

Visualization Analysis of Health Behavior Research Hotspots in China

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Abstract: Object The purpose of this paper is to understand the current research status and hot spots in the field of health behavior in China in recent six years, and to provide reference for the development and practice of health behavior research. Methods This paper takes Chinese core and CSSCI journals in the field of health behavior as samples in recent six years and uses visual analysis tools Cite Space V for multi-angle analysis. Results The overall change of the number of published papers was small, and the number of high-quality literatures increased year by year. The periodicals are mainly medical and health journals, and CSSCI source periodicals are few. There are cooperative relationships among high-yield institutions, but the degree of cooperation is low and the research force is scattered. The research focuses on the analysis of residents' behavior status and its influencing factors, the evaluation of the effect of health education applied to health behavior, and the research on the status of health literacy and its correlation with behavior. Conclusion Cooperation between research institutions should be strengthened to form a core research team. More attention should also be paid to the study of women's health behavior. In the study of behavior influencing factors, there is a lack of in-depth analysis from the perspective of social factors. It is necessary to further deepen the theoretical research and improve the quality of research.

1. Introduction

Health behavior refers to a series of behaviors taken by individuals to prevent diseases and maintain physical health. Common health behaviors include regular physical examination, active physical exercise, or changing harmful behaviors to the body. Because the occurrence of common diseases is related to behavioral factors and psychological factors, so by changing people ' s bad behavior, bad habits, so as to achieve the purpose of developing healthy habits to prevent the occurrence of diseases. In view of this, based on the core journal database of CNKI, this paper uses the visualization analysis tool Cite Space V to draw the knowledge map, and analyzes the time distribution of literature in the field of health behavior in China, the published journals and highly cited literature, the cooperative distribution of core authors and publishing institutions, and the research hotspots, so as to accurately grasp the achievements and hotspots of domestic scholars in this field.

2. Data Sources and Research Methods

2.1. Data Sources

In this paper, the academic journal database on CNKI platform is selected as the data source. This paper takes advanced retrieval as the main approach of database platform. The retrieval time is January 16, 2020. Select the search field as 'Subject' and set the search criteria as 'Subject = Health Behavior'. The retrieval field is 'topic', and the retrieval condition is set as 'topic = health behavior'. Source categories are 'Core Journals' and 'CSSCI'. The time span is set as '2015-2020'. Through manual screening and deletion of irrelevant literatures, 1006 valid literatures were finally obtained, and the RefWorks plain text format of valid literatures was derived to obtain sample data.

2.2. Research Methods

In this study, bibliometrics and co-occurrence analysis were used to analyze and summarize domestic research in the field of health behavior in the past six years from the dimensions of the number of published papers, cooperation between key authors and institutions, published journals, highly cited literatures, hot keywords and research topics. Bibliometrics uses statistical and mathematical methods to describe, analyze, evaluate and predict the development status and trend of a subject with the help of literature system and quantitative characteristics^[1]. The co-occurrence analysis method gives the characteristics of the literature content and takes the literature subject words as the analysis object. Based on the cluster analysis of the occurrence times of a group of words in the same literature, the research hotspots of the discipline can be found^[2].

3. Results

3.1. Time Distribution of Research Literature

To some extent, the number of papers published in journals in a certain research field reflects the theoretical level and development speed of academic research in this field. After screening, a total of 1006 papers on health behavior related journals were published in China from 2015 to 2020, among which 252 were CSSCI papers, accounting for 25.05% of the total. The time distribution of literatures is shown in Figure 1. In recent six years, the development trend of core literatures in the field of health behavior in China is relatively fluctuating, with a small change in the number of literatures, and the annual average number of published articles is 167. However, it is worth noting that the number of CSSCI papers has been increasing year by year, with 42 published annually. This indicates that the field of health behavior has attracted the attention of domestic scholars in recent years, and many high-quality and authoritative academic results have been produced, driving the enthusiasm of the academic circle gradually in this field.

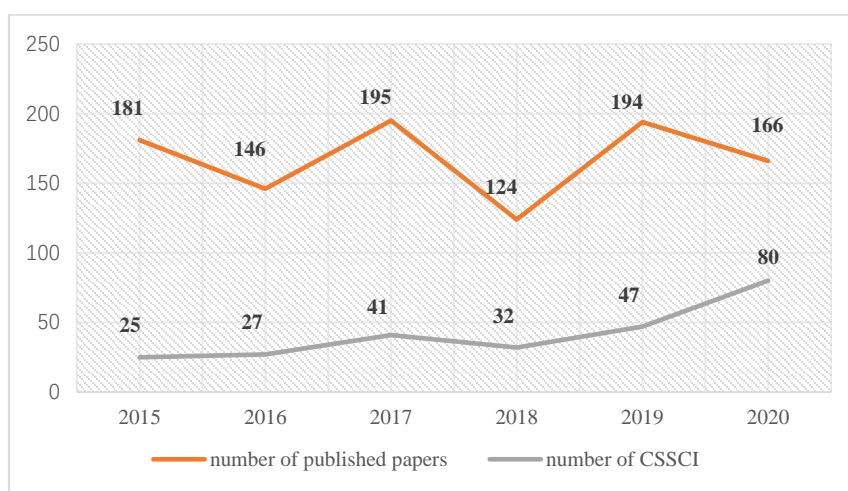


Figure 1: Distribution of publishing year of domestic core journals.

3.2. Journal and Highly Cited Literature

All the papers in this study are from journals. Statistical analysis of the corresponding journals and highly cited literatures is helpful to further understand the research status of health behaviors in China in recent years. Table 1 shows the top 6 journals in terms of publication volume. The number of papers published in these 6 journals is 457, accounting for 45.43% of the total number of papers, and they belong to the ‘core journals’ with more papers published. *CHINESE JOURNAL OF SCHOOL HEALTH* and *CHINESE JOURNAL OF HEALTH EDUCATION* were the main battlegrounds for the publication of papers, with more than 100 papers each. Rounding out the top six are the *CHINESE JOURNAL OF GERONTOLOGY*, *MODERN PREVENTIVE MEDICINE*, *CHINESE GENERAL PRACTICE*, *CHINESE NURSING RESEARCH*, which provide a good communication platform for domestic health behavior researchers. Among them, the compound impact factor (2020) of *CHINESE GENERAL PRACTICE* was the highest, reaching 2.25, which to some extent indicated that the overall quality of the papers in this journal was high and played a leading and promoting role in the development of healthy behaviors.

Table 1: Number of articles published in major journals.

Journal Name	number of publications	impact factors(2020)	Proportion
<i>CHINESE JOURNAL OF SCHOOL HEALTH</i>	154	1.721	22.48%
<i>CHINESE JOURNAL OF HEALTH EDUCATION</i>	133	1.936	19.42%
<i>CHINESE JOURNAL OF GERONTOLOGY</i>	51	1.187	7.45%
<i>MODERN PREVENTIVE MEDICINE</i>	47	1.801	6.86%
<i>CHINESE GENERAL PRACTICE</i>	41	2.25	5.99%
<i>CHINESE NURSING RESEARCH</i>	31	1.396	4.53%

The statistics and analysis of the citation frequency of the literature in the research field of a certain discipline in a period of time can dig out the literature with high academic reference value, application value and influence in this field, and then further reveal the research level and level of this discipline ^[3]. In the past six years, 1,006 papers were ranked from high to low in terms of citation frequency, and 6 papers with more than 80 citation frequency were selected as the cited papers with high citation frequency in this research field, as shown in Table 2. It can be clearly seen from Table 2 that the contents of the six papers involve a wide range of research objects, including

urban and rural residents, students, diabetes patients, middle-aged and young stroke patients respectively. The contents of the study include health literacy research, health behavior investigation, health education effect evaluation, etc. Among them, the articles on healthy behavior written by Yao Hongwen and Shi Qi are of high reference value and application value, which are worthy of peer study and reference.

Table 2: Distribution of highly cited papers.

Paper title	Author	Literature sources	Published year	Cited frequency
The Current Status of Health Literacy in China	Yao Hongwen, Shi Qi, Li Yinghua	<i>Population Research</i>	2016	199
Construction of The Framework System of Chinese Student's Physical Education Disciplinary Core Makings	Yu Sumei	<i>Journal of Physical Education</i>	2017	182
Effect of Health Education on Self-management Mode among Diabetes patients in community	Huang Hailing, Chen Xiaomin, Cao Jiefang	<i>Chinese Journal of Health Education</i>	2016	97
Effect of Health Education on Aged Diabetes Inpatients Health Behavior Self-efficacy	Huang Lifan	<i>Chinese Journal of Health Education</i>	2016	89
Investigation and Analysis of Influencing Factors of Health Behavior in Young and Middle-aged Stroke Patients	Liu Hualing, Shi Yanxia, Zhu Haiping, He Xiang	<i>Chinese Journal of Nursing</i>	2015	80

3.3. Distribution of Core Authors and Publishing Institution

The literature quantity of an author can reflect his knowledge output ability, which is one of the objective criteria to evaluate the author's work efficiency. According to statistics, a total of 3480 scholars have been engaged in the field of health behavior research in China in the past six years. Among them, there were 12 people with more than 7 occurrences, accounting for 0.35%. There were 54 patients with 4-6 times of occurrence, accounting for 1.55%. There were 425 patients with 2-3 times of occurrence, accounting for 12.21%. There were 2989 patients with one occurrence frequency, accounting for 85.89%. The above data indicate that the core group of authors has not been formed in the field of health behavior research in China, and the number of authors in amateur studies is far greater than that in continuous studies. Table 3 shows the authors and their research institutions who have published more than 10 papers in this field. The top two authors were both from Jishou University. This indicates that this research institution pays more attention to health behavior and conducts in-depth research.

Table 3: High-yield authors in the field of health behavior in China.

author name	Subordinate institutions	number of publications
Zhang Fulan	Jishou University	14
Zhang Tiancheng	Jishou University	14
Xing Fengmei	North China University of Science and Technology	11
Zhang Min	Wuhan University	11
Zhang Yan	University of Chinese Academy of Sciences	10

On the other hand, the co-occurrence analysis of scientific research institutions can more intuitively show the main forces and influence distribution of health behavior research in China. Figure 2 is the knowledge map of research institutions in the field of health behavior in China. Each node in the figure represents an organization, and the size of the node is proportional to the number of messages issued by the organization. The line between nodes represents the cooperative relationship between organizations, and the thickness of the line represents the cooperation density between organizations. The thicker the line, the closer the cooperation between organizations. It can be seen from the figure 2 that the School of Information Management of Wuhan University has the largest node. From 2015 to 2020, 20 papers on health behavior were published in Wuhan University. It has collaborated with three research institutions: The School of Public Policy and Management at the University of Chinese Academy of Sciences, the School of Management at Anhui University and the Hefei Normal University. The research results of this team include the study on the behavior of selecting public electronic health information sources ^[4] and the study on the behavior of non-continuous use of intelligent health bracelet users ^[5]. Next came the School of Sports Science of Jishou University and the School of Nursing and Rehabilitation of North China University of Science and Technology, which published 14 and 12 papers respectively. It can be seen from the figure 2 that the School of Physical Education Science of Jishou University has carried out academic cooperation with the Department of Physical Education of Normal College of Jishou University. The team mainly studied adolescents, and the research content revolve around the analysis of health risk behaviors and their influencing factors. Although the College of Nursing and Rehabilitation of North China University of Science and Technology published a large number of papers, it was a completely independent node in the co-occurrence map of institutions, indicating that the university did not carry out academic cooperation with other institutions and lacked academic communication. In addition, the team led by the Department of Neurology of Guangdong Provincial Hospital of Traditional Chinese Medicine also has frequent academic exchanges. The team consists of 6 scientific research institutions, mainly the School of Nursing of Sun Yat-sen University and affiliated hospitals. The team studies the health behaviors of patients with ischemic stroke ^[6] and hypertension ^[7].



Figure 2: Network of Health Behavior Research Institutions in China.

3.4. Analysis of Research Hotspots

3.4.1. Keywords Co-occurrence Network Graph

Keywords are the concentration of literature content, reflecting the focus of research and hot topics in academic circles. Figure 3 shows the co-occurrence map of high-frequency keywords in the field of health behavior in China from 2015 to 2020. The size of nodes in the map reflects the frequency of the keyword, and the larger the nodes are, the higher the weight of the keyword in the collinear network is. The connections between nodes represent the connections between keywords, and the more connections the nodes have, the more information involved, and thus become a hot spot in this research field. Figure 3 contains a total of 130 nodes and 213 lines. In addition to the search subject 'health behavior', the key words with large nodes included health education, influencing factors, health literacy, adolescents, the elderly, health knowledge, etc.

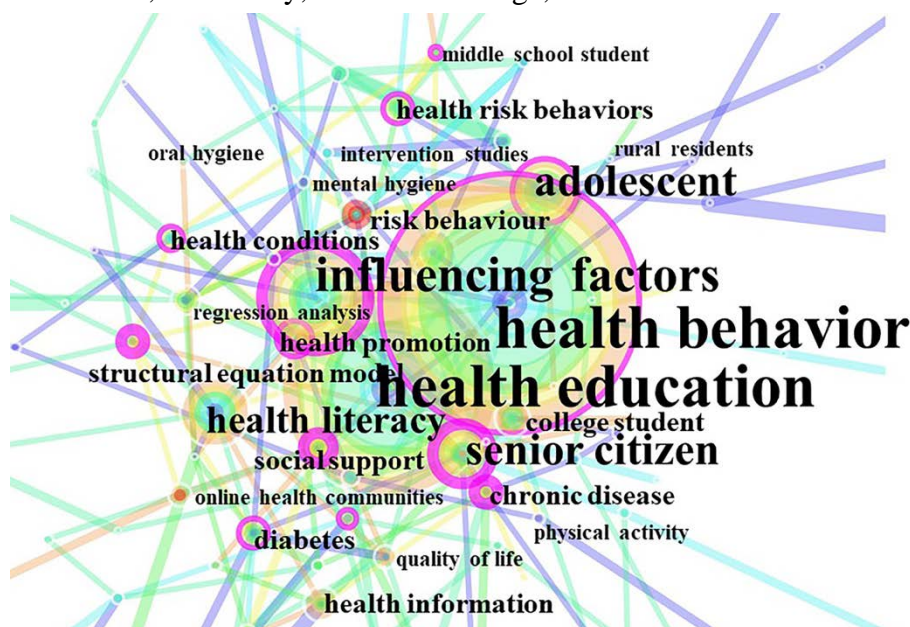


Figure 3: Co-occurrence map of key words in health behavior research in China.

3.4.2. Analysis of Hot Topics

Based on the analysis of hot keywords and major literatures, the research on health behavior in China from 2015 to 2020 can be roughly divided into the following three categories:

First of all, most of the domestic research is about the status quo of Chinese residents' behavior and the analysis of its influencing factors. The research objects mainly include the elderly, middle school students, college students, rural residents, urban residents, employed and so on. The research involves a wide range of content. For example, in the study on the consumption behavior of healthy products, the scholar found that the proportion of urban occupational population consuming healthy food was relatively high, and the health value of customers significantly positively affected their attitudes towards food taste and food health, and further significantly positively predicted their healthy food consumption behavior intention^[8]. Some scholars also pay attention to residents' medical consumption behavior and medical treatment behavior. Research indicates that basic knowledge and concepts, basic skills, health literacy are positively correlated with the opportunity to seek medical treatment. Basic knowledge and concepts, healthy lifestyle and behavior, and basic skills can distinguish samples of different medical institutions effectively. We should attach importance to the cultivation of health information literacy and establish an integrated health education and health promotion model of 'family-community-hospital-university'^[9]. Combined with the background of Covid-19 epidemic, prevention and control of health behaviors is also the focus of recent scholars. Some scholars have found that the overall level of health protection behaviors of middle school students in Wuhan is general, with poor grasp of details of health protection behaviors, and there are characteristic groups with low rate of health protection behaviors^[10]. Other scholars have carried out studies on residents' living behaviors, such as diet management behavior^[11], oral health behavior^[12], health information searching behavior^[13], migration behavior^[14], and health examination behavior^[15].

Secondly, health education is one of the hot concerns of domestic scholars, involving 349 literatures, accounting for 34.69% of the total literatures. Health education is a planned, organized and systematic social education activity, its purpose is to make people adopt healthy behavior and lifestyle consciously, eliminate or reduce the risk factors that affect the health of residents, so as to prevent diseases, promote health and improve the quality of life. Health education mode is very rich, some scholars discuss skills based on Information—Motivation—Behavior model of health education in patients with bronchial asthma self-management ability and the influence of asthma control, the results showed that the model of health education is helpful to promote the formation of patients with bronchial asthma self-management ability, can improve the level of asthma control, improve the quality of life in patients with asthma^[16]. Some scholars have applied this model to alcohol-dependent patients and found that it not only improves the knowledge level of alcohol-dependent patients, but also improves the quality of life of patients and reduces the relapse rate of patients^[17]. Some other scholars have applied different models of health education to evaluate and analyze the effects, such as the model of knowledge, belief and action^{[18][19]}, the model of spouse participation^[20], and the model of peer support^[21].

Thirdly, health literacy is also a hot topic in the field of health behavior research in China, and the literature involved accounts for about 11.93% of the total literature. Health literacy refers to the ability of individuals to obtain and understand the most basic health information and services, and to make correct judgments and choices so as to actively maintain and promote their own health. Some studies have discussed the e-health literacy and disease behaviors of college students in higher vocational colleges and their relationship with each other. The results show that e-health literacy is an important factor affecting disease behaviors of college students in higher vocational colleges, and the cultivation of e-health literacy of college students in higher vocational colleges

should be paid attention to to improve their disease behaviors ^[22]. Some scholars have also discussed the correlation between health literacy and health behaviors of stroke inpatients. Studies have found that health literacy and health behaviors of stroke patients are correlated positively, and nursing staff should take measures to improve the health literacy of patients and promote them to form good health behaviors ^[23].

4. Conclusion and Suggestion

4.1. Conclusion

Through the analysis of the above four dimensions, the research status of health behavior in the past six years can be directly reflected: From the point of view of the number of papers, the overall change of the number of published papers is small, but there is a small fluctuation, while the number of high-quality, authoritative results increased year by year. From the perspective of publishing journals, the journals with the highest publishing volume are mainly medical and health journals, and the CSSCI source journals are few. From the perspective of publishing institutions, cooperative relationships exist among high-producing institutions, but compared with all research institutions, the degree of cooperation is low, and the research force is more dispersed. From the perspective of highly cited papers, a number of core papers with high reference value have been formed in the aspects of health literacy research, health behavior investigation, health education effect evaluation, etc. From the perspective of research topics, scholars mainly focus on the analysis of the status quo of residents' behaviors and its influencing factors, the evaluation of the effect of health education applied to health behaviors, and the research on the status quo of health literacy and its correlation with behaviors.

4.2. Suggestion

Based on the current status of health behavior research in China, this paper proposes the following suggestions:

First of all, cooperation between research institutions should be strengthened to form a core research team. Although the authors come from a wide range of sources, they are researchers from universities or university affiliated hospitals generally. In addition, there are more amateur authors and fewer continuous researchers in the field of health behavior research in China. Except for the cooperation of a few schools, there are few cross-school or institutional exchanges and cooperative research. Therefore, this paper suggests that domestic scholars deepen their research and thinking in this field, and that academic exchanges and cooperation should be strengthened among cooperating institutions, especially high-frequency publishing institutions, so as to form an institutional cooperation network with certain research strength, which is conducive to the in-depth study of this topic. At the same time, the types of cooperation institutions can be more diversified, not limited to universities and universities. For example, universities can share big data and exchange results with relevant health departments. In addition, cooperative institutions should break through regional and disciplinary limitations, and realize cross-regional and cross-disciplinary exchanges and cooperation among scholars as soon as possible, so as to learn from each other's achievements in this field, which is conducive to promoting the development and progress of the field of health behavior in China.

Secondly, domestic scholars should pay more attention to women's health behaviors. According to the statistics, less than 3.5% of the literatures related to women's health in the field of domestic health behavior research in the past six years. Research efforts need to be strengthened. With the increasingly fierce competition in modern society, the fast-paced life and the special physiological

structure of women themselves, the health problems of modern women are escalating constantly, and the great emotional changes and reduced immunity often attack the health of women. According to the 2020 White Paper on Women's Health in China, the diseases with a high incidence rate in women include reproductive tract infections, breast diseases, endocrine diseases, cervical and uterine diseases, gynecological tumors, and ovarian diseases. In addition, according to the survey, many women lack full understanding and attention to their own diseases, and even a small number of women have misunderstandings about women's diseases, which eventually lead to the delay of the best treatment time. Therefore, domestic scholars can explore women's health risk behaviors deeply and explore the influencing factors of women's health risk behaviors, so as to provide theoretical basis for improving women's health behaviors in China.

Thirdly, there is a lack of in-depth analysis from the perspective of social factors in the research of behavior influencing factors. Social factors refer to the various components of society, mainly including economic factors, cultural factors and living environment factors. Their influence on health is characterized by universality, persistence, accumulation and interaction, and plays an important role in the occurrence, development and transformation process of behaviors.

Fourthly, scholars need to further deepen theoretical research and improve the quality of research. According to statistics, in the recent six years, there were 115 literatures involving theoretical research in the field of health behavior research, accounting for 11.43% of the total literatures. Domestic scholars have used many theories, such as protective motivation theory, cross-theory model, planned behavior theory, health belief model and behavior change theory. Through literature review, it is found that the basic theoretical research in the field of health behavior research in China is relatively weak. Therefore, in the future research, researchers need to further improve and deepen the theoretical research on health behavior, conduct empirical research on the application model of health behavior, and form a complete and reliable theoretical evaluation system.

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