Visualization Research on the Hotspots and Frontier of Autism Research in China

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Abstract

In order to understand the hotspots and frontiers of autism research, 271 related literatures in CSSCI database were collected as research objects, and CiteSpace V software was used for visual analysis. Result: The research hotspots mainly focus on "Autism", "Autistic children", "Autistic pedigree disorder", "Psychological theory", "Autistic pedigree disorder children", "Autistic children", "Intervention", "Special education", "Eye movement research" and so on. There are 17 clusters of research cluster, including "Autism", "Autistic children", "Autistic pedigree disorder", "Psychological theory", "Autistic pedigree disorder children", "Special education", "Autistic children", "Autistic children", "Executive function", "Evidence-based practice", "Language disorder" and "Social cognition". According to the time line analysis of high frequency keyword clustering, the research hotspots of autism include "Autism", "Autistic children" and "Autism spectrum disorder".

Keywords

Autism, Hotspot and trends, Visualization, CiteSpace.

1. Introduction

Autistic Disorder, also known as autism. The American Psychiatric Society (2000) defines it as a general developmental disorder, which started 30 months ago. It mainly manifests such psychological deficiencies as social communication disorder, abnormal communication patterns between speech and non-speech, rigid interest, limitation of behavior and activity content, and rigidity. The US Centers for Disease Control announced in 2012 that the prevalence of autism in 2007 and 2009 was 1/150 and 1/110, respectively, and increased to 1/88 in 2012. The prevalence of autism has been increasing year by year[1], becoming the fastest growing obstacle for children[2]. Autism has a wide range of impacts, involving all aspects of individuals as well as families and societies. It is destructive, complex, difficult and very complex among individuals. The problem of autism has attracted wide attention and attention from governments, scholars in many fields and the general public. In order to deeply understand the research hotspots and frontiers, this paper takes the relevant literature index data of autism research included in CSSCI database as the research object. Using CiteSpace V.5.1.R8. (64-BIT) software to generate visualized scientific knowledge maps and related data for analysis, in order to provide reference for researchers in this field.

2. Participants and design

In the Chinese Social Science Citation Index (CSSCI) database, "Advanced search" is used to retrieve the keyword "自闭症(Autism)". The time span is 1998-2017; the literature type is papers; and the retrieval time is December 10, 2018. A total of 271 literatures were included for visual analysis.

3. Measures

The visualization software of CiteSpace 5.1.R8 based on JAVA platform is used to draw the map of scientific knowledge[3]. Through the analysis of the trend of the number of papers, we can understand the changes of research hotspots in this field. Through the analysis of scientific research institutions and High-yielding authors, we can understand the main body of knowledge in this field. Through the analysis of key words, we can understand the research hotspots and frontiers in this field.

4. Results

4.1 Distribution of Publications

The earliest literatures on autism included in CSSCI were published in 1998. Yingshun Yinshan of Nagoya University, Japan and others published in the Journal of East China Normal University (Educational Science Edition), "A Sketch of Autism World - Youth Autism World". The author used psychotherapy to explore the effects of autism patients. The other is "New Progress in Autism Research in the Field of Cognitive development" published by Beiying of East China Normal University in Psychological Science. Based on the hypothesis of cognitive theory barrier of thinking, the author has gone out of the field of clinical psychiatry and tends to study the pathogenesis, basic obstacles and educational rehabilitation of autism from various perspectives such as developmental psychology and cognitive psychology.Fig.1 shows that the number of pre-2004 papers is relatively small, after 2004, the number of posts is more than 10, maintaining a steady upward trend, to reach 33 by 2017.
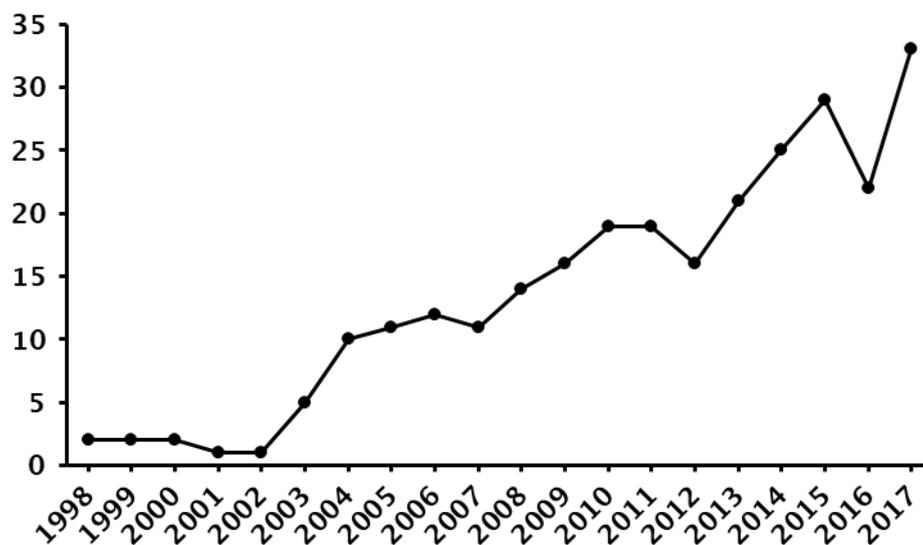

Fig. 1 statistics of literature published from 1998 to 2017

4.2 Analysis of Scientific Research Institutions

In CiteSpace V analysis software, a single time zone is set for one year, the network node is selected as Institution, the data is screened as Top 50 per slice, and the visualization map of the research institute network is drawn. Through analysis, more than 80 research institutes related to autism have been established. From Fig.2, we can see that there are 88 nodes, but there are fewer connections, which indicates that there are few links and cooperative relationships among research institutions, mainly within the institutions of higher learning as contact groups. Tab.1 shows that organizations that publish more than five papers are mainly distributed in universities, and all of them are normal universities. Among them, 72 were from East China Normal University, ranked first; 26 were from Beijing Normal University, ranked second; 13 were from Chongqing Normal University, 9 were from Shanxi Normal University, 9 were from Zhejiang Normal University, 8 were from Zhejiang Normal University, 6

were from Nanjing Normal University, 5 were from South China Normal University and 5 were from Central China Normal University.

Fig.2 The mapping knowledge domains of Institution

Tab.1 The major institution to research issue a document

No.	Institutions	Number of published articles
1	East China Normal University	72
2	Beijing Normal University	26
3	Chongqing Normal University	13
4	Shaanxi Normal University	9
5	Zhejiang Normal University	9
6	Zhejiang Normal University Hangzhou Infant Normal School	8
7	Nanjing Normal University	6
8	South China Normal University	5
9	Central China Normal University	5

4.3 Analysis of the Main Authors

In CiteSpace V analysis software, a single time zone is set for one year, the network node is selected as Author, the data is screened as Top 50 per slice, and the network visualization map of high-yield authors is drawn. Each node represents an author, the size of nodes and fonts represents the frequency of network co-occurrence, the lines between nodes represent the degree of cooperation between authors, and the color of lines represents the age of cooperation[4]. Fig.3 shows that node N=294 and connection E=322. The analysis shows that there are more than 300 authors in the field of autism research, and the high-yielding authors are more concentrated, but the core authors'co-occurrence network density is low (Density=0.0075), which indicates that the degree of cooperation among authors is relatively low, forming several relatively large research teams. Among them, Jun-ming F. and Nian-li Z. of East China Normal University and Shu-qin C. of Zhejiang Normal University are the core research teams. Yun-qiang L. and Guan-xing C. of Zhejiang Normal University and Xiao-yi H. of Beijing Normal University are the core research teams. Guangxue Y. of East China Normal University

is the core research team. And also formed several smaller teams, such as Wei C. of Nanjing Normal University. Shou-hong W. of Beijing Normal University. Shunsen C. of Minnan Normal University/Zhangzhou Normal College. Tab.2 shows that the research results are relatively large, accounting for nearly 40% of the total.

Fig.3 The mapping knowledge domains of author

Tab.2 The major author to research issue a document

No.	Author	Number of published articles	Institution
1	Junming F.	28	School of Preschool Education and Special Education, East China Normal University
2	Guangxue Y.	15	Autism Research Center of East China Normal University
3	Nianli Z.	12	East China Normal University
4	Yunqiang L.	11	Zhejiang Normal University Hangzhou Pre-school Normal College
5	Shuqin C.	10	Zhejiang Normal University
6	Wei C.	8	Nanjing Normal University
7	Xiaoyi H.	8	Beijing Normal University
8	Shenghong W.	7	Beijing Normal University
9	Shunsen C.	7	Minnan Normal University/Zhangzhou Normal College

4.4 Analysis of the Main Authors

In CiteSpace V analysis software, a single time zone is set for one year, Noun Phrases is selected as the type, Keyword is selected as the network node, Top 50 per slice is selected as the data, and the network visualization map of high-yield authors is drawn. The key words are the author's summary and refinement of the core content of the paper, which is the essence of the paper and represents the research hotspot in this field to a certain extent. In the graph spectrum, each node represents the research hotspot. The size of the font of the annotated words and the thickness and size of the ring are proportional to the frequency of keywords in the research field. The thickness of the links between nodes indicates the degree of affinity between keywords[5]. Fig.4 is a map of scientific knowledge

formed by high-frequency keywords. It can be seen from the graph that the key words of relevant research on autism are "Autism", "Autistic children", "Autistic pedigree disorder", "Theory of mind", "Autistic pedigree disorder children", "Autistic children", "Intervention", "Special education" and "Eye movement research". Fig.5 is a research cluster based on high frequency keywords. The cluster name represents the specific direction of the research. A total of 17 research clusters are "Autism", "Autistic children", "Autistic pedigree disorder", "Psychological theory", "Autistic pedigree disorder children", "Special education", "Autistic children", "Autistic children", "Child autism", "Executive function", "Evidence-based practice", "Language disorder", "Social cognition" and "Autistic child mother". "Library", "Repetitive Stereotyping", "Mirror Nervous System" and "Disco". The time-line graph of keywords is analyzed, and the horizontal lines of each cluster indicate the time period of this cluster which is the hotspot of research. There are three big circles in the whole time line, which are mainly focused on "Autism", "Autistic children" and "Autism spectrum disorder". In the early stage, the research focus on "Mental illness", "Cognitive psychology", "Child psychology" and "Developmental linguistic psychology" has shifted to "Child rehabilitation training", "Education program", "Family needs", "Key skills training" and "Intervention mode". At the same time, in recent years, the research entry point is expanding, such as "Parent executive therapy", "Evaluation of educational effectiveness", "Music intervention" and "Early diagnosis". The emphasis is on prevention, and many evaluation tools and treatment methods have been formed.

Fig.4 The mapping knowledge domains of keywords

Fig.5 Research hotspot clustering knowledge map

5. Conclusion

Autism research in China began in 1998 and has achieved certain results after 20 years of development. The main research institutions are East China Normal University, Beijing Normal University, Chongqing Normal University, Shaanxi Normal University, Zhejiang Normal University, Nanjing Normal University, South China Normal University and Central China Normal University. There are many scholars in this field, and the degree of cooperation is relatively low. Several large research teams have been formed, such as Jun-ming F., Yun-qiang L., Guang-xue Y. and so on. Research hotspots mainly focus on "Autism", "Autistic children", "Autistic pedigree disorder", "Psychological theory", "Autistic pedigree disorder children", "Autistic children", "Intervention", "Special education" and "Eye movement research". There are 17 research clusters including "Autism", "Autistic children", "Autistic pedigree disorder", "Psychological theory", "Autistic pedigree disorder children", "Special education", "Autistic children", "Autistic children", "Executive function", "Evidence-based practice", "Language disorder" and "Social cognition". The results show that this field is mainly focused on three hot spots: autism, autistic children and autism spectrum disorder. In the past 20 years, great breakthroughs have been made in the treatment and screening of autism, and many systematic assessment tools and treatment methods have been developed.

Acknowledgements

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