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Artificial Intelligence and Empowerment of People with Disabilities in Society 5.0: Trends and Insights from a Bibliometric Analysis

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Abstract

In today's world, there is a notable focus on incorporating disabled people within the community and the workplace. Advancements in artificial intelligence (AI) have the potential to significantly impact empowering individuals with disabilities to enhance inclusivity and autonomy for this demographic in the era of Society 5.0. This paper aims to offer a bibliometric analysis of the increasing number of publications addressing the potential impact of AI on disabled individuals and their future employment. To conduct this analysis, Scopus served as the bibliographic source, using Disability, Employment, and Future Workforce as the search terms, yielding 203 publications on the subject of study from 1973 to 2024. The

analysis was conducted using VOS viewer. The results indicate that as Society 5.0 evolves, advancements in AI have the potential to significantly empower individuals with disabilities, enhancing inclusivity and autonomy for this demographic.

Keywords: Artificial intelligence; Bibliometric analysis; People with Disabilities; Scopus; VOS viewer; Society 5.0.

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Introduction

Navigating the journey to the workplace continues to present challenges for individuals with disabilities. According to the World Report on Disability, approximately 15% of the global population experiences disabling conditions (World Health Organization, 2011). Despite growing awareness, the persistence of the disability employment gap highlights the ongoing challenges faced by individuals with disabilities in today's labor market. Initiatives such as the United Nations Disability Inclusion Strategy underscore the increasing focus on disability employment within international organizations and academia (Bezyak et al., 2020; Marín Palacios et al., 2021). Moreover, the notion of future employment is rapidly evolving, driven by advancements in digital technology and the widespread adoption of various digital tools and technologies (Jetha et al., 2023). However, there remains limited research on how these advancements affect employment opportunities for people with disabilities, who often struggle to secure and adapt to jobs (Jetha et al., 2023; Ra, 2023). The dawn of Society 5.0 has seen the intelligent fusion of human ingenuity and artificial intelligence (AI) come to the fore, offering a glimmer of hope. This era presents a unique opportunity to dismantle workplace barriers and foster inclusivity. The involvement of intelligent machines is anticipated to alleviate human limitations (Rahwan et al., 2019).

Despite growing awareness, initiatives, and extensive research on disability employment (Lin, Levy, & Campbell, 2024; Ne'eman & Maestas, 2023; Olsen, 2024; Smith, 2024), the disability employment gap remains significant due to persistent barriers in job accessibility. This is particularly concerning in light of AI's potential to empower specific groups within the future workforce and the evolving landscape of Society 5.0. While there is extensive literature on AI's impact on disability, there is still a notable lack of comprehensive bibliometric studies specifically aimed at understanding this role within the context of Society 5.0. This study employs a heuristic approach, investigating the following research questions:

RQ1. What is the present status of research on disabilities and the workforce?

RQ2. What emerging trends are evident in publications on disabilities and the workforce?

RQ 3. Which significant players - nations, and writers - are at the forefront of disabilities and workforce research?

RQ 4. Which publications and journals serve as the epicenters for disabilities and workforce studies?

RQ5. Which seminal studies have influenced the discourse, path of disabilities, and workforce research?

The inclusion of disabled individuals in workplaces has often been deemed challenging without addressing their disabilities (Hao & Li, 2020; Mousa & Samara, 2023). Disability was thus used to characterize a person's flaws or impairments; as a result, people with disabilities were viewed merely as individuals requiring home care, without recognizing their potential societal contributions (Kim, Kim, & Kim, 2020). The World Health Organization (WHO, 2020) estimates that by 2050, a staggering 3.5 billion people worldwide will require one or more supportive technologies to function in their daily lives. With AI solutions playing an increasingly crucial role in future decision-making and interactions, they may impact the fair treatment of individuals with disabilities (Trewin et al., 2019). Therefore, it is essential to investigate how AI can benefit individuals with disabilities (Smith & Smith, 2021). Similarly, Zhang et al. (2022), in a bibliometric analysis, highlighted significant advancements in AI in treating autism spectrum disorder (ASD), noting improvements in cognitive abilities and social skills in children and adolescents. Likewise, Tran et al. (2019) emphasized the benefits of AI applications in health and medicine. Despite the extensive literature on AI's benefits and drawbacks for disabled people, gaps remain regarding the role of AI in empowering future workforce readiness in the era of Society 5.0. This gap, as Banes and Lobnig (2023) point out, reflects a general lack of focus on the employment journey in the assistive technology field, particularly concerning job retention and career advancement.

Methodology

To conduct bibliometric research effectively, it is essential to use precise keywords pertaining to the research domain (Abdul Rahman et al., 2022). Consequently, to ensure that publications are sourced from trustworthy databases, the following search codes were employed in the document titles obtained from Scopus: TITLE, ABSTRACT, and KEYWORD (“disabilities” AND (“employment” OR “future workforce” OR “readiness” OR “society 5.0” OR “S5.0” OR “empowering”) AND (“information technology” OR “machine learning” OR “artificial intelligence” OR “digital” OR “AI” OR “IoT”). The search was not restricted by language, document types, source types, or topics covered in the journal. This search identified 236 research studies published between 1973 and 2024. However, 33 articles were excluded due to their lack of relevance to the topic.

Significantly, the search yielded 203 articles from 1973 to 2024, as shown in Figure 1. This final count represents the dataset used for our study on disabilities and technology research. Focusing on this period is crucial because it marks a pivotal phase in the field's development. By examining this timeframe, we can trace the evolution of research about disabilities from its inception, including the emergence of conceptual frameworks, early reporting practices, and the associated research trends and themes.

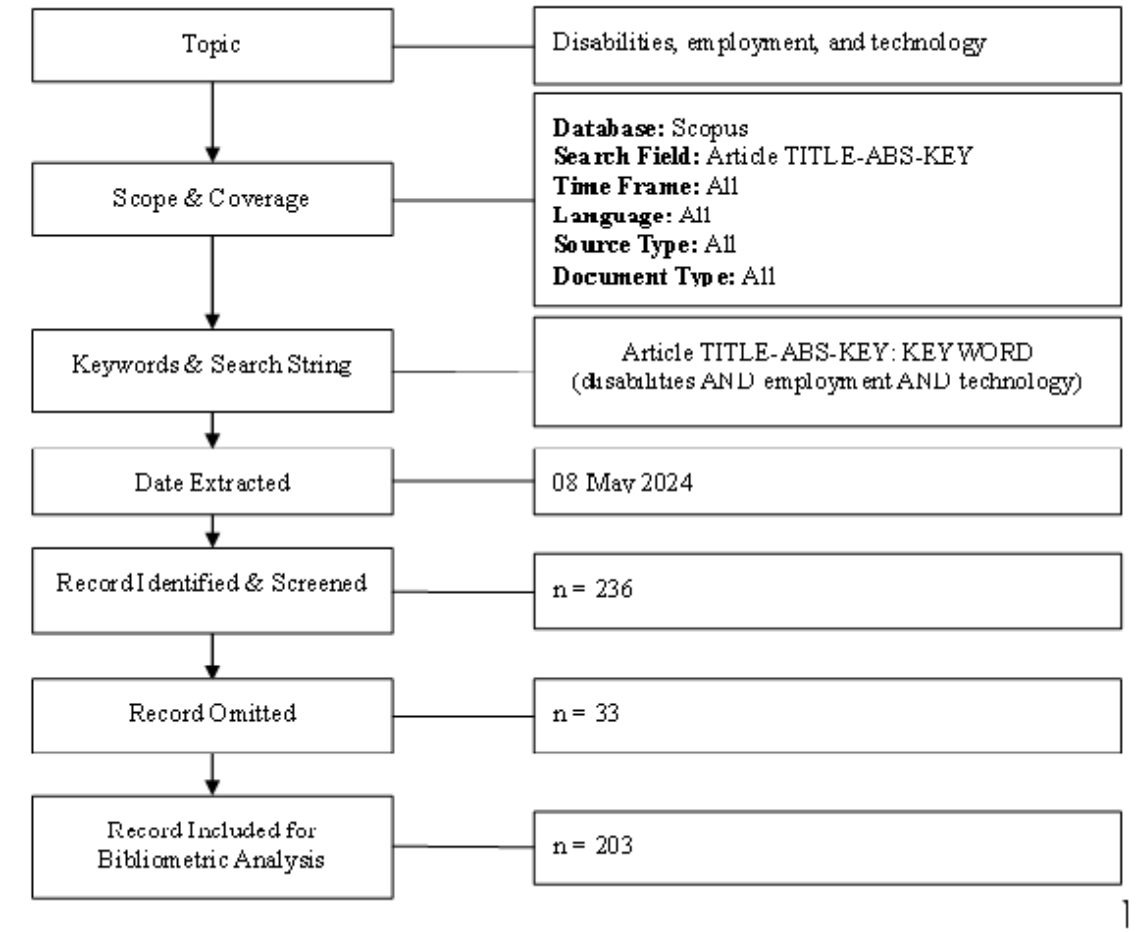

Figure 1. Search strategy flow diagram

Search Strategy

The Scopus database was utilized to gather studies related to employment by examining all types of publications dated from 1973 to May 2024 in the Scopus Science database. Scopus is an extensive multidisciplinary database comprising citations and abstracts from industry journals, patent records, books, peer-reviewed articles, and conference publications, and it offers tools for analyzing, tracking, and visualizing the search findings (Vieira & Gomes, 2009).

Data Analysis

The data were organized based on the study questions proposed in the introduction. We collected information on papers per year, types of documents and sources, languages of publications, subject areas, total citations, source citations for each paper, citations within specific periods, fundamental sources (journals), and author behavior. Additionally, bibliometric indicators such as overall citation count, the number of cited papers, total publications, average citations per paper, h-index, g-index, and citation sums in h-core were included in the analysis.

Tools

A range of tools was utilized for a comprehensive bibliometric analysis. Microsoft Excel was initially used for data cleaning and organization. BiblioMagika facilitated the cleaning, shaping, and normalization of author, affiliation, and country data due to the large number of authors and affiliations. The OpenRefine tool was employed to harmonize shared keywords across authors, faculties, and universities. Additionally, VOSviewer (version 1.6.18) was used for network visualization of co-authorship and to construct an intellectual map of disabilities, incorporating keyword co-occurrence and bibliographic coupling. These tools and techniques enhanced the depth and rigor of the study of disabilities and technology.

Results

Current landscape

To investigate the first research question, which focuses on the current status of the research in the domain of disabilities, we will identify the distribution of publications based on the type of document and source, language, and subject area. Moreover, we will discuss the total citations of the publications in the domain of disabilities to get an idea of the impact of these publications. Table 1 illustrates the distribution of publications among seven types of documents for disabilities, predominantly Journals emerge as the most prevalent category 37.43 % of the total, whereas conference papers 33.99%, and Book Chapters 16.26%, further uncovers that the other document types almost have 5% often less than 5% of the total.

Table 1. Distribution of publications by document type

Document Type		Total Publications (TP)	Percentage (%)
Article		76	37.43%
Conference Paper		69	33.99%
Book Chapter		33	16.26%
Conference Review		11	5.42%
Book		8	3.94%
Review		5	2.47%
Editorial		1	0.49%
Total		203	100.00

Table 2 illustrates the distribution of publications according to the 5 different types of source media. Journals had the most publications in 46.30% of the total subjects, in addition conference proceeding accounted for 23.64% and the least common source type was a trade journal, with 0.49% of the representation. This reveals that journals are the foremost medium for disseminating research findings in this field.

Table 2. Breakdown of publications by source type

Source Type	Total Publications (TP)	Percentage (%)
Journals	94	46.30%
Conference Proceeding	48	23.64%
Book Series	33	16.25%
Books	27	13.30%
Trade Publications	1	0.49%
Total	203	100.00

Table 3 shows the distribution of publications by language. As indicated, the majority—95.56%—of the documents retrieved in our search are in English. The next most common language is Russian, accounting for 1.97% of all publications. This highlights that English is the dominant language for scientific communication in disability research.

Table 3. Distribution of publications by language

Language	Total Publications (TP)*	Percentage (%)
English	194	95.56%
Russian	4	1.97%
Spanish	3	1.49%
German	1	0.49%
Lithuanian	1	0.49%
Total	203	100.00

The present study investigated the documents by subject area to provide an overview of the potential interdisciplinary nature of disability research. According to Table 4, disability research is spread across a variety of disciplines, with "Computer Science" leading at 27.58% of total publications. Other significant contributors include Social Sciences (19.70%), Engineering (15.27%), and Mathematics (13.30%), demonstrating the multidisciplinary nature of this research field. Additionally, Psychology accounts for 5.92% of the publications, further highlighting the diverse range of subject areas involved. The predominant research topics include computer science, social science, business management, drones, healthcare, and several others. Overall, the data underscores the importance of an interdisciplinary approach in addressing the complexities of disability research.

Table 4. Publication subject area distribution

Subject Area	Total Publications (TP)	Percentage (%)
Computer Science	56	27.58%
Social Sciences	40	19.70%
Engineering	31	15.27%
Mathematics	27	13.30%
Business, Management, and Accounting	20	9.85%
Arts and Humanities	17	8.38%
Psychology	12	5.92%
Total	203	100

The citation metrics in Table 5 indicate that disability research has significantly contributed to the field, as evidenced by the high h-index and g-index, reflecting the research's broad reception and impact on human lives and scholarly work. The average citations per paper and year further demonstrate the recognition and relevance of disability research within the academic community. It also highlights the collaborative nature of this field, with an average of 3.24 authors per paper, suggesting that researchers from various disciplines frequently collaborate to tackle challenges related to disabilities.

Table 5 presents citation metrics and some parameters used in the bibliometric analysis of the disability domain. These parameters were extracted from Scopus data using the biblioMagika software package. Extracted parameters include papers, citations, publication years, citations per year, and per author, papers per author, h-index, and g-index. According to Table 5, 203 publications were considered for this study, which received a total of 1.589 citations in a total of 51 years. The average number of years in which citations were received per year is 31.16, while the average number of citations recorded per paper is 3.24. The h-index, reflecting both productivity and impact within the disability research domain, is 15, while the g-index, which emphasizes highly cited research, stands at 36, underscoring the impact of these publications. The citation metrics in Table 5 indicate that disability research is highly regarded as evidenced by the high h-index and g-index values. These metrics reflect significant recognition and influence within the academic community, demonstrating the research's substantial impact on the field and its relevance to broader applications.

Also, the average citations recorded per paper and per disability are another form of significance received by the research community on the disability’s topic. Table 5 further highlights the collaborative nature of disabilities research. The average of 3.24 authors per paper suggests that researchers from various disciplines often come together to address challenges in the field of disabilities. This analysis directly addresses the first research question (RQ1). Examining the genre of articles, publication sources, languages employed, and subject areas further reveals a more holistic understanding of the context surrounding disabilities research.

Table 5. Publication productivity and impact metrics

Metrics	Data
Papers	203
Number of citations	1.589
Year	51
Citations per year	31.16
Citations Per Author	2.41
Authors Per Paper	3.24
h-index	15
g-index	36

Publication Trends

To address the second research question, "What emerging trends can be identified in works related to disabilities?", Figure 2 and Table 6 depict a time series analysis through a combined bar and line chart, elucidating the total number of publications and citations from 1973 to 2024. Over this period, a total of 203 publications and 1589 citations are observed, reflecting the growing scholarly interest in this field. There was no significant change in the publication number until 2017. However, a marked increase in publication output is evident from 2017 onwards, suggesting a growing recognition and focus on disability-related research in recent years. In terms of breadth and depth, the h-index and g-index values, as presented in Table 6, demonstrate fluctuations with periods of notable increases. This suggests at different stages of the disability research process, the impacts are varying, but significant.

Similarly, the total citations (TC) have shown a fluctuation over the years with some notable peaks indicating highly influential papers, such as in 2010, 2013, and 2021. As shown in Table 6, the number of contributing authors (NCA) has significantly risen starting in 2012, and this trend is also reflected in the total publications (TP). This indicates a parallel growth pattern. Therefore, it can be inferred that the increase in the number of contributing authors (NCA) is linked to the rise in total publications (TP). Calculating the ratio of NCA to TP confirms that while the number of authors has increased over the years, likely due to more collaboration and stronger research networks- the growth remains relatively modest. The average citation per publication (CP) and average citation per cited publication (C/CP) can indicate the impact and quality of the research

The highest values for both metrics were recorded in 2013. However, the recent decline in the average citations per publication (C/P) and citations per cited publication (C/CP) may be attributed to the influx of new publications that do not have sufficient time to gather citations.

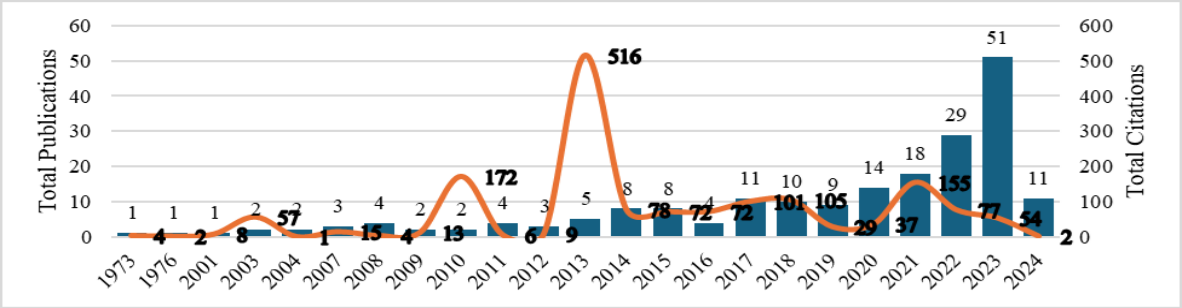

Figure 2. Publications and citations by year (1973-2024)

Table 6. Publication and citation metrics (1973-2024)

Year	TP	NCA	NCP	TC	C/P	C/CP	h-index	g-index
1973	1	1	1	4	4.00	4.00	1	1
1976	1	3	1	2	2.00	2.00	1	1
2001	1	1	1	8	8.00	8.00	1	1
2003	2	3	1	57	28.50	57.00	1	2
2004	2	3	1	1	0.50	1.00	1	1
2007	3	8	3	15	5.00	5.00	2	3
2008	4	8	2	4	1.00	2.00	1	2
2009	2	11	2	13	6.50	6.50	2	2
2010	2	5	2	172	86.00	86.00	1	2
2011	4	7	2	6	1.50	3.00	2	2
2012	3	6	3	9	3.00	3.00	2	3
2013	5	11	3	516	103.20	172.00	2	5
2014	8	32	7	78	9.75	11.14	5	8
2015	8	24	7	72	9.00	10.29	4	8
2016	4	16	4	72	18.00	18.00	4	4
2017	11	40	9	101	9.18	11.22	7	10
2018	10	34	8	105	10.50	13.13	5	10
2019	9	20	4	29	3.22	7.25	3	5
2020	14	50	9	37	2.64	4.11	4	5
2021	18	54	12	155	8.61	12.92	6	12
2022	29	100	21	77	2.66	3.67	5	7
2023	51	186	17	54	1.06	3.18	4	6
2024	11	35	2	2	0.18	1.00	1	1
Total	203	658	122	1589	7.83	13.02	64	82

Note: Abbreviations explained here can be referred to in all tables. if any: TP = total number of publications; NCA=number of contributing authors; NCP = number of cited publications; TC = total citations; C/P = average citations per publication; C/CP = average citations per cited publication; h = h-index; g = g-index

Publications by Authors

In response to the third research question, "Who are the key players—authors and countries—who drive the advancements in disability and workforce research?" we approached this inquiry by analyzing the contributors, their works, and the associated citations. This examination delves into various parameters, including authors' affiliations, countries, total publications (TP), number of contributing papers (NCP), total citations (TC), citations per publication (C/P), citations per cited publication (C/CP), h-index, g-index, and citations with

high citation counts (CSwHC). For instance, Burgstahler from the University of Washington in the U.S. has authored two papers, accumulating a total of 59 citations, with both C/P and C/CP recorded at 29.5.

Similarly, Baljko, Hynie, M., McGrath, S. from York University in Canada, and Hamidi, F. from the University of Maryland have each published two papers. These authors share the same h-index of 2 and have accumulated a total of 43 citations, with C/P and C/CP values of 21.5. The average number of citations for the core of the top two papers among these leading authors is 51, reflecting their influence and the significance of their research in shaping the discourse on disability and workforce integration.

Table 7. Most productive authors

Author's Name	Affiliation	Country	TP	N CP	TC	C/P	C/CP	h	g	CSwHC
Burgstahler, S.	University of Washington	United States	2	2	59	29.5	29.5	2	0	59
Baljko, M.	York University	Canada	2	2	43	21.5	21.5	2	0	43
Hamidi, F.	University of Maryland	United States	2	2	43	21.5	21.5	2	0	43
Hynie, M.	York University	Canada	2	2	43	21.5	21.5	2	0	43
McGrath, S.	York University	Canada	2	2	43	21.5	21.5	2	0	43
Ladner, R.	University of Washington	United States	2	2	12	6	6	2	0	12
Harih, G.	University of Maribor	Slovenia	2	2	10	5	5	1	1	9
Banks, C.G.	University of California Berkeley	United States	2	2	9	4.5	4.5	2	0	9
Bonaccio, S.	University of Ottawa	Canada	2	2	9	4.5	4.5	2	0	9
Bültmann, U.	University Medical Centre Groningen	Netherlands	2	2	9	4.5	4.5	2	0	9
Gignac, M.A.M.	University of Toronto	Canada	2	2	9	4.5	4.5	2	0	9
Jetha, A.	University of Toronto	Canada	2	2	9	4.5	4.5	2	0	9
Norman, C.	Cense LTD, Toronto	Canada	2	2	9	4.5	4.5	2	0	9
Shamaee, A.	Institute for Work & Health	Canada	2	2	9	4.5	4.5	2	0	9
Buck, A.	Ohio State University	United States	2	2	6	3	3	2	0	6
Izzo, M.V.	The Ohio State University	United States	2	2	6	3	3	2	0	6
Murray, A.	Imperial College London	United Kingdom	2	2	6	3	3	2	0	6
Barroso, J.	University of Tras-os-Montes e Alto Douro	Portugal	2	2	2	1	1	1	1	1
Murphy, E.	NCBI, Whitworth Rd., Drumcondra, Dublin-9	Ireland	2	2	2	1	1	1	1	1
Barbareschi, G.	Graduate School of Media Design	Japan	2	0	0	0	0	0	1	0

Notes: CSwHC = citation sum within h-core

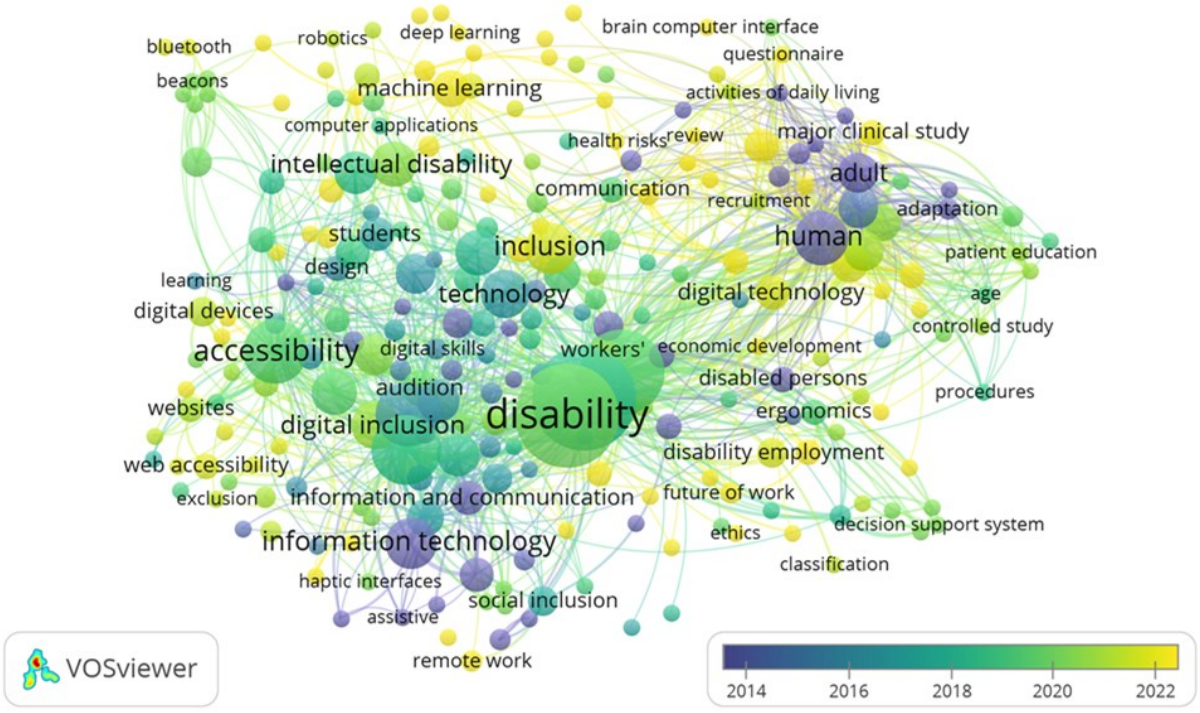

Figure 3. Network visualization of the author's keywords

Figure 3 presents a network visualization of 247 keywords, distilled from an initial set of 1,431 keywords based on their co-occurrences within the dataset using the full counting method. The network is color-coded by the year of publication, ranging from purple to yellow, covering the period from 2014 to 2024. This color gradient illustrates the evolution of research trends over time. Figure 3 highlights how research in disability, accessibility, and technology has evolved over a decade, showing shifts in focus from earlier themes like 'information technology' to more recent trends such as 'machine learning' and 'digital inclusion.'

Publications by Countries

The research output of individuals with impairments in different nations is shown in Table 8 and Figure 4, focusing on those with at least 20 papers. With a total publications (TP) count of 60, the United States gains notable prominence on the list. Additionally, it presents a remarkable h-index of 11, evidencing the profound impact and excellence of its research contributions. The high total citations (TC) count of 58 confirms the significant impact of U.S. research in the global scientific community. Next in line, the United Kingdom, with a TP of 22, demonstrates its major contributions to the domain. While its h-index is slightly lower at 9, it is remarkable that the g-index for both the UK and the U.S. is closely identical, indicating a consistent level of quality in their research findings.

Spain and Canada, despite having a TP of 16—lower than that of the United Kingdom and the United States—share a comparable h-index of 4. With h-indices of 7 and 6, respectively, Germany and Australia both demonstrate high-quality research outputs. Given their relatively high citations per publication (C/P) and citations per cited publication (C/CP) scores, their substantial reach and contribution to the field are highlighted. Nations like the Russian Federation, Portugal, Greece, and Italy consistently contribute to the field, even if they are not as prolific in their total output. Their g-indices of 3, 2, 2, and 3, respectively, along with their comparative h-indices, underline the validity of their findings in disability and workforce research.

In general, the data presented in Table 8 provides a comprehensive view of the global distribution of research productivity concerning disabilities and the workforce. This identifies where impactful and high-quality research is being produced, providing directions for upcoming collaborations, policymaking, and research projects.

Table 8. Top countries contributed to the publications

Country	TP	NCP	TC	C/P	C/CP	*h*	*g*
United States	60	1004	58	14.14	17.31	11	6
United Kingdom	22	622	17	24.88	36.59	9	3
Spain	16	61	10	2.77	6.10	4	4
Canada	16	114	13	6.00	8.77	7	3
Australia	14	103	16	5.72	6.44	7	3
Germany	10	130	15	7.22	8.67	6	2
Russian Federation	9	17	5	1.70	3.40	2	3
Portugal	8	2	2	0.33	1.00	1	2
Greece	7	672	15	44.80	44.80	7	2
Italy	7	10	3	0.77	3.33	1	3

Publications by Source Titles

Table 9 highlights the differences among academic publication sources in terms of citations and academic engagement. Notably, "Universal Access in the Information Society" stands out with a Citations per Publication (C/P) ratio of 12.33 and a Citations per Cited Publication (C/CP) ratio of 12.33, despite having only three publications. This high impact per article, combined with a CSWh-core value of 37, indicates that these publications are not only widely cited but also hold significant influence within the field. Similarly, "Disability and Society" exhibits strong academic engagement with a C/P of 6.33, a C/CP of 6.33, and a CSWh-core value of 37.

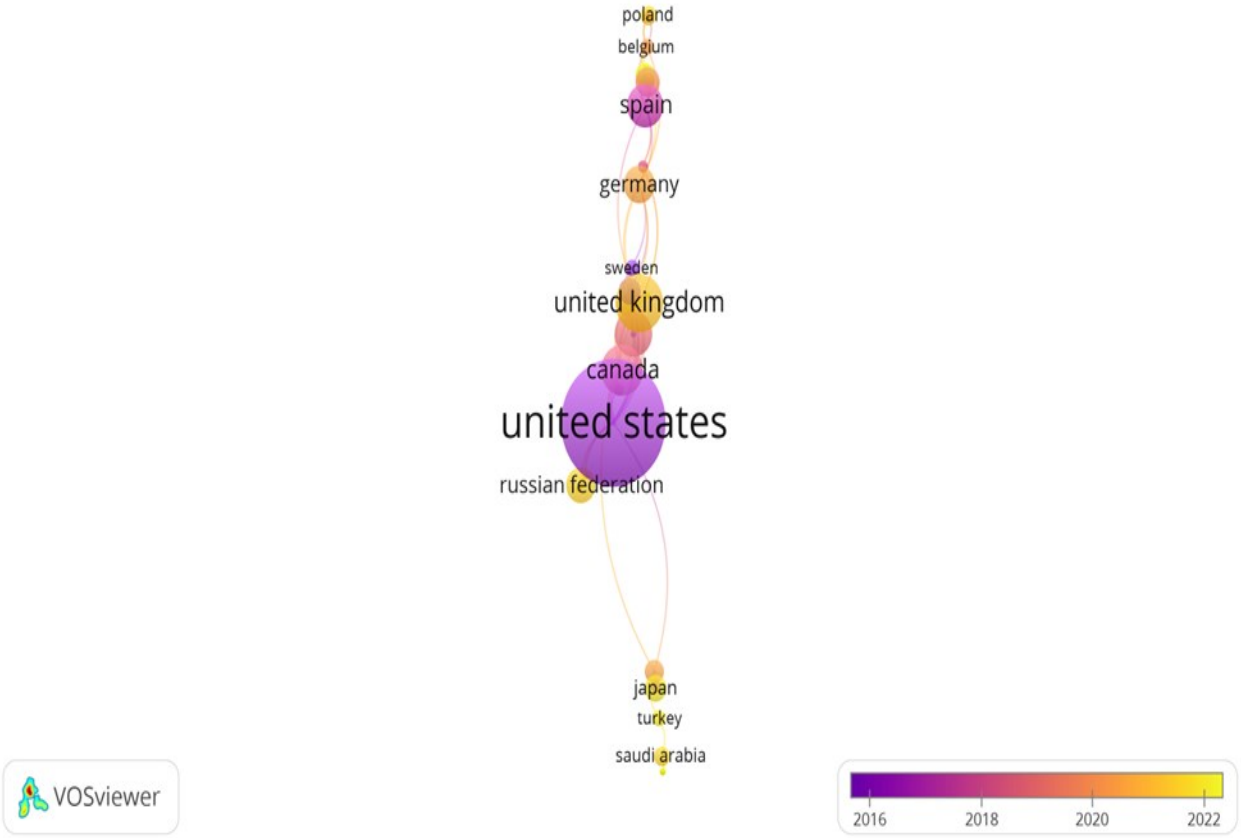

Figure 4. Overlay visualization of co-authorship by countries

In contrast, more prolific sources like the "ACM International Conference Proceeding Series" and "Lecture Notes in Computer Science" have produced larger quantities of publications but with lower per-article impact, reflected in their C/P ratios of 2.24 and 1.92, respectively. Their CSWh-core values 35 and 17 suggest a strong but less concentrated citation impact. Other sources, such as "Communications in Computer and Information Science," "Lecture Notes in Electrical Engineering," and "Advances in Intelligent Systems and Computing," show very low academic impact, with minimal citations and CSWh-core values close to zero. These variations emphasize the importance of considering both the breadth and depth of engagement when evaluating the success and influence of academic publications. Specialized journals often achieve a higher impact per article, while broader conference proceedings tend to distribute their influence across a larger number of publications, albeit with a generally lower per-article impact.

Table 9. Most active source titles

Source Title	TP	NCA	NCP	TC	C/P	C/CP	CSWh-core
ACM International Conference Proceeding Series	17	59	16	38	2.24	2.38	35
Lecture Notes in Computer Science (including subseries Lecture Notes in AI and Lecture Notes in Bioinformatics)	13	46	12	25	1.92	2.08	17
Disability and Society	6	14	6	38	6.33	6.33	37
Lecture Notes in Networks and Systems	6	26	6	2	0.33	0.33	1
Lecture Notes in Electrical Engineering	4	16	4	1	0.25	0.25	1
Communications in Computer and Information Science	3	2	1	0	0.00	0.00	0
Universal Access in the Information Society	3	5	3	37	12.33	12.33	37
Career Development and Transition for Exceptional Individuals	2	14	2	6	3.00	3.00	6
Psychological Science and Education	2	8	2	3	1.50	1.50	2
Advances in Intelligent Systems and Computing	2	4	2	1	0.50	0.50	1

Notes: CSwHC = citation sum within h-core

Highly Cited Documents

The answer to the fifth research question is presented in Table 10, detailing the top 20 most highly cited papers on working people with disabilities. By publishing and studying these articles, researchers and practitioners can familiarize themselves with seminal papers on different subjects. Reading the most highly cited papers in this area helps readers understand new concepts and related themes, especially since these papers profoundly influence their field for a long time. Table 10 lists the top 20 most highly cited papers on working people with disabilities. These articles likely represent significant contributions that have had a far-reaching impact on understanding how disabilities intersect with employment and technology. The high citation counts suggest that scholars value these works for their contributions to academic knowledge and their potential benefits for both researchers and students.

To begin with, the paper published by Retalis et al. (2014) titled “Empowering children with ADHD learning disabilities with the Kinems Kinect learning games” is the most highly cited, with 539 citations. While this paper primarily focuses on educational technology for children with ADHD, its high citation count indicates its broader impact on the field of disability and technology. The paper by Vicente and López (2010), entitled “A multidimensional analysis of the disability digital divide: Some evidence for Internet use,” ranks second with 171 total citations and 11.40 citations per year. This work examines the Internet digital divide between individuals with and without disabilities from a multidimensional perspective. Their findings confirm that ICTs have become a vital part of everyday life and wider social activities, including education, employment, and leisure.

Several key papers spanning various years have significantly impacted the intersection of technology and disability: “The Role of Technology in Preparing Youth with Disabilities for Postsecondary Education and Employment” (Burgstahler, 2003) and “Potentials of Digital Assistive Technology and Special Education in Kenya” (Hamidi et al., 2017). These papers reflect enduring contributions to understanding technology's role in enhancing educational and employment opportunities for individuals with disabilities.

Recent research also includes noteworthy contributions such as "Inclusive Communications in COVID-19: A virtual ethnographic study of disability support networks in China" by Dai and Hu (2022) and “Access to Employment: A Comparison of Autistic, Neurodivergent, and Neurotypical Adults’ experiences of hiring processes in the United Kingdom” by Davies et al. (2023). The main message of these papers is that technology can significantly improve disabled people’s chances in the workplace. These central landmark papers span a diverse range of years and have shaped the discourse on disability research, particularly in areas related to technology's role in education, employment, and digital inclusion. These studies showcase key areas such as technology, innovations, and the development of inclusive environments, which contribute uniquely to the overall aspects of the field.

Table 10. Top 20 highly cited articles

No	Author(s)	Title	TC	C/Y
1	Retalis, S., Korpa, T., Skaloumpakas, C., Boloudakis, M., Kourakli, M., Altanis, I., ... & Pervanidou, P. (2014)(Retalis et al. 2014)	Empowering children with ADHD learning disabilities with the Kinems Kinect learning games	539	42.50
2	Vicente M.R.; López A.J. (2010)(Vicente and López 2010)	A multidimensional analysis of the disability digital divide: Some evidence for Internet use	171	11.40
3	Rani U.; Furrer M. (2021)(Rani and Furrer 2021)	Digital labour platforms and new forms of flexible work in developing countries: Algorithmic management of work and workers	89	21.75
4	Burgstahler S. (2003)(Burgstahler 2003)	The Role of Technology in Preparing Youth with Disabilities for Postsecondary Education and Employment	57	2.59
5	Piper A.M.; Cornejo R.; Hurwitz L.; Unumb C. (2016)(Piper et al. 2016)	Technological caregiving: Supporting online activity for adults with cognitive impairments	42	4.67
6	Boldsen J.K.; Engedal T.S.; Pedraza S.; Cho T.-H.; Thomalla G.; Nighoghossian N.; Baron J.-C.; Fiehler J.; Østergaard L.; Mouridsen K. (2018) (Boldsen et al. 2018)	Better diffusion segmentation in acute ischemic stroke through automatic tree learning anomaly segmentation	38	5.00
7	Hamidi F.; Owuor P.M.; Hynie M.; Baljko M.; McGrath S. (2017) (Hamidi et al. 2017)	Potentials of digital assistive technology and special education in Kenya	35	4.25
8	Schartz, K., Schartz, H. A., & Blanck, P. (2002) (Schartz, Schartz, and Blanck 2002)	Employment of persons with disabilities in information technology jobs: literature review for “IT works	34	3.24
9	Izzo M.V.; Bauer W.M. (2015) (Izzo and Bauer 2015)	Universal design for learning: enhancing achievement and employment of STEM students with disabilities	28	2.80
10	Dalenberg D.J. (2018) (Dalenberg 2018)	Preventing discrimination in the automated targeting of job advertisements	27	3.43

11	Beyene W.M. (2018) (Beyene 2018)	Digital Inclusion in Library Context: A Perspective from Users with Print Disability	26	2.71
12	Ellis K. (2016) (Ellis 2016)	Disability media work: Opportunities and obstacles	24	2.11
13	Irvin D.W.; Crutchfield S.A.; Greenwood C.R.; Simpson R.L.; Sangwan A.; Hansen J.H.L. (2017)(Irvin et al. 2017)	Exploring Classroom Behavioral Imaging: Moving Closer to Effective and Data-Based Early Childhood Inclusion Planning	24	2.25
14	Cihak D.F.; McMahon D.; Smith C.C.; Wright R.; Gibbons M.M. (2015) (Cihak et al. 2015)	Teaching individuals with intellectual disability to email across multiple device platforms	23	1.70
15	Carrero J.; Krzeminska A.; Härtel C.E.J. (2019) (Carrero, Krzeminska, and Härtel 2019)	The DXC technology work experience program: Disability-inclusive recruitment and selection in action	19	2.67
16	Dai R.; Hu L. (2022)(Dai and Hu 2022)	Inclusive communications in COVID-19: a virtual ethnographic study of disability support network in China	19	4.67
17	Khanlou N.; Khan A.; Vazquez L.M.; Zangeneh M. (2021) (Khanlou et al. 2021)	Digital Literacy, Access to Technology and Inclusion for Young Adults with Developmental Disabilities	13	3.25
18	(McCallum and Price 2015)	Nurturing wellbeing development in education: From little things, big things grow	13	1.30
19	Davies J.; Heasman B.; Livesey A.; Walker A.; Pellicano E.; Remington A. (2023) (Davies et al. 2023)	Access to employment: A comparison of autistic, neurodivergent and neurotypical adults' experiences of hiring processes in the United Kingdom	12	6.00
20	Bearne L.M.; Manning V.L.; Choy E.; Scott D.L.; Hurley M.V. (2017) (Bearne et al. 2017)	Participants' experiences of an Education, self-management and upper extremity eXercise Training for people with Rheumatoid Arthritis programme (EXTRA)	12	1.50

Discussion

A bibliometric analysis was conducted to analyze the studies on people with disability from 1973 to 2024. Since the publication of the first paper in 1973, the number of papers in this field has steadily increased. There has been a noticeable uptick in publications from 2020 to the present, with a total of (203) publications and (1589) citations from 1973 to 2024, reflecting the growth and impact of research in this area. The predominant language for scientific communication in the research of disabilities is English. The research productivity of the top three countries is allocated to the United States, the United Kingdom and Spain. The most productive authors published two papers in the field of disabilities and workforce research in different conferences and journals, which Burgstahler examined from the University of Washington in the US and Baljko from York University in Canada.

In the realm of AI for empowering individuals with disabilities, the highly cited papers emphasize how technology supports disabled people enrolling in active workforce environments and research findings show that the paper published by Retalis in 2014 is entitled "Empowering children with ADHD learning disabilities with the Kinems Kinect learning games". It is the most highly cited paper in the area of working people with disabilities, with a total of 539 citations.

The recent paradigm shift in the field of AI (Grubaugh & Levitt, 2023) presents exciting possibilities for further research on disability and workforce readiness. The surge in publications observed after 2020 coincides with significant advancements in AI capabilities. This trend suggests a likely increase in research that integrates AI to empower individuals with disabilities. We can anticipate a future wave of studies exploring how AI-powered assistive technologies, personalized learning tools, and intelligent automation can enhance workplace accessibility and, ultimately, increase the work readiness of a diverse workforce that includes people with disabilities.

Conclusion

This study conducted a thorough bibliometric analysis of research on AI and disabilities from 1973 to 2024. The results indicate a growing research interest in this area, as evidenced by the significant increase in publications and citations, particularly in the last few years. As we move further into the era of Society 5.0, AI's role in enhancing the autonomy and inclusivity of individuals with disabilities is expected to grow. This study not only sheds light on the current research landscape but also highlights areas where further investigation is needed. Specifically, there is a need for research that addresses the underrepresented regions and explores the practical applications of AI for people with disabilities in real-world settings. Future research should aim to translate these academic insights into practical strategies that can be implemented in workplaces and society. By addressing these gaps, scholars can contribute to creating a more inclusive and accessible future for individuals with disabilities.

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Conflict of interest

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues including plagiarism, informed consent, misconduct, data fabrication and, or falsification, double publication and, or submission, and redundancy have been completely witnessed by the authors.

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References

Abdul Rahman, Nor Aida, Aidi Ahmi, Luai Jraisat, and Arvind Upadhyay. 2022. "Examining the Trend of Humanitarian Supply Chain Studies: Pre, during and Post COVID-19 Pandemic." *Journal of Humanitarian Logistics and Supply Chain Management* 12(4):594–617. doi: 10.1108/JHLSCM-01-2022-0012.

Banes, David, and Sabine Lobnig. 2023. "Accessible Consumer Electronics Are Essential to Closing the Gap in Assistive Technology Provision." *Assistive Technology: Shaping a Sustainable and Inclusive World* 306:264.

Bearne, Lindsay M., Victoria L. Manning, Ernest Choy, David L. Scott, and Michael V. Hurley. 2017. "Participants' Experiences of an Education, Self-Management and Upper Extremity eXercise Training for People with Rheumatoid Arthritis Programme (EXTRA)." *Physiotherapy* 103(4):430–38.

Beyene, W. M. 2018. "Digital Inclusion in Library Context: A Perspective from Users with Print Disability." *Journal of Web Librarianship* 12(2):121–40.

Bezyak, Jill, Erin Moser, Kanako Iwanaga, Jia-Rung Wu, Xiangli Chen, and Fong Chan. 2020. "Disability Inclusion Strategies: An Exploratory Study." *Journal of Vocational Rehabilitation* 53(2):183–88. doi: 10.3233/JVR-201095.

Boldsen, J. K., T. S. Engedal, S. Pedraza, T. H. Cho, G. Thomalla, N. Nighoghossian, and K. Mouridsen. 2018. "Better Diffusion Segmentation in Acute Ischemic Stroke through Automatic Tree Learning Anomaly Segmentation." *Frontiers in Neuroinformatics* 12:21.

Broecke, Stijn. 2023. "Artificial Intelligence and Labour Market Matching."

Burgstahler, S. 2003. "The Role of Technology in Preparing Youth with Disabilities for Postsecondary Education and Employment." *Journal of Special Education Technology* 18(4):7–19.

Carrero, Justin, Anna Krzeminska, and Charmine EJ Härtel. 2019. "The DXC Technology Work Experience Program: Disability-Inclusive Recruitment and Selection in Action." *Journal of Management & Organization* 25(4):535–42.

Cihak, David F., Donald McMahon, Cate C. Smith, Rachel Wright, and Melinda M. Gibbons. 2015. "Teaching Individuals with Intellectual Disability to Email across Multiple Device Platforms." *Research in Developmental Disabilities* 36:645–56.

Dai, Ruikai, and Luanjiao Hu. 2022. "Inclusive Communications in COVID-19: A Virtual Ethnographic Study of Disability Support Network in China." *Disability & Society* 37(1):3–21. doi: 10.1080/09687599.2021.1933388.

Dalenberg, D. J. 2018. "Preventing Discrimination in the Automated Targeting of Job Advertisements." *Computer Law & Security Review* 34(3):615–27.

Davies, Jade, Brett Heasman, Adam Livesey, Amy Walker, Elizabeth Pellicano, and Anna Remington. 2023. "Access to Employment: A Comparison of Autistic, Neurodivergent and Neurotypical Adults' Experiences of Hiring Processes in the United Kingdom." *Autism* 27(6):1746–63. doi: 10.1177/13623613221145377.

Ellis, K. 2016. *Disability Media Work: Opportunities and Obstacles*. Springer.

Grubaugh, S., and G. Levitt. 2023. "Artificial Intelligence and the Paradigm Shift: Reshaping Education to Equip Students for Future Careers." *International Journal of Social Sciences and Humanities Invention* 10(6):7931–41.

Hamidi, F., P. M. Owuor, M. Hynie, M. Baljko, and S. McGrath. 2017. "Potentials of Digital Assistive Technology and Special Education in Kenya." Pp. 125–51 in *Sustainable ICT Adoption and Integration for Socio-Economic Development*. IGI Global.

Hao, Yuling, and Peng Li. 2020. "Employment Legal Framework for Persons with Disabilities in China: Effectiveness and Reasons." *International Journal of Environmental Research and Public Health* 17(14):4976.

Irvin, D. W., S. A. Crutchfield, C. R. Greenwood, R. L. Simpson, A. Sangwan, and J. H. Hansen. 2017. "Exploring Classroom Behavioral Imaging: Moving Closer to Effective and Data-Based Early Childhood Inclusion Planning." *Advances in Neurodevelopmental Disorders* 1:95–104.

Izzo, M. V., and W. M. Bauer. 2015. "Universal Design for Learning: Enhancing Achievement and Employment of STEM Students with Disabilities." *Universal Access in the Information Society* 14:17–27.

Jetha, Arif, Ali Shamaee, Emile Tompa, Peter Smith, Ute Bültmann, Silvia Bonaccio, Lori B. Tucker, Cameron Norman, Cristina G. Banks, and Monique A. M. Gignac. 2023. "The Future of Work in Shaping the Employment Inclusion of Young Adults with Disabilities: A Qualitative Study." *Equality, Diversity and Inclusion: An International Journal* 42(9):75–91. doi: 10.1108/EDI-06-2022-0154.

Khanlou, Nazilla, Attia Khan, Luz Maria Vazquez, and Masood Zangeneh. 2021. "Digital Literacy, Access to Technology and Inclusion for Young Adults with Developmental Disabilities." *Journal of Developmental and Physical Disabilities* 33(1):1–25. doi: 10.1007/s10882-020-09738-w.

Khatib, Saleh F. A., Dewi Fariha Abdullah, Ahmed A. Elamer, and Raed Abueid. 2021. "Nudging toward Diversity in the Boardroom: A Systematic Literature Review of Board Diversity of Financial Institutions." *Business Strategy and the Environment* 30(2):985–1002. doi: 10.1002/bse.2665.

Kim, Eun Jung, Inhan Kim, and Mi Jeong Kim. 2020. "The Impact of Workplace Disability Facilities on Job Retention Wishes among People with Physical Disabilities in South Korea." *Sustainability* 12(18):7489.

Lane, Marguerita, Morgan Williams, and Stijn Broecke. 2023. "The Impact of AI on the Workplace: Main Findings from the OECD AI Surveys of Employers and Workers."

Lin, Dong, Susan Levy, and Fiona Kumari Campbell. 2024. "Disability and Employment in China: A Guangzhou Case Study." *Disability & Society* 1–23. doi: 10.1080/09687599.2024.2368556.

Mansour, A. A. Z., A. Ahmi, O. M. J. Popoola, and A. Znaimat. 2022. "Discovering the Global Landscape of Fraud Detection Studies: A Bibliometric Review." *Journal of Financial Crime* 29(2):701–20.

Marín Palacios, Cristina, Oliver Carrero Márquez, and Rhona Lohan. 2021. "Review of Employment and Disability: Bibliographic Analysis." doi: 10.1108/JEC-05-2021-0074.

McCallum, Faye, and Deborah Price. 2015. *Nurturing Wellbeing Development in Education*. Taylor & Francis.

Milanez, Anna. 2023. "The Impact of AI on the Workplace: Evidence from OECD Case Studies of AI Implementation."

Mousa, Mohamed, and Georges Samara. 2023. "The Institutional Limitations of Emancipation: The Inclusion of Disabled Employees in the Egyptian Public Context Post COVID-19." *International Journal of Public Administration* 46(13):939–50. doi: 10.1080/01900692.2022.2049815.

Ne'eman, Ari, and Nicole Maestas. 2023. "How Has COVID-19 Impacted Disability Employment?" *Disability and Health Journal* 16(2):101429.

Olsen, Jason. 2024. "Employers: Influencing Disabled People's Employment through Responses to Reasonable Adjustments." *Disability & Society* 39(3):791–810. doi: 10.1080/09687599.2022.2099251.

Piper, A. M., R. Cornejo, L. Hurwitz, and C. Unumb. 2016. "Technological Caregiving: Supporting Online Activity for Adults with Cognitive Impairments." Pp. 5311–23 in *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*.

Ra, Young-An. 2023. "Factors Affecting Disability Disclosure in Employment Setting for Individuals with Intellectual Disability." *International Journal of Environmental Research and Public Health* 20(4):3054.

Rahwan, Iyad, Manuel Cebrian, Nick Obradovich, Josh Bongard, Jean-François Bonnefon, Cynthia Breazeal, Jacob W. Crandall, Nicholas A. Christakis, Iain D. Couzin, Matthew O. Jackson, Nicholas R. Jennings, Ece Kamar, Isabel M. Kloumann, Hugo Larochelle, David Lazer, Richard

McElreath, Alan Mislove, David C. Parkes, Alex 'Sandy' Pentland, Margaret E. Roberts, Azim Shariff, Joshua B. Tenenbaum, and Michael Wellman. 2019. "Machine Behaviour." *Nature* 568(7753):477–86. doi: 10.1038/s41586-019-1138-y.

Rani, U., and M. Furrer. 2021. "Digital Labour Platforms and New Forms of Flexible Work in Developing Countries: Algorithmic Management of Work and Workers." *Competition & Change* 25(2):212–36.

Retalis, S., T. Korpa, C. Skaloumpakas, M. Boloudakis, M. Kourakli, I. Altanis, and P. Pervanidou. 2014. "Empowering Children with ADHD Learning Disabilities with the Kinems Kinect Learning Games." P. 469 in *European Conference on Games Based Learning*. Vol. 2. Academic Conferences International Limited.

Schartz, Kevin, Helen A. Schartz, and Peter Blanck. 2002. "Employment of Persons with Disabilities in Information Technology Jobs: Literature Review for 'IT Works.'" *Behavioral Sciences & the Law* 20(6):637–57. doi: 10.1002/bsl.510.

Smith, Peter J. 2024. "The Impact of Legislation and Conventions on Disability Employment Outcomes in Australia." *Advances in Neurodevelopmental Disorders* 8(1):35–41. doi: 10.1007/s41252-023-00343-4.

Smith, Peter, and Laura Smith. 2021. "Artificial Intelligence and Disability: Too Much Promise, yet Too Little Substance?" *AI and Ethics* 1(1):81–86. doi: 10.1007/s43681-020-00004-5.

Tran, Bach Xuan, Giang Thu Vu, Giang Hai Ha, Quan-Hoang Vuong, Manh-Tung Ho, Thu-Trang Vuong, Viet-Phuong La, Manh-Toan Ho, Kien-Cuong P. Nghiem, and Huong Lan Thi Nguyen. 2019. "Global Evolution of Research in Artificial Intelligence in Health and Medicine: A Bibliometric Study." *Journal of Clinical Medicine* 8(3):360.

Trewin, Shari, Sara Basson, Michael Muller, Stacy Branham, Jutta Treviranus, Daniel Gruen, Daniel Hebert, Natalia Lyckowski, and Erich Manser. 2019. "Considerations for AI Fairness for People with Disabilities." *AI Matters* 5(3):40–63. doi: 10.1145/3362077.3362086.

Vicente, María Rosalía, and Ana Jesús López. 2010. "A Multidimensional Analysis of the Disability Digital Divide: Some Evidence for Internet Use." *The Information Society* 26(1):48–64. doi: 10.1080/01615440903423245.

Vieira, E. S., and J. A. Gomes. 2009. "A Comparison of Scopus and Web of Science for a Typical University." *Scientometrics* 81:587–600.

WHO. 2011. "World Report on Disability." Retrieved June 25, 2024 (https://www.who.int/teams/noncommunicable-diseases/sensory-functions-disability-and-rehabilitation/world-report-on-disability).

WHO. 2020. "World Health Organization." *Air Quality Guidelines for Europe* (91).

Zhang, Shouyao, Shuang Wang, Ruilu Liu, Hang Dong, Xinghe Zhang, and Xiantao Tai. 2022. "A Bibliometric Analysis of Research Trends of Artificial Intelligence in the Treatment of Autistic Spectrum Disorders." *Frontiers in Psychiatry* 13:967074.

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