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## **Analisis Bibliometrik terhadap Intervensi Berbasis Seni Bela Diri untuk *Positive Youth Development***

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### **Abstrak**

Studi ini menyajikan analisis bibliometrik dengan pendekatan kuantitatif deskriptif terhadap penelitian mengenai intervensi berbasis seni bela diri yang bertujuan untuk mendorong perkembangan positif remaja. Tujuannya adalah untuk memetakan keluaran ilmiah, mengidentifikasi tren utama, serta menyoroti karya, penulis, dan institusi yang berpengaruh dalam bidang ini. Data dikumpulkan dari basis data Scopus dengan rentang publikasi dua dekade terakhir, kemudian dianalisis menggunakan perangkat lunak VOSviewer melalui tahapan *co-authorship analysis*, *keyword co-occurrence*, *citation analysis*, dan pemetaan geografis. Sebanyak 46 artikel memenuhi kriteria inklusi dan dianalisis lebih lanjut. Temuan menunjukkan peningkatan stabil jumlah publikasi dari tahun ke tahun, dengan kontribusi dominan berasal dari Amerika Utara dan Eropa serta peningkatan signifikan dari negara-negara Asia. Tema-tema yang paling menonjol berpusat pada manfaat psikologis (seperti peningkatan harga diri, disiplin diri, dan regulasi emosi) serta penguatan aspek sosial (termasuk kerja sama, empati, dan rasa hormat). Berdasarkan sintesis hasil analisis, seni bela diri memiliki peran penting dalam mendukung perkembangan positif generasi muda melalui penguatan kompetensi intrapersonal, keterampilan interpersonal, dan nilai moral yang sejalan dengan kerangka *Positive Youth Development*. Studi ini memberikan wawasan strategis bagi peneliti, pendidik, dan pembuat kebijakan untuk mengoptimalkan seni bela diri sebagai intervensi holistik dalam pembinaan remaja.

**Kata Kunci:** analisis bibliometrik, seni beladiri, *positive youth development*

## ***Bibliometric Analysis on Martial Arts-based Interventions for Positive Youth Development***

### **Abstract**

*This study employs a bibliometric analysis with a descriptive quantitative approach to investigate research on martial arts-based interventions that promote Positive Youth Development (PYD). The objective is to map the scientific landscape, identify research trends, and highlight influential authors, institutions, and publications. Data were retrieved from the Scopus database, covering articles published between 2004 and 2024. A total of 46 relevant documents were selected and analyzed using VOSviewer through co-authorship, keyword co-occurrence, citation, and geographical distribution analyses. The results indicate a consistent rise in research output over the past two decades, reflecting growing academic interest in martial arts as a developmental tool. The United States and*

*European countries dominate publication output, with an increasing contribution from Asian nations. Thematic clusters reveal that martial arts interventions are frequently associated with psychological benefits, including improved self-esteem, self-discipline, emotional regulation, and social outcomes such as teamwork, empathy, and respect for others. Citation analysis highlights several seminal works that have shaped theoretical and practical perspectives on martial arts as a youth-focused intervention. Synthesizing these findings, martial arts demonstrate a significant role in fostering PYD by enhancing intrapersonal competencies, strengthening interpersonal relationships, and cultivating moral values aligned with the PYD framework. This study provides strategic insights for researchers, educators, and policymakers, emphasizing the importance of adopting martial arts as a holistic intervention to support the physical, mental, and social well-being of young people.*

**Keywords:** *bibliometric analysis, martial arts, positive youth development*

## INTRODUCTION

The importance of Positive Youth Development (PYD) cannot be overstated in today's society, where the challenges facing young people are diverse and complex. Positive youth development is an approach that seeks to empower youth by fostering their strengths and providing them with the skills and opportunities needed to thrive. Among various interventions promoting PYD, martial arts-based programs have garnered considerable attention for their unique physical, mental, and social benefits (Vertonghen & Theeboom, 2010). This introduction delves into the scope and significance of martial arts-based interventions for youth, reviews the current state of research, and outlines the methodology of a bibliometric analysis conducted to map the academic landscape of this field.

Positive Youth Development is an intentional, prosocial approach that engages youth within their communities, schools, organizations, peer groups, and families productively and constructively (Kurtines et al., 2008). It recognizes, utilizes, and enhances young people's strengths and promotes positive outcomes by providing opportunities, fostering positive relationships, and furnishing the support needed to build on their leadership strengths (Holt et al., 2017). PYD stands in contrast to approaches that focus solely on correcting problematic behaviors. Instead, it emphasizes building competencies and fostering environments that support the holistic growth of youth. The PYD framework is built on the belief that all young people have the potential to become successful adults when provided with the proper support and opportunities. This approach underscores the importance of creating positive environments encouraging youth to develop skills, form meaningful relationships, and contribute to their communities. By focusing on strengths rather than deficits, PYD aims to cultivate a sense of competence, confidence, connection, character, and caring, often called the "5 Cs" of positive youth development (Conway et al., 2015).

Positive Youth Development has gained significant traction in recent decades as researchers and practitioners have recognized the limitations of traditional youth intervention models that primarily address problematic behaviors (Holt et al., 2020). PYD instead emphasizes the inherent strengths and potential of young people and seeks to create environments and opportunities that foster their holistic growth and development (Amodeo & Collins, 2007). The PYD approach's core is the belief that all youth can thrive with the necessary support and resources. This framework encourages the development of key competencies, including social, emotional, cognitive, and behavioral skills, that enable young people to navigate challenges, build meaningful relationships, and contribute

positively to their communities. The “5 Cs” – competence, confidence, connection, character, and caring – are often used to encapsulate the key outcomes associated with successful PYD programs (Vierimaa et al., 2012). By cultivating these attributes, young people are empowered to become active and engaged citizens, better equipped to lead fulfilling and productive lives. As the importance of positive youth development has become increasingly recognized, a growing body of research has explored the various interventions and approaches that can effectively promote these desired outcomes. Among the interventions that garnered significant attention are those rooted in martial arts (Harwood et al., 2017; Lakes & Hoyt, 2004).

Martial arts programs for youth effectively promote positive youth development outcomes (Vertonghen & Theeboom, 2010). The physical, mental, and social aspects of martial arts training can contribute to developing the “5 Cs” of PYD – competence, confidence, connection, character, and caring. The physical training component of martial arts can enhance youth’s physical fitness, motor skills, and overall health, contributing to a sense of competence (Moore et al., 2023). The emphasis on discipline, goal-setting, and mastery can foster confidence and a growth mindset (van der Kooi, 2020). The group-based nature of martial arts training and the mentorship provided by instructors can facilitate meaningful connections and a sense of belonging. The philosophical principles of martial arts, such as respect, integrity, and perseverance, can shape the character and values of young participants (Cho et al., 2018).

Furthermore, martial arts’ cooperative and collaborative aspects and community service and leadership opportunities can cultivate a sense of caring and social responsibility. By combining physical, mental, and social elements, martial arts-based interventions can potentially address the holistic development of youth, aligning with the core tenets of positive youth development (Blomqvist Mickelsson, 2020). In recent years, a growing body of research has explored the impacts of martial arts-based programs on various youth outcomes, including academic achievement, social-emotional skills, self-regulation, and overall well-being (Moore et al., 2019; Pinto-Escalona et al., 2024). These studies have contributed to understanding how martial arts can foster positive youth development. As the field continues to evolve, a comprehensive bibliometric analysis can provide valuable insights into the current state of research, emerging trends, and future directions in this area. Integrating these physical, psychological, and social benefits makes martial arts a holistic approach to youth development (Theeboom et al., 2009). By participating in martial arts, young individuals improve their physical abilities and develop the character traits and social skills needed to navigate life’s challenges successfully. Despite the potential benefits of martial arts for youth development, the academic investigation into this area needs to be more cohesive. Previous studies have explored various outcomes associated with martial arts training. Still, a comprehensive understanding of the field’s development and identifying key trends and influential works have been lacking. This gap in the literature calls for a systematic review and analysis of existing research.

Although numerous studies have explored the positive impacts of martial arts on youth development, most of these investigations are individual in scope and lack a comprehensive overview of the scholarly direction, trends, and scientific contributions in this field. Prior research has focused on specific outcomes such as enhanced self-esteem or emotional regulation without considering broader dynamics, including scientific collaboration networks, geographic distribution, or the longitudinal evolution of research themes. Furthermore, systematic bibliometric analyses are absent that map author collaborations, citation patterns, and the emergence of core topics within martial arts-based interventions for positive youth development. This represents a significant gap in the literature. Consequently, there is a pressing need for a comprehensive bibliometric review

to identify global trends, influential contributions, and future research directions. This need serves as the rationale and urgency underpinning the present study.

Martial arts-based interventions for youth development have been examined across diverse contexts, including schools, community centers, and recreational programs. Existing research underscores the effectiveness of these interventions in enhancing physical fitness, improving mental health, and fostering essential social skills. Despite these promising outcomes, the body of research remains fragmented, making it challenging to formulate comprehensive conclusions regarding the overall impact of martial arts on youth development. In response to this gap, the present study is guided by several key research questions: What are the key trends in scholarly output on martial arts-based interventions for positive youth development over the past two decades? Which works and authors have been identified as the most influential in this research area? What are the emerging themes related to the psychological and social benefits of martial arts for youth development? How do geographic trends influence the research output on martial arts-based interventions, particularly the contributions from North America, Europe, and Asia? Finally, what role do martial arts-based interventions play in fostering psychological benefits such as self-esteem, self-discipline, and emotional regulation among youth?

## METHOD

This study adopts a bibliometric design with a descriptive quantitative approach to systematically analyze the scholarly landscape related to martial arts-based interventions for positive youth development. The bibliometric method was selected to quantitatively assess publication patterns, collaboration networks, emerging themes, and the scientific influence of authors and documents in this research domain (Donthu et al., 2021).

The data were retrieved from the Scopus database, which was chosen for its extensive coverage of high-quality peer-reviewed publications. The search strategy employed a combination of keywords such as “martial arts,” “youth development,” “positive youth development,” and related terms using Boolean operators (e.g., “martial arts” AND “positive youth development”). The search was limited to journal articles published between 2004 and 2024 to capture the evolution of research trends over the past two decades. Only articles written in English and related to martial arts-based interventions for youth development were included, while conference papers, book chapters, editorial notes, and gray literature were excluded. The initial search yielded 150 documents. After screening based on relevance to martial arts and youth development themes, and removing duplicates and non-empirical or unrelated records, a total of 46 articles were retained for analysis. The metadata, including authors, affiliations, titles, abstracts, keywords, countries, citations, and publication sources, were exported in CSV format for further processing.

The bibliometric analysis was conducted using VOSviewer, a widely recognized software for constructing and visualizing bibliometric networks. Several analytical procedures were performed: (1) co-authorship analysis was conducted to identify collaboration patterns among authors and institutions; (2) keyword co-occurrence analysis was used to determine the most prominent themes and conceptual relationships within the field; (3) citation analysis was applied to identify the most influential documents and authors based on citation impact; and (4) geographical distribution analysis was used to map research productivity across different countries. The results were visualized through network, overlay, and density maps generated in VOSviewer to highlight thematic clusters and temporal developments in research topics. By employing this structured bibliometric procedure, the study provides a comprehensive mapping of the scientific contributions and evolutionary trends in martial arts-based interventions for positive youth development.

## RESULTS AND DISCUSSIONS

The graph depicts the number of documents published each year related to the trend of research on martial arts-based interventions for positive youth development over the past 20 years from the Scopus database. The data spans from 2004 to 2024 and shows a distinct pattern. From 2004 to 2009, the publication output was minimal, with at most one document published each year, and some years, such as 2008, saw no publications at all. Between 2010 and 2013, there was a slight increase in activity, with a small rise in publications peaking at two documents in 2014. A notable spike occurred in 2014 with five publications, followed by a slight decrease and stabilization of around three documents per year. From 2016 to 2021, significant fluctuations were observed, with the number of publications rising sharply to six in 2016, dropping to zero in 2017, and then surging again, peaking at seven documents in 2019. The following years saw stabilization, with seven publications annually until 2021. The trend remained high in 2022 and 2023, with seven documents yearly, but dropped dramatically to one in 2024. Overall, the graph indicates a growing interest and increased research output in martial arts-based interventions for positive youth development, particularly noticeable from 2014 onwards. This trend reflects an increasing recognition of the potential benefits of martial arts in fostering youth development. The recent decline in 2024 suggests either a temporary dip or the start of a new trend that would require further data to confirm.

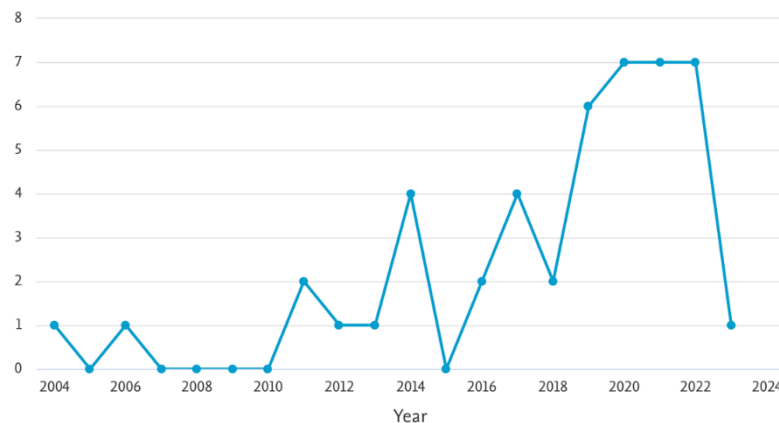


Figure 1. Yearly Publication Trend

### Main Source Document

Table 1 presents the key sources of scholarly publications, including their respective article counts and SJR (SCImago Journal Rank) index values for 2023, categorized by quartile rankings. This information underscores the breadth of sources contributing to the academic literature on this topic. It provides insights into their relative impact as indicated by their SJR index and quartile rankings.

Table 1. Frequently Published Journal Article on Martial Arts-Based Interventions

Sources	Articles	SJR Index (SCIMAGOJR 2023)
PloS ONE	3	0.84 (Q1)
Journal of Sport Medicine and Physical Fitness	2	0.43 (Q2)
International Journal of Environmental Research and Public Health	6	0.81 (Q2)
Journal of Environmental and Public Health	1	Discontinued
Ido Movement for Culture	3	0.29 (Q2)
Asian Journal of Social Science	1	0.2 (Q3)
Research in Autism Spectrum Disorders	1	0.83 (Q2)



Sustainability (Switzerland)	1	0.67 (Q1)
Mental Health and Physical Activity	1	1.16 (Q1)
Psychoneuroendocrinology	1	1.37 (Q1)
Frontiers in Behavioral Neuroscience	1	0.95 (Q1)
Child Psychiatry and Human Development	1	1.15 (Q1)
Journal of Physical Education and Sport	1	0.33 (Q3)
European Journal for Sport and Society	1	0.7 (Q1)
European Journal of Sport Science	1	1.08 (Q1)
Learning and Behavior	1	0.47 (Q3)
Scientific Reports	1	0.9 (Q1)
Preventing School Failure	1	0.38 (Q2)
Human Movement Science	2	0.63 (Q2)
Revista de Artes Marciales Asiaticas	1	0.26 (Q2)
Journal of Human Sport and Exercise	1	0.25 (Q3)
BioMed Research International	1	0.66 (Q2)
Early Intervention in Psychiatry	1	0.98 (Q2)
South African Journal for Research in Sport, Physical Education and Recreation	1	0.15 (Q4)
Journal of Autism and Developmental Disorders	1	1.34 (Q1)
Societies	1	0.49 (Q2)
BMC Public Health	1	1.25 (Q1)
Journal of Clinical Child and Adolescent Psychology	1	1.64 (Q1)
Perceptual and Motor Skills	1	0.56 (Q3)
Mindfulness	1	1.32 (Q1)
Science	1	11.9 (Q1)
International Journal of Offender Therapy and Comparative Criminology	1	0.61 (Q1)
Journal of Applied Developmental Psychology	1	1.34 (Q1)

### Top Publications by Country

Figure 2 illustrates the number of documents published on martial arts-based interventions for positive youth development, categorized by country. The data shows that the United States leads significantly with 14 publications. South Korea follows with eight publications. China and Italy each have four publications. Belgium, Canada, Israel, Malaysia, Poland, and the United Kingdom have three publications. This distribution highlights the predominant contributions from the United States, with substantial input from South Korea and several other countries.

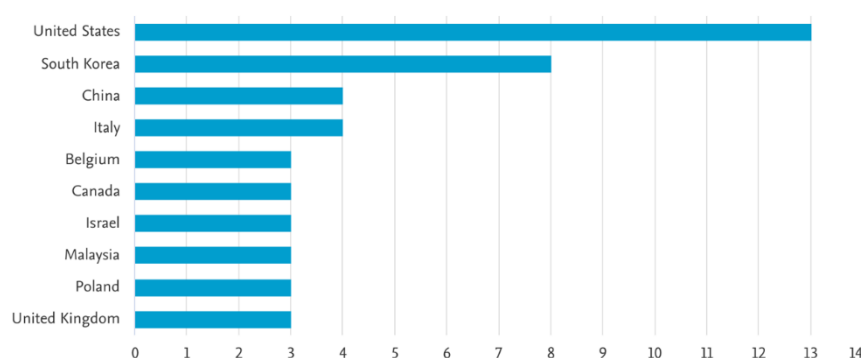


Figure 2. Document by Country

### University Affiliation

Figure 3 displays the number of publications by various institutions related to research on martial arts-based interventions. The Jane & Terry Semel Institute for Neuroscience and Human Behavior has the most publications, totaling 3. Other institutions, each contributing one publication, include Bar-Ilan University, Universiti Teknologi MARA, the University of California, Irvine, and Akademia im. Jana Dlugosza w Czeszochowie, College of the Holy Cross, Reichman University, University of Central Florida, Assumption University, and Vrije Universiteit Brussel. This distribution highlights the significant contributions from a diverse range of institutions, with the Jane & Terry Semel Institute being particularly prominent in this research area.

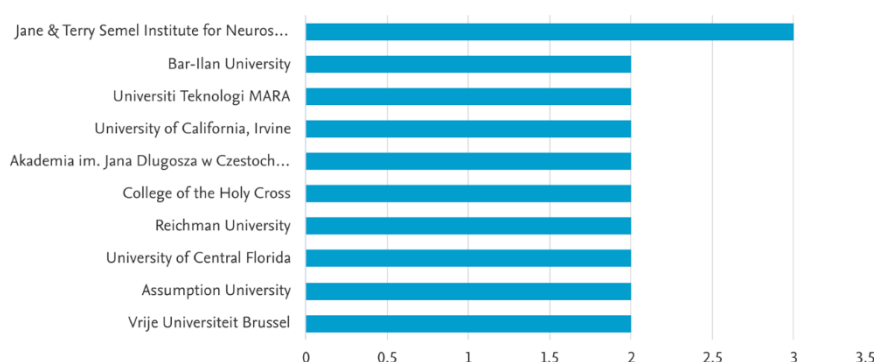


Figure 3. Document by Affiliation

### Top 10 Authors

Figure 4 displays the number of documents published by various authors on martial arts and social behavior or social skills, from 2004 to 2023. A total of 46 documents were analyzed. The authors with the highest number of publications, each contributing two documents, are Feldman, R., Greco, G., Oh, Y., Ortenburger, D., Rassovsky, Y., Schmidt, R.C., Theeboom, M., Vertonghen, J., Wasik, J., and Zagoory-Sharon, O. The bar chart visually compares these document counts, showing that all these authors have contributed equally to the field with two publications each. This indicates a balanced contribution among the top authors in the research area of martial arts and social behavior or social skills.

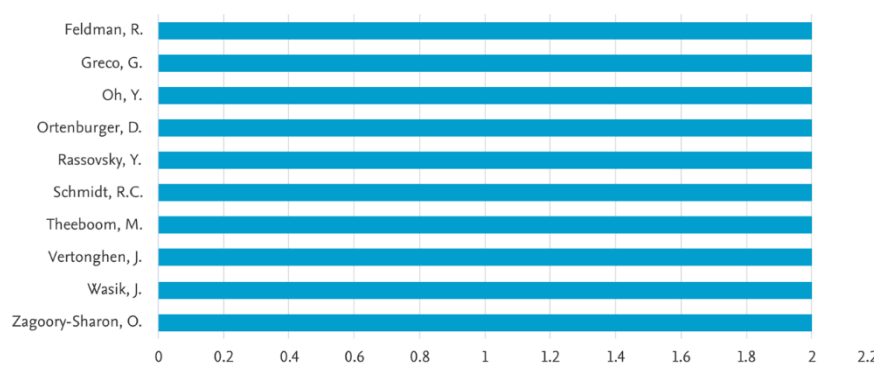
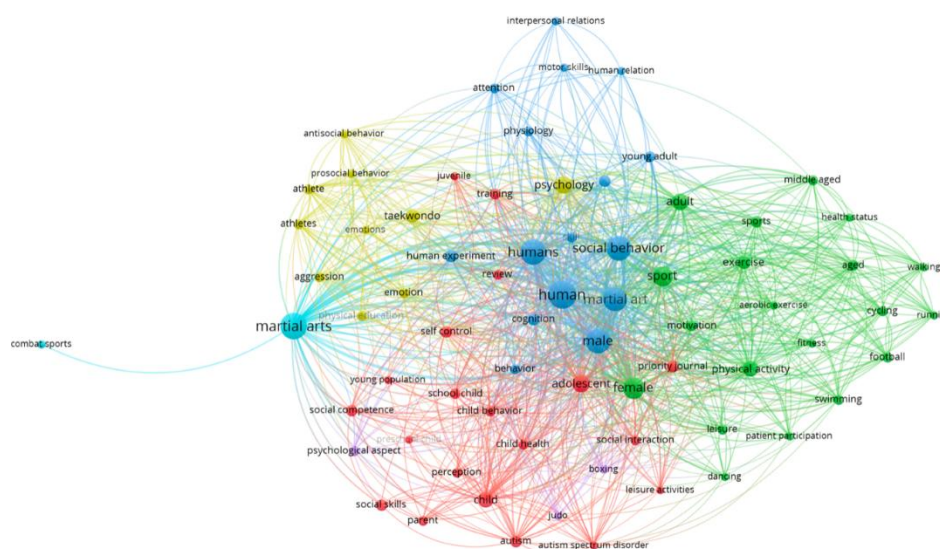


Figure 4. Documents by Author

### Mapping of Martial Arts-based Interventions for PYD

The VOSviewer cluster visualization depicts the network of keywords associated with research on martial arts-based interventions. The nodes represent different keywords,

and each node's size indicates its occurrence frequency. The connections between nodes illustrate the co-occurrence relationships between these keywords, with clusters color-coded to represent distinct thematic areas. The blue cluster centers around the keyword "martial arts". It includes terms related to human behavior, such as "social behavior," "psychology," "attention," "motor skills," "interpersonal relations," and "physiology," highlighting the psychological and social dimensions of martial arts. The green cluster focuses on physical activities and sports, with keywords like "sport," "exercise," "fitness," "physical activity," "health status," and various types of exercises like "walking," "running," "cycling," and "swimming," emphasizing the broader context of physical activities, about martial arts. The red cluster is associated with youth and child development, featuring keywords such as "adolescent," "female," "school child," "child behavior," "child health," "autism," "autism spectrum disorder," and "social competence," underscoring the role of martial arts in the development and well-being of children and adolescents. The yellow cluster includes keywords related to behavior and emotional aspects, such as "antisocial behavior," "prosocial behavior," "aggression," "emotion," and "self-control," indicating a focus on the behavioral and emotional outcomes of martial arts training. Other connections include keywords like "combat sports," "taekwondo," "boxing," and "judo" linked to "martial arts," showing specific types of martial arts being studied, as well as keywords like "review," "training," "human experiment," and "emotion" that connect various clusters, indicating interdisciplinary research themes. The visualization reveals a complex interplay between martial arts' psychological, social, and physical dimensions, highlighting its multifaceted impact on human behavior, development, and health. The distinct clusters demonstrate the diverse research interests and thematic areas within martial arts-based interventions.



**Figure 5. Network Visualization of Author Keyword**

### Document Citation

Based on the table, the author with the highest citation count is Schmidt et al. (2011), who received 167 citations for their work on understanding social motor coordination. Following them, Vertonghen, Theeboom, & Pieter (2014) have 34 citations for their analysis of mediating factors in martial arts and combat sports. Rassovsky et al. (2019) are next, with 29 citations for their study on how martial arts increase oxytocin production. Greco & DE RONZI (2020) have 20 citations for their research on the effects



of karate training on children with autism spectrum disorder, while Greco et al. (2019) have 15 citations for their work on the resilience to bullying in adolescents through Shotokan Karate. Ortenburger et al. (2017) have 10 citations for their study on Taekwondo as a chance to develop social skills. Caron et al. (2017) also have eight citations for investigating the social behavioral dynamics in martial arts techniques, the same as Harwood-Gross et al. (2020), who studied hormonal reactivity during martial arts practice among high-risk youths. Ortenburger et al. (2021) received seven citations for their research on self-efficacy and health-related behavior in Taekwon-Do sport camps, while Vertonghen, Theeboom, Dom, et al. (2014) received five citations for their case study on the organization and regulation of full-contact martial arts in Flanders. Oh (2022b) has two citations for his work on the relationship between passion and the psychological well-being of Taekwondo athletes. Finally, Oh (2022a) received no citations for his study on the mediating effect of social behavior on the passion and aggression of Taekwondo athletes.

**Table 2. Document Citation**

Author/ Year	Title	DOI	Total Citation
(Harwood-Gross et al., 2020)	Hormonal reactivity during martial arts practice among high-risk youths	<a href="https://doi.org/10.1016/j.psyneuen.2020.104806">https://doi.org/10.1016/j.psyneuen.2020.104806</a>	8
(Rassovsky et al., 2019)	Martial arts increase oxytocin production	<a href="https://doi.org/10.1038/s41598-019-49620-0">https://doi.org/10.1038/s41598-019-49620-0</a>	29
(Greco & DE RONZI, 2020)	Effect of karate training on social, emotional, and executive functioning in children with autism spectrum disorder	10.7752/jpes.2020.04223	20
(Greco et al., 2019)	Effects of Shotokan Karate on resilience to bullying in adolescents	<a href="https://doi.org/10.14198/jhse.2019.14.Proc4.52">https://doi.org/10.14198/jhse.2019.14.Proc4.52</a>	15
(Oh, 2022a)	Mediating effect of social behavior on passion and aggression of Taekwondo athletes: validation of three instruments in the Korean language	<a href="https://doi.org/10.23736/S0022-4707.22.13602-9">https://doi.org/10.23736/S0022-4707.22.13602-9</a>	0
(Oh, 2022b)	Relationship between passion and psychological well-being of taekwondo athletes: testing the mediating effects of social behavior	<a href="https://doi.org/10.23736/S0022-4707.21.12924-X">https://doi.org/10.23736/S0022-4707.21.12924-X</a>	2
(Ortenburger et al., 2021)	Perception of Self-Efficacy and Health-Related Behavior in Context of Taekwon-Do Sport Camps	<a href="https://doi.org/10.3390/su13094645">https://doi.org/10.3390/su13094645</a>	7
(Ortenburger et al., 2017)	Taekwon-do: A chance to develop social skills	10.14589/ido.17.4.3	10
(Caron et al., 2017)	Investigating the social behavioral dynamics and differentiation of skill in a martial arts technique	<a href="https://doi.org/10.1016/j.humov.2017.05.005">https://doi.org/10.1016/j.humov.2017.05.005</a>	8
(Schmidt et al., 2011)	Understanding social motor coordination	<a href="https://doi.org/10.1016/j.humov.2010.05.014">https://doi.org/10.1016/j.humov.2010.05.014</a>	167

(Vertonghen, Theeboom, Dom, et al., 2014)	The organization and regulation of full contact martial arts: A case study of flanders	<a href="https://doi.org/10.3390/soc4040654">https://doi.org/10.3390/soc4040654</a>	5
(Vertonghen, Theeboom, & Pieter, 2014)	Mediating factors in martial arts and combat sports: An analysis of the type of martial art, characteristics, and social background of young participants	<a href="https://doi.org/10.2466/06.30.PMS.118k14w3">https://doi.org/10.2466/06.30.PMS.118k14w3</a>	34

### Overlay Visualization

The overlay visualization from VOSviewer depicts the network of keywords related to research on martial arts-based interventions, with a color gradient indicating the recency of the publications associated with each keyword. The nodes represent different keywords, and each node's size indicates its occurrence frequency. The connections between nodes illustrate the co-occurrence relationships. The colors range from purple (older publications) to yellow (more recent publications), providing insights into the evolution of research topics over time.

The central cluster, anchored by “martial arts,” includes terms such as “social behavior,” “human,” “male,” “female,” “adolescent,” “sport,” and “psychology,” reflecting ongoing research interest. On the right, the physical activity and sports cluster includes more recent keywords like “physical activity,” “exercise,” “health status,” “walking,” “running,” “cycling,” “swimming,” “fitness,” and “sports,” indicating a growing focus on the connection between martial arts and physical activities. The youth and development cluster features terms like “child,” “child behavior,” “school child,” “self-control,” “autism,” “psychological aspect,” and “juvenile,” showing steady interest over time. The behavioral and emotional aspects cluster includes keywords such as “antisocial behavior,” “prosocial behavior,” “aggression,” “emotions,” and “taekwondo,” reflecting consistent research on the emotional and behavioral impacts of martial arts.

Methodological terms like “randomized controlled trial,” “clinical article,” “controlled clinical trial,” “intervention study,” “survey and questionnaires,” and “cross-sectional study” appear in various colors, indicating a range of publication dates and methodological diversity. Peripheral keywords such as “combat sports,” “boxing,” and “judo” are less connected but still relevant, indicating specific areas of interest within the broader field. Overall, the visualization reveals a dynamic and evolving field of research on martial arts-based interventions, highlighting key themes and the temporal development of various research topics.

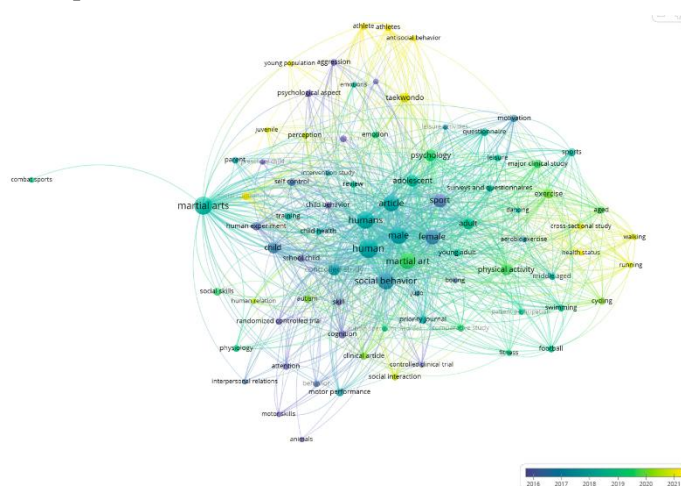


Figure 6. Overlay Visualization

### Density Visualization

The density visualization highlights the primary focus areas and the breadth of research topics within martial arts-based interventions. The central cluster strongly focuses on martial arts' psychological, social, and developmental aspects, particularly human behavior, gender differences, and adolescent development. Surrounding this central theme is substantial research interest in physical activity, exercise, and related health outcomes. Peripheral and isolated keywords suggest niche areas that, while less frequently studied, contribute to the overall understanding of martial arts interventions. This visualization effectively illustrates the key areas of concentration and the diversity of research topics.

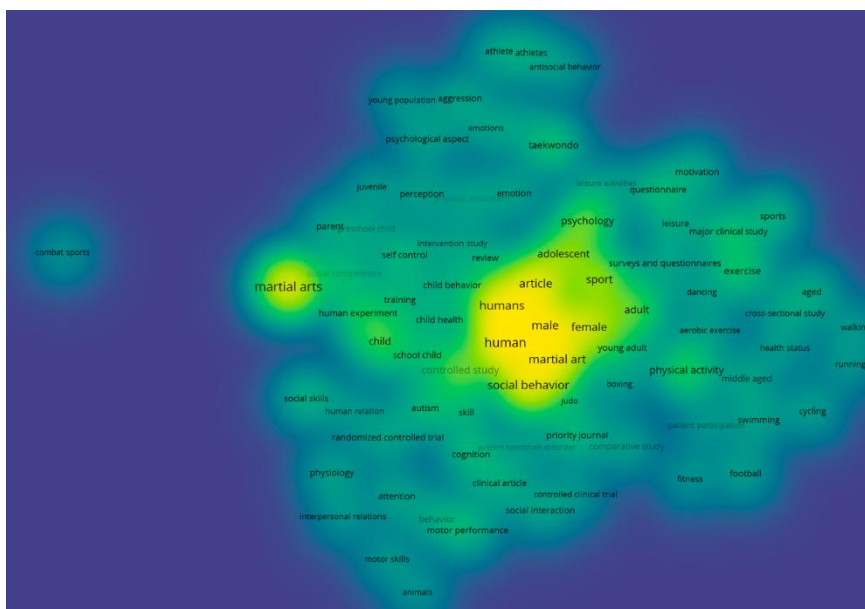


Figure 7. Density Visualization

### CONCLUSION

This bibliometric analysis provides a comprehensive overview of the scholarly landscape on martial arts-based interventions for positive youth development (PYD). Over the past two decades, the number of publications in this field has steadily increased, indicating a growing global interest. Research is predominantly contributed by authors and institutions from North America and Europe, with notable emerging contributions from Asian countries. Thematic clustering reveals a strong focus on psychological domains—such as self-esteem, self-discipline, emotional regulation—and social dimensions, including teamwork, respect, empathy, and social interaction. Influential studies have established martial arts as a strategic vehicle for youth character development.

Synthesizing the findings, martial arts demonstrate substantial potential in fostering PYD by enhancing intrapersonal competencies (self-regulation, confidence, resilience), interpersonal skills (cooperation, empathy, prosocial behavior), and core moral values (discipline, responsibility, perseverance). The integration of physical, cognitive, and socio-emotional components positions martial arts as a holistic developmental intervention aligned with the PYD framework. These insights offer meaningful implications for both research and practice.

Future studies should explore comparative intervention models (e.g., school-based vs. community-based), contextual influences, and long-term developmental outcomes.

Policymakers and practitioners are encouraged to integrate structured, PYD-oriented martial arts programs into youth development initiatives. Furthermore, fostering interdisciplinary collaboration among educators, sports practitioners, psychologists, and community stakeholders may enhance the scalability, sustainability, and impact of martial arts-based interventions on shaping resilient, character-driven, and socially responsible youth.

## REFERENCES

- Amodeo, M., & Collins, M. E. (2007). Using a Positive Youth Development Approach in Addressing Problem-Oriented Youth Behavior. *Families in Society*, 88(1), 75–85. <https://doi.org/10.1606/1044-3894.3594>
- Blomqvist Mickelsson, T. (2020). Modern unexplored martial arts—what can mixed martial arts and Brazilian Jiu-Jitsu do for youth development? *European Journal of Sport Science*, 20(3), 386–393.
- Caron, R. R., Coey, C. A., Dhaim, A. N., & Schmidt, R. C. (2017). Investigating the social behavioral dynamics and differentiation of skill in a martial arts technique. *Human Movement Science*, 54, 253–266. <https://doi.org/10.1016/j.humov.2017.05.005>
- Cho, I. R., Park, H. J., & Lee, T. K. (2018). The influence of taekwondo training on school-life adaptation and exercise value in the United States. *J Exerc Rehabil*, 14(2), 213–218. <https://doi.org/10.12965/jer.1836006.003>
- Conway, R. J., Heary, C., & Hogan, M. J. (2015). An evaluation of the measurement properties of the five Cs model of Positive Youth Development. *Frontiers in Psychology*, 6(DEC). <https://doi.org/10.3389/fpsyg.2015.01941>
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285–296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
- Greco, G., & DE RONZI, R. (2020). Effect of karate training on social, emotional, and executive functioning in children with autism spectrum disorder. *Journal of Physical Education and Sport*, 20(4), 1637–1645. <https://doi.org/10.7752/jpes.2020.04223>
- Greco, G., Fischetti, F., Cataldi, S., & Latino, F. (2019). Effects of Shotokan Karate on resilience to bullying in adolescents. *Journal of Human Sport and Exercise*, 14(Proc4), S896–S905. <https://doi.org/10.14198/jhse.2019.14.Proc4.52>
- Harwood, A., Lavidor, M., & Rassovsky, Y. (2017). Reducing aggression with martial arts: A meta-analysis of child and youth studies. *Aggression and Violent Behavior*, 34, 96–101. <https://doi.org/https://doi.org/10.1016/j.avb.2017.03.001>
- Harwood-Gross, A., Feldman, R., Zagoory-Sharon, O., & Rassovsky, Y. (2020). Hormonal reactivity during martial arts practice among high-risk youths. *Psychoneuroendocrinology*, 121, 104806. <https://doi.org/https://doi.org/10.1016/j.psyneuen.2020.104806>
- Holt, N. L., Deal, C. J., & Pankow, K. (2020). Positive Youth Development Through Sport. In *Handbook of Sport Psychology* (pp. 429–446). <https://doi.org/https://doi.org/10.1002/9781119568124.ch20>

- Holt, N. L., Neely, K. C., Slater, L. G., Camiré, M., Côté, J., Fraser-Thomas, J., MacDonald, D., Strachan, L., & Tamminen, K. A. (2017). A grounded theory of positive youth development through sport based on results from a qualitative meta-study. *International Review of Sport and Exercise Psychology*, 10(1), 1–49. <https://doi.org/10.1080/1750984X.2016.1180704>
- Kurtines, W. M., Ferrer-Wreder, L., Berman, S. L., Lorente, C. C., Briones, E., Montgomery, M. J., Albrecht, R., Garcia, A. J., & Arrufat, O. (2008). Promoting Positive Youth Development: The Miami Youth Development Project (YDP). *Journal of Adolescent Research*, 23(3), 256–267. <https://doi.org/10.1177/0743558408314375>
- Lakes, K. D., & Hoyt, W. T. (2004). Promoting self-regulation through school-based martial arts training. *Journal of Applied Developmental Psychology*, 25(3), 283–302. <https://doi.org/https://doi.org/10.1016/j.appdev.2004.04.002>
- Moore, B., Dudley, D., & Woodcock, S. (2019). The effects of martial arts participation on mental and psychosocial health outcomes: a randomised controlled trial of a secondary school-based mental health promotion program. *BMC Psychology*, 7(1), 60. <https://doi.org/10.1186/s40359-019-0329-5>
- Moore, B., Dudley, D., & Woodcock, S. (2023). The Effects of a Martial Arts-Based Intervention on Secondary School Students' Self-Efficacy: A Randomised Controlled Trial. *Philosophies*, 8(3). <https://doi.org/10.3390/philosophies8030043>
- Oh, Y. (2022a). Mediating effect of social behavior on passion and aggression of Taekwondo athletes: validation of three instruments in the Korean language. *Journal of Sports Medicine and Physical Fitness*, 62(12), 1754–1760. <https://doi.org/10.23736/S0022-4707.22.13602-9>
- Oh, Y. (2022b). Relationship between passion and psychological well-being of taekwondo athletes: testing the mediating effects of social behavior. *Journal of Sports Medicine and Physical Fitness*, 62(4), 568–574. <https://doi.org/10.23736/S0022-4707.21.12924-X>
- Ortenburger, D., Wasik, J., Gora, T., Tsos, A., & Bielikowa, N. (2017). Taekwon-do: A chance to develop social skills. *Ido Movement for Culture*, 17(4), 14–18. <https://doi.org/10.14589/ido.17.4.3>
- Ortenburger, D., Wasik, J., & Mosler, D. (2021). Perception of self-efficacy and health-related behavior in context of taekwon-do sport camps. *Sustainability (Switzerland)*, 13(9). <https://doi.org/10.3390/su13094645>
- Pinto-Escalona, T., Gobbi, E., Valenzuela, P. L., Bennett, S. J., Aschieri, P., Martin-Loeches, M., Paoli, A., & Martinez-de-Quel, O. (2024). Effects of a school-based karate intervention on academic achievement, psychosocial functioning, and physical fitness: A multi-country cluster randomized controlled trial. *Journal of Sport and Health Science*, 13(1), 90–98. <https://doi.org/10.1016/j.jshs.2021.10.006>
- Rassovsky, Y., Harwood, A., Zagoory-Sharon, O., & Feldman, R. (2019). Martial arts increase oxytocin production. *Scientific Reports*, 9(1). <https://doi.org/10.1038/s41598-019-49620-0>



- Schmidt, R. C., Fitzpatrick, P., Caron, R., & Mergeche, J. (2011). Understanding social motor coordination. *Human Movement Science*, 30(5), 834–845. <https://doi.org/10.1016/j.humov.2010.05.014>
- Theeboom, M., De Knop, P., & Vertonghen, J. (2009). Experiences of children in martial arts. *European Journal for Sport and Society*, 6(1), 19–35.
- van der Kooi, M. (2020). Developmental outcomes and meanings in martial arts practice among youth: a review. *European Journal for Sport and Society*, 17(2), 96–115. <https://doi.org/10.1080/16138171.2020.1737421>
- Vertonghen, J., & Theeboom, M. (2010). The social-psychological outcomes of martial arts practise among youth: A review. In ©*Journal of Sports Science and Medicine* (Vol. 9). <http://www.jssm.org>
- Vertonghen, J., Theeboom, M., Dom, E., De Bosscher, V., & Haudenhuyse, R. (2014). The organization and regulation of full contact martial arts: A case study of flanders. *Societies*, 4(4), 654–671. <https://doi.org/10.3390/soc4040654>
- Vertonghen, J., Theeboom, M., & Pieter, W. (2014). Mediating Factors in Martial Arts and Combat Sports: An Analysis of the Type of Martial Art, Characteristics, and Social Background of Young Participants. *Perceptual and Motor Skills*, 118(1), 41–61. <https://doi.org/10.2466/06.30.PMS.118k14w3>
- Vierimaa, M., Erickson, K., Côté, J., & Gilbert, W. (2012). Positive Youth Development: A Measurement Framework for Sport. *International Journal of Sports Science & Coaching*, 7(3), 601–614. <https://doi.org/10.1260/1747-9541.7.3.601>