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Bibliometric Analysis of Research on Recreational Activities for Individuals with Disabilities

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Abstracts

This study examines research on the recreational activities of people with disabilities from 1975 to 2023 using a bibliometric approach. By highlighting the contribution of leisure activities to the physical, mental and social well-being of people with disabilities, it significantly enhances the scientific literature in this field. A total of 5,696 documents from the Web of Science database were analyzed. Methods such as keyword analysis, citation analysis, co-citation analysis and cooperation network analysis were used in the bibliometric analysis. Research aimed at increasing the participation of people with disabilities in society and improving their quality of life is of great importance. The results of the analysis show the countries with the most publications (USA, Australia, Canada), the leading authors (Bauman, Faigenbaum) and the most influential journals (The Lancet, American Journal of Epidemiology) and their respective areas of influence. The results emphasize the importance of scientific research in promoting the social inclusion of people with disabilities and increasing their levels of physical activity. This study demonstrates the growing importance of leisure activities in improving the quality of life of people with disabilities and lays the foundation for encouraging future research directions. It also highlights the need for more accessible and inclusive sports programs for people with disabilities. The frequent use of terms such as "physical activity" and "exercise" among the keywords indicates that research in this area focuses mainly on the benefits of physical activity. The impact of academic studies on leisure activities for people with disabilities is increasing and the potential for knowledge development and practical application in this area will continue to grow in the future.

Keywords: Bibliometric analysis, disability, leisure activities, recreation.

INTRODUCTION

Since the beginning of its existence, human beings have constantly worked and produced in order to maintain their physical existence. In addition to working, people also have recreational and leisure activities. Recreational activities that we participate in during our free time play an important role in coping with the physical and mental problems of daily life and in staying healthy and fit (Demirci, 2019). Recreation includes activities that individuals participate in voluntarily and spend their free time in. These activities cover a wide range such as sports activities, musical hobbies, artistic activities, games and group or individual activities in nature (Neves et al., 2022). One of the most diverse and striking areas of recreation is sports and sports activities. Recreational activities have positive effects on the health and well-being of individuals. Intense working conditions and the monotony of daily life can threaten the physical and mental health of individuals. For this reason, individuals try to regain their health by participating in voluntary activities in their free time. The positive effects of recreational activities on health have led to the idea that these activities can be systematically applied for therapeutic purposes (Demirci, 2019; Erbaş et al., 2021). The basic determinants of individuals'

participation in recreational activities include desires, goals and pleasures. Recreational activities can be classified in different ways according to the number of participants, age, physical characteristics, location, purpose and function (Abells et al., 2008; Arbour-Nicitopoulos & Ginis, 2011). Recreational activities can be carried out in indoor and outdoor areas. Outdoor recreation includes free time activities carried out in nature. For example, activities such as hiking, camping and mountain climbing can be given as examples of outdoor recreation. In indoor areas, activities such as playing chess, reading books and hobby activities are classified as indoor recreation. These activities can be programmed according to the age group and type of participant and can be applied to the whole society (Fatih, 2020; Hinz et al., 2023; Solish et al., 2010). The age factor is an important factor in determining the type, frequency, duration and location of recreational activities that individuals participate in. Recreational activities are divided into two groups according to the type of participation: active and passive. While active recreation includes activities that individuals participate in individually or in groups, passive recreation includes activities that individuals participate in only as spectators. It is divided into individual and group recreation according to the number of participants. For example, individual recreation is activities such as ice skating done alone; group recreation is activities done with other people such as basketball and rafting (Cho et al., 2018; Molton & Jensen, 2010; Shields et al., 2014; Xia et al., 2023). The function of recreational activities may vary depending on the preferences of individuals and the source of the activity. Commercial recreation includes activities that individuals participate in by paying a certain fee in order to evaluate their free time. Such activities include special sports areas, entertainment venues and theme parks. Social recreation includes individuals coming together in various ways to carry out social activities. Aesthetic/Artistic recreation includes activities such as listening to opera and visiting art galleries carried out by individuals with higher education and culture. Physical recreation includes all kinds of recreational activities of a sporting nature. The number of disabled individuals who have lost their physical, mental and sensory abilities due to problems experienced before, during or after birth is quite high worldwide (Demirci, 2019; Gretebeck et al., 2012; Erail, Çebi & Uzun, 2023).

Disabled individuals participate less in daily life activities compared to other individuals in society. This situation brings psychological and social problems and also damages social harmony and togetherness. The participation of disabled individuals can be increased with sports, physical activities and recreational activities. Games and physical activities have an important place in the development of individuals and the lack of these activities can lead to

problems in personality development. Sports is one of the best types of recreational activities that orthopedically disabled people can participate in. Selecting recreational activities appropriate to the capacity of disabled individuals contributes to their physical and psychological development and provides them with social roles. Participation is of critical importance in terms of individuals' life satisfaction and self-sufficiency. Active and meaningful participation of disabled individuals creates positive effects on their health and well-being. Today, activities such as basketball, football, swimming and archery are included in rehabilitation programs and provide social integration for disabled individuals. This situation increases the quality of life of individuals and reduces emotional and social problems (Al-Harahsheh et al., 2022; Demirci, 2019; Lee & Park, 2008).

Bibliometric analysis provides valuable information about the development and current status of research on recreational activities for people with disabilities. It highlights the most influential publications and researchers, identifies major research trends and maps the collaboration networks that have shaped the field in recent years. This comprehensive perspective can guide future research directions and encourage further collaboration in this important research area. One of the frequently used research tools to review and analyze scientific studies is bibliometric methods (Belter, 2015; Escamilla-Fajardo et al., 2020; Opthof, 1997). Bibliometric analysis can quantitatively measure and evaluate the impact of research on a topic of interest, identify past characteristics and critical points and provide insight into future research trends (Zhang et al., 2020). Bibliometric indicators are important tools to identify the number and distribution of publications, the most cited articles and authors (López-Carril et al., 2020). This research was designed considering that the studies on recreational activities related to bibliometric researches for the disabled can guide the scientific community, developments and trends and offer new and creative contributions. In addition, since it is thought that the relationship between recreational studies and disabled individuals, which is becoming increasingly important every passing day, can provide a perspective to new studies and the quantitative inadequacy of scientific studies, especially in our country, it can be said that it is important to subject previous studies to bibliometric analysis. Because bibliometric analysis is a quantitative application that allows the examination of the characteristics and development of scientific production (Zhang et al., 2023). The aim of the bibliometric analysis of the studies conducted on the leisure time activities of individuals with special needs is to reveal the current status of the field and to emphasize what the recreational activities that contribute to the social, physical and psychological well-being of these individuals are and their importance. In

particular, the focus of this study is to increase the participation of disabled individuals in social life, improve their quality of life and ensure their social integration. In addition, it is aimed to enrich the academic literature in this field, determine research trends and present suggestions for future studies. Thus, it is aimed to contribute to the development of more inclusive and accessible recreational programs for individuals with disabilities.

METHODS

This study aims to visually map and analyze the research conducted on recreational activities of individuals with disabilities between 1975-2023 using a bibliometric approach. Bibliometric analysis is used to determine research trends, key researchers, important publications and international collaborations in a specific field. In this study, publications on recreational activities of individuals with disabilities were examined using the Web of Science database. A total of 5696 documents were identified and included in the analysis. The collected data was organized to remove duplicate records and organize the data for analysis. Citation analysis was used to measure the impact of individual publications by determining how many times each publication was cited by other studies. Co-citation analysis revealed the relationships between different publications and the intellectual structure of the field and related research clusters were mapped. Keyword analysis examined the keywords used in the publications and determined the main research topics and trends over time. Collaboration network analysis examined the collaboration models between authors, institutions and countries. At this stage, the data obtained using the VOSviewer software was mapped and visualized.

In order to reach bibliometric analyses and visualize the results within the scope of the study, the free and publicly available VOSviewer software was used. VOSviewer is a software used to create and visualize bibliometric networks (Van Eck & Waltman, 2010).

This bibliometric analysis began with a comprehensive search in the Web of Science database. In this initial search process, keywords such as "Disability", "Disabled athlete", "Physical disability", "Recreational activities", "Leisure activities", "Sport activities" and "Adaptive sports" were used. These keywords were selected to cover relevant studies published between 1975-2023. It was designed to cover all publications related to recreational activities of disabled individuals and a total of 5696 documents were identified. Secondly, in the data cleaning and preparation phase, the collected data were cleaned and organized to ensure accuracy and consistency. Duplicate records were removed and the remaining data were structured for analysis. In the third step, citation analysis was performed. This technique was

used to determine the impact of individual publications by analyzing how many times each publication was cited by other studies. Highly cited publications were identified and important contributions to the field were highlighted. In the fourth step, co-citation analysis was applied. This method was used to determine the relationships between different publications. By analyzing which studies were frequently cited together, it was possible to map the intellectual structure of the field and identify related research clusters. In the fifth step, keyword analysis was performed. The keywords used in the publications were analyzed and the main research topics and trends over time were determined. This analysis helped to understand the evolution of research topics and the emergence of new areas of interest. A method was used that included the density and correlation status of the most frequently used keywords. In the sixth step, collaboration networks were analyzed. This analysis examines collaboration patterns among authors, institutions and countries. By mapping co-author networks, it was possible to understand the dynamics of international collaboration in this field with leading researchers and research institutions. The number of publications and citations of publishing journals were also examined at this stage. Finally, VOSviewer software was used in the data processing and mapping stage. After the obtained map and data, the number of citations and document publications of the authors, the number of studies conducted in the countries and their relationships were examined. First, the analysis of scientific production performance, which allows the evaluation of the impact of the field of study and scientific actors (countries, universities and authors), was carried out. Then, bibliometric mapping was performed with a combination of a clustering technique that reveals the cognitive structure and course of action of the scientific field under consideration by analyzing its subjects, disciplines and research themes (Adrian & Muntazimah, 2023; Ellegaard & Wallin, 2015; Thor et al., 2018).

FINDINGS

Table 1. Analysis of Keyword Occurrences and Link Strength

Keyword	Occurrences	Total Link Strength
Physical Activity	750	1899
Exercise	411	1141
Sport	165	409
Children	151	422
Participation	151	387
Aging	142	382
Dementia	136	386
Adolescents	120	325
Older Adults	120	277
Health	115	339
Motivation	115	270
Quality Of Life	109	272

Sports	107	278
Leisure	99	247

Table 1 and Figure 1 shows the occurrence and overall link strength of prominent keywords in the literature on disabled people and leisure activities. Among the keywords analysed, "physical activity" proved to be the most frequently used term, with 750 occurrences and the highest link strength of 1899. This was followed by "exercise" with 411 occurrences and a link strength of 1141. The term "sport" recorded a total link strength of 409 with 165 occurrences. The keywords "children" and "participation" each occurred 151 times, with a connection strength of 422 and 387 respectively. The term "ageing" is notable with 142 occurrences and a connection strength of 382, while "dementia" is also significant with 136 occurrences and a connection strength of 386. Both "young people" and "older adults" occurred 120 times, with a connection strength of 325 and 277 respectively. The keywords "health", "motivation", "quality of life", "sports" and "leisure" were also included in the analysis and had connection strengths of 115, 115, 109, 107 and 99 respectively.

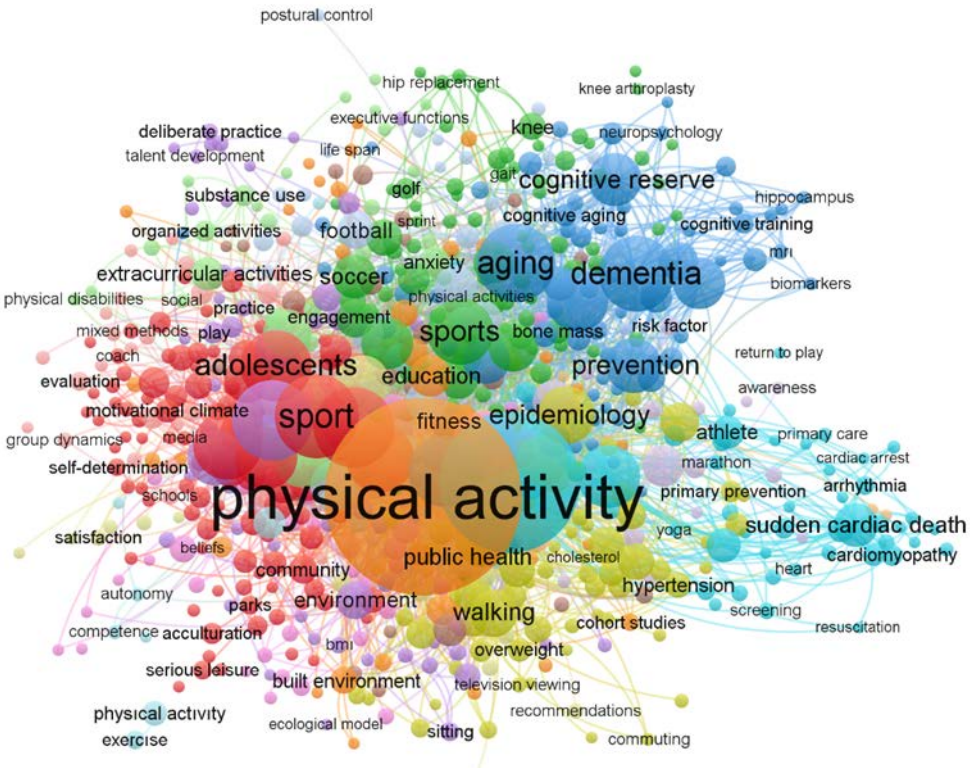

Figure 1. Co-occurrence Map of Keywords

The country that produced the most documents was the United States with 1817 articles. These studies were cited 90,618 times and achieved the highest total link strength (959). Australia followed with 630 documents and 31,979 citations. In third place is the United

Kingdom with 625 documents and 36,295 citations, with a total link strength of 784. Canada made an important contribution with 616 documents and 22,605 citations, followed by Spain and Germany with 392 and 333 documents respectively. The People's Republic of China was included in this list with 249 documents and 4,839 citations; the Netherlands and Sweden made strong contributions with 244 and 218 documents respectively. Sweden in particular had a very high influence with 12,485 citations. Italy, Brazil, France and Norway also contribute to the literature with a certain number of documents and citations. Japan contributed with 130 documents, but was less significant in terms of the number of citations and the strength of the links (Table 2).

Table 2. Analysis of Document and Citation Counts by Country

Country	Documents	Citations	Total Link Strength
Usa	1817	90,618	959
Australia	630	31,979	653
England	625	36,295	784
Canada	616	22,605	446
Spain	392	9,083	373
Germany	333	9,208	402
People's Republic Of China	249	4,839	220
Netherlands	244	11,995	357
Sweden	218	12,485	386
Italy	201	6,212	314
Brazil	173	9,733	188
France	149	6,555	261
Norway	149	10,555	268
Switzerland	138	10,807	221
Japan	130	2,481	82
Denmark	125	7,832	240

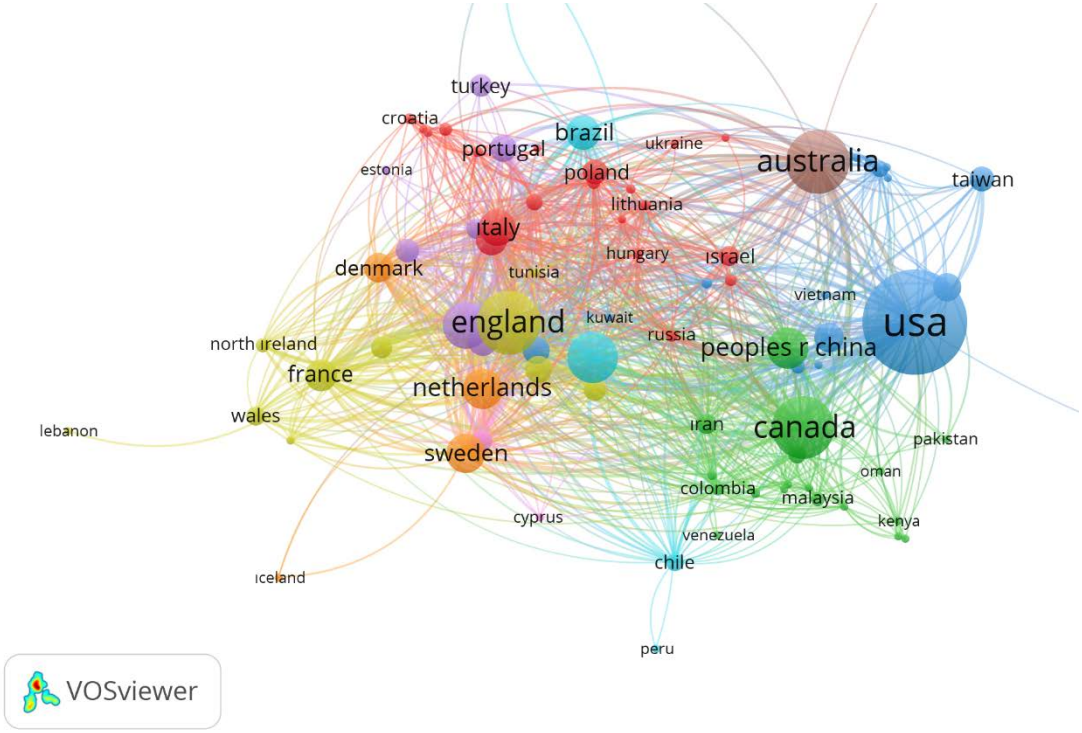

Figure 2. Visual Co-occurrence Map of Countries Regarding the Study

When analysing the correlation status by country, the USA, shown in blue, forms one of the central nodes. Another country that plays a central role in the clusters is Australia, shown in brown. Although they refer to studies conducted in the USA, there are works that cover other topics. Canada, shown in green, has a high degree of correlation. The United Kingdom, shown in yellow, forms a central cluster. Sweden and the Netherlands, shown in orange, form a central cluster. Countries such as Italy, Russia and Poland form a red central cluster, indicating a group of highly correlated joint papers. It can also be observed that there are related studies to countries such as Bulgaria and Denmark (Figure 2).

Table 3. Publication and Citation Counts by Publisher

Publisher	Documents	Citations
Lancet	4	7,084
American Journal of Epidemiology	17	3,883
International Journal of Behavioral Nutrition and Physical Activity	42	3,697
Lancet Neurology	3	3,598
British Journal of Sports Medicine	60	3,386
JAMA - Journal of the American Medical Association	10	3,317
Sports Medicine	30	2,979
PLOS ONE	77	2,761
Medicine and Science in Sports and Exercise	53	2,747
BMC Public Health	58	2,505
Circulation	12	2,499
Preventive Medicine	36	2,415
Psychology of Sport and Exercise	69	2,367
Scandinavian Journal of Medicine & Science in Sports	50	2,281
Neurology	19	2,244

American Journal of Preventive Medicine	26	2,238
Neuropsychologia	3	2,170

Although there are only four documents, the most cited journal is The Lancet with a total of 7,084 citations. This is followed by the American Journal of Epidemiology with 3,883 citations for 17 documents. The International Journal of Behavioural Nutrition and Physical Activity is in third place with 42 published documents and 3,697 citations. Lancet Neurology is in fourth place with three published papers and 3,598 citations, while the British Journal of Sports Medicine makes an important contribution with 60 papers and 3,386 citations. In addition, JAMA - Journal of the American Medical Association has published 10 papers with 3,317 citations, while Sports Medicine stands out with 30 papers and 2,979 citations. The journal with the most published documents, PLOS ONE, has published 77 documents with 2,761 citations. Medicine and Science in Sports and Exercise contributed 53 documents and was cited a total of 2,747 times.

Among the other journals, BMC Public Health collected 2,505 citations from 58 articles, while Circulation collected 2,499 citations from 12 articles. Preventive Medicine published 36 articles and received 2,415 citations, while Psychology of Sport and Exercise received 2,367 citations from 69 articles. Scandinavian Journal of Medicine & Science in Sports contributed 50 articles and was cited 2,281 times, while Neurology published 19 articles and was cited 2,244 times. Finally, the American Journal of Preventive Medicine produced 26 articles with 2,238 citations and Neuropsychologia rounded out the list with 2,170 citations from three articles. The International Journal of Environmental Research and Public Health topped the list with a total of 144 articles. It is followed by PLOS ONE with 77 articles and Psychology of Sport and Exercise, which takes third place with 69 articles. Frontiers in Psychology is in fourth place with 67 articles, while the British Journal of Sports Medicine published 60 articles. BMC Public Health contributed 58 articles and Medicine and Science in Sports and Exercise published 53 articles. Other notable contributions came from the Scandinavian Journal of Medicine & Science in Sports with 50 articles, the Journal of Leisure Research with 49 articles, the Journal of Sports Sciences with 49 articles and the Journal of Physical Activity & Health with 48 articles. The journal Disability and Rehabilitation has made an important contribution with 47 articles, while Leisure Sciences is on the list with 44 articles. Finally, the International Journal of Behavioural Nutrition and Physical Activity completes the list with 42 published articles (Table 3).

Table 4. Number of citations of influential publications

Document	Citations
Hallal (2012)	3175
Bauman (2012)	2612
Stern (2009)	2125
Stern (2012)	2099
Matthews (2008)	1914
Fratiglioni (2004)	1398
McEachan (2011)	1377
Thies (2013)	1276
Harada (2013)	1192
Hamilton (2007)	1146
Lee (2011)	982
Fratiglioni (2000)	942
Wilson (2007a)	889
Anderson (2000)	884
Côté (1999)	807
Lynch (1997)	779
Albert (2000)	699

The article by Hallal (2012) is the most frequently cited document with a total of 3175 citations, which emphasises its significant influence on the field. It is closely followed by Bauman (2012) with 2612 citations, which emphasises its importance and relevance. Stern's two articles from 2009 and 2012 have also attracted considerable attention with 2125 and 2099 citations respectively. Matthews (2008) is another highly cited work with 1914 citations, reflecting his influence and contribution to the literature. Fratiglioni has two entries on the list; the 2004 article has been cited 1398 times, while the 2000 publication has been cited 942 times, showing the continued impact of Fratiglioni's research over the years. McEachan (2011) and Thies (2013) have also made a significant contribution with 1377 and 1276 citations respectively. Harada (2013) and Hamilton (2007) were both cited over 1000 times, 1192 and 1146 times respectively, emphasising their considerable influence. Lee's 2011 paper was cited 982 times. Other important works are Wilson (2007a) with 889 citations, Anderson (2000) with 884 citations and Côté (1999) with 807 citations. Lynch (1997) and Albert (2000) were also recognised with 779 and 699 citations respectively (Table 4).

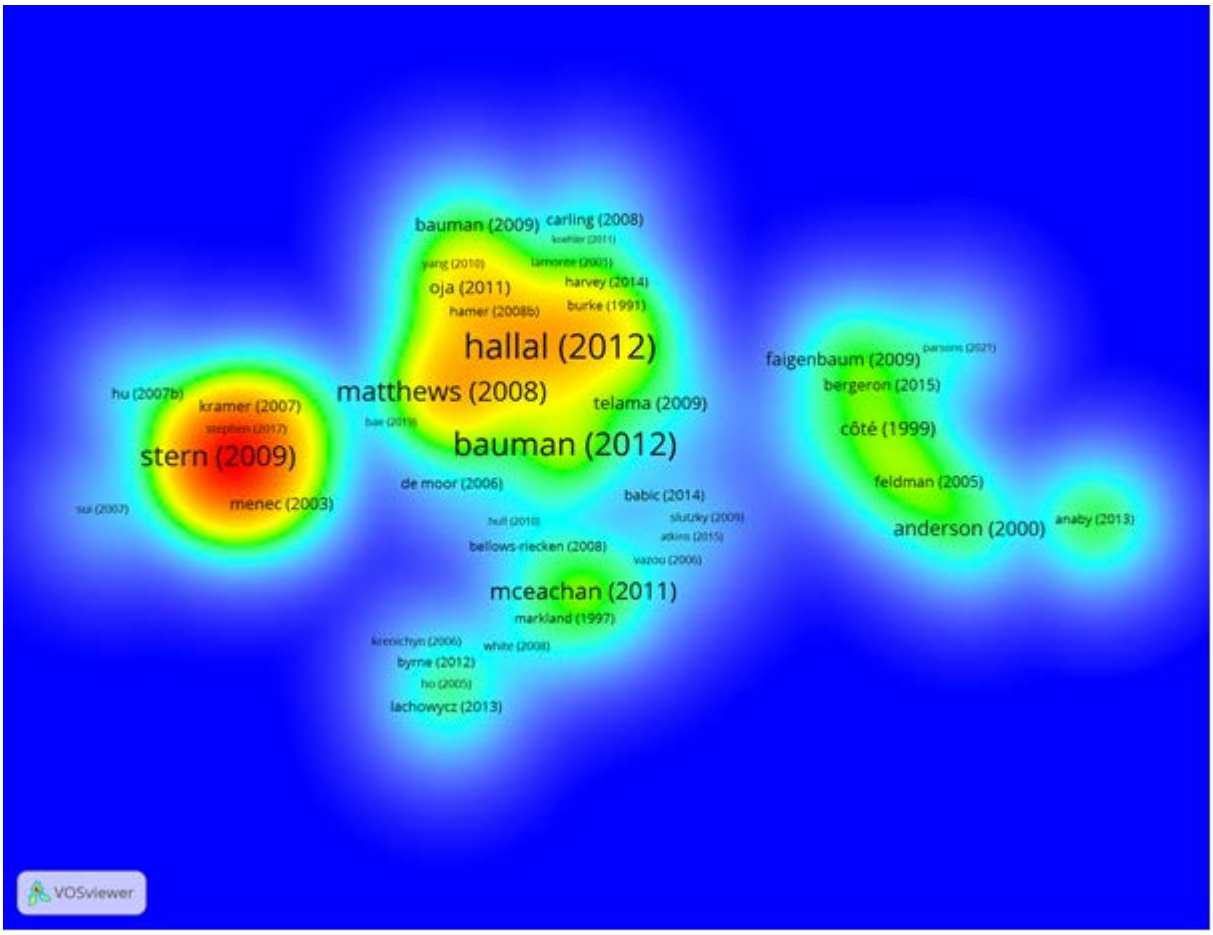

Figure 3. Density Map Showing the Relationship Between Publications

The Figure 3 shows that the publication in orange at the center is Stern's work from 2009. Additionally, Hallal (2012), Bauman and Matthews' studies, also represented in orange are among the most cited publications. The works that diverge from Stern are located in separate clusters. It can be observed that Côté, Feldman and Anderson's studies exhibit low citation density and are related to each other. McEachan's study forms a cluster with high citation density; however, it differs in topic from the other densely cited works.

DISCUSSION AND CONCLUSION

In this study, an international literature review was conducted on recreational activities of individuals with disabilities and the sources in the Web of Science database were examined using the bibliometric analysis method. The analysis results were evaluated based on parameters such as countries with the most publications in this field, authors, journals and preferred keywords. The findings reveal the distribution and importance of academic studies on recreational activities of individuals with disabilities worldwide. Among the countries with the most publications on recreational activities for individuals with disabilities in the Web of

Science database, The USA stands out with 1,817 publications and 90,618 citations. The USA's leadership in this field shows that it has a wide research network internationally and that its studies are referenced more. Countries such as the United Kingdom (UK), Australia and Canada also contribute with a significant number of publications and citations; the UK with 625 publications and 36,295 citations and Australia with 630 publications and 31,979 citations is among the countries that follow the USA. Bauman, Adrian and Avery D. Faigenbaum stand out among the authors with the most publications. Bauman is the leader in research on recreational activities of individuals with disabilities with 28 articles and Faigenbaum with 22 articles.

In terms of journals, journals such as The Lancet, American Journal of Epidemiology and International Journal of Behavioral Nutrition and Physical Activity are among the most influential publications in this field. The Lancet, in particular, demonstrates the impact of research in this field on the scientific community with 7,084 citations and 291 total link strengths with four publications. On the other hand, the International Journal of Environmental Research and Public Health constitutes an important source of literature on the physical activity and health of individuals with disabilities with 144 publications and 1,743 citations. These results show that recreational activity research aimed at improving the quality of life of individuals with disabilities has created a wide scientific network worldwide. While the USA, UK, Australia and Canada lead the field, European countries also contribute with quality research despite lower publication and citation numbers. These findings reveal that scientific studies on increasing the social integration and physical activity levels of individuals with disabilities are of great importance in policy development processes. As a result, the number and impact of academic studies on recreational activities of individuals with disabilities are increasing and the knowledge and application potential in this area will expand further in the future. Hallal et al. (2012) drew attention to the need for more accessible and inclusive physical activity programs for communities including individuals with disabilities in their study examining physical activity levels worldwide. This study has a wide impact with 1,033 citations and plays an important role in encouraging the participation of individuals with disabilities in physical activity (Hallal et al., 2012). Bauman et al. (2012) stated that physical inactivity is one of the most important causes of non-communicable diseases, especially in high-income countries and presented ecological model suggestions for increasing physical activity in their study (Bauman et al., 2012). This study, which has received 2,741 citations, comprehensively addresses how the physical environment and social factors affect individuals' activity levels. Stern (2009, 2012) draws attention with his studies on the concept of cognitive reserve. Stern

stated that cognitive reserve plays a protective role against age-related brain changes and Alzheimer's disease. His 2009 study received 2,382 citations, while his 2012 study received 1,990 citations. These studies reveal the importance of physical activity not only on physical but also on cognitive functions in a wider community, including individuals with disabilities (Stern, 2009, 2012). Fratiglioni et al. (2004) showed the positive effects of social ties on cognitive function in their study examining the effects of lifestyle and social networks on dementia. This study, which has received 1,134 citations, emphasizes that social and physical activities can reduce the risk of dementia, especially in disabled individuals (Fratiglioni et al., 2004).

Matthews et al. (2008), in their study examining the sedentary lifestyle, found that physical activity levels in the United States were low and that this was particularly prevalent among adults aged 60 and over. This study, which received 1,276 citations, demonstrated the importance of increasing physical activity for individuals with disabilities. In light of these findings, it is seen that studies on recreational activities for individuals with disabilities have a wide impact on both the scientific community and policy makers. Supporting such studies will contribute to the development of more effective strategies to increase the quality of life of individuals with disabilities. When the keywords are examined, the term "physical activity" is used 750 times and the term "exercise" is used 411 times, indicating that research in this area focuses on the benefits of physical activity (Matthews et al., 2008). In addition, the frequency of the terms "sport" and "children" shows the importance of sports and physical activities in children, while the frequent use of terms such as "aging" and "dementia" (142 and 136 times, respectively) draws attention to the vital effects of physical activity in older individuals and those with dementia. This emphasizes the importance of physical activity for different age groups in the life process and reveals that healthy lifestyles should be adopted in both young and old people. The equal frequency of the terms "adolescents" and "older adults" (120 times) shows the importance of the participation of different age groups in physical activity and that these groups have similar needs. The participation of disabled individuals in physical activity depends on motivational factors and these factors directly affect the quality of life of individuals. The use of the keyword "motivation" 115 times reveals how important motivation is in the participation of disabled individuals in physical activity. This shows that developing strategies to increase the motivation of disabled individuals is a key element in the success of physical activity programs. Likewise, the use of the term "quality of life" 109 times supports how effective physical activity is in improving the quality of life of disabled individuals. Sports

provides great benefits for disabled individuals in terms of both physical and social interaction. The use of the keyword "Sports" 107 times clearly shows the positive effects of sports on these individuals. It is known that sports play an important role not only in physical health but also in social participation and social integration. For this reason, it is necessary to increase the accessibility of sports and physical activity programs for disabled individuals, strengthen social support systems and increase the participation motivation of individuals. Other terms that stand out in the keyword analysis of the study emphasize the multidimensional benefits of recreational activities. The frequency of terms such as "leisure", "athletes", "cognition" and "gender" reveals the effects of physical activity not only in terms of health but also on cognitive functions and gender dynamics. In addition, the keywords "obesity" and "prevention" emphasize the importance of physical activity in preventing obesity and related diseases.

As a result, academic studies on recreational activities of individuals with disabilities cover a wide range of topics. The findings show that physical activity programs for individuals with disabilities are of great importance not only in terms of health but also in terms of social integration and improving quality of life. Therefore, policy makers and researchers need to develop programs and strategies that encourage the participation of individuals with disabilities in physical activity.

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Design	*To design the method and research design.*	Mehmet CEBI
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Data Collecting and Processing	*Collecting, organizing and reporting data*	Bade YAMAK
Discussion and Commentary	*Evaluation of the obtained finding*	Mehmet CEBI

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Researchers do not have any personal or financial conflicts of interest with other people and institutions related to the research.

Statement of Ethics Committee

Thıs study does not require ethics committee approval.