recommendations, artificial intelligence (AI) tools were used solely to assist with translation and language editing, with the aim of improving clarity and readability. No AI tools were used in the generation of scientific content, including the study design, data collection, analysis, interpretation of results, or the formulation of conclusions. The authors retain full responsibility for the content of the manuscript and confirm its originality, integrity, and accuracy.

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