



# Health Education Research on the Prevention and Treatment of Myopia: A Bibliometric Analysis of Trends a Cross Regions

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## Abstract

**Background:** In recent years, the prevalence of myopia or eye illnesses in adolescents has remained high, with younger onset ages and increasing degrees of myopia. Adolescents' understanding of the reasons of myopia (such as eye habits, eating habits, and outdoor sports) is limited to self-awareness, and studies reveal that most youngsters are unaware of myopia defenses. Health education may show to be an effective means of preventing myopia, and it can be taught to adolescents to help them become more aware of myopia prevention and control.

**Methods:** From 1970 to June 2022, this bibliometric study looked at the publishing trends of publications on the impact of health education on myopia prevention and treatment in the literature. These data are taken from the SCOPUS. Annual publications, most relevant authors, sources, countries, subjects, and keywords are all displayed on distinct visualization maps. These data were put *via* a network analysis. The goal of this study is to look into current trends in myopia prevention and control measures. Furthermore, the data was qualitatively examined using 10 cited articles, exhibiting our instructional themes and methodologies in the field of myopia prevention and control study.

**Results:** The findings suggest that the citation rate in this discipline increases as the literature grows. International Eye Science, which witnessed a substantially better citation rate after 2012 and published the most myopia-related publications, published the majority of the most relevant papers. British Journal of Ophthalmology is more likely to publish articles with keywords like myopia, myopia prevention, juvenile myopia, and myopia testing. China, the United States, Singapore, and the United Kingdom are the countries that publish the most articles on a global scale. Using myopia prevention, prevention, detection, and education as goals, and myopia surgery and lens section surgery as means, at least 11 citations have been published, according to qualitative analysis.

**Conclusion:** A bibliometric analysis of health education on myopia prevention and treatment sheds light on future research possibilities while also highlighting potential opportunities and problems. He could be able to help future researchers choose appropriate subfields of research for myopia prevention and therapy.

**Keywords:** Myopia; Health education; Bibliometrics; Myopia prevention

## Introduction

In recent decades, the rising frequency of myopia has become a major public health issue. Myopia is a common healthy lifestyle issue that causes vision loss and is linked to other eye illnesses [1,2]. People with low vision due to refraction, according to the survey results, have low eyesight. Prevention is impossible to rely on. The number of people with visual disabilities and amblyopia can be reduced by detecting instances early, evaluating their regular wear, and emphasizing the importance of prevention and control [1]. In East Asia, myopia proceeds quickly, with a yearly diopter of around 1 diopter(D); up to 24% of young people are highly myopic [2, 3].

The bibliometric research to date has focused on visual acuity [4], optics and refraction [5], low vision and health education [6]. Myopia is a typical refractive defect that develops during childhood. Myopia has become a global public health problem due to the rising occurrence and younger age of young people around the world, jeopardizing their physical and mental health. The prevention and control of juvenile myopia has once again become the focus of work in the disciplines of

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school health and ophthalmology in recent years, thanks to the high priority given by several nations and the implementation of related regulations.

For the systematic examination of publications, bibliometric methods have been employed to quantify scientific progress in numerous disciplines [7]. Other indicators were required for research evaluation. In many occasions, citation analysis combined with peer review resulted in improved judgment. Several tools appear to have made producing a bibliometric report easier in recent years. This includes databases that contain integrated reference management capabilities, such as Web of Science Core Collection (WoS), SCOPUS, and Google Scholar [8,9]. WoS and Scopus are the most comprehensive databases for searching literature in various scientific topics. As a result, we and the WoS database were compared to Scopus for a "myopia" investigation within the scope of this study [10].

### Methodology

This article uses bibliometric analysis to examine publishing patterns and get insight into "Myopia Prevention" publications. SCOPUS and WoS were used to conduct a title search for "myopia prevention," with the optimal database being chosen for data gathering. The number of documents on Scopus is 924, which is significantly more than the number of papers found in the WoS database. Despite the fact that the Scopus database has no WoS authorization, it has a large number of papers and is useful for quantitative analysis [11]. As a result, under the heading "Myopia Prevention and Control,"

these data were extracted from the Scopus database. Scopus myopia prevention and health education title search produced 80 items on June 8<sup>th</sup>, 2022. There are 1128 citations in the total literature from 1970 to the present, with an average of 14.1 citations per work. As indicated in Figure 1, the number of publications of "Myopia Prevention and Control" in the field of health education has increased dramatically. The bibliometrics package (<http://www.bibliometrix.org/>), a R tool for scientific mapping, was used to evaluate the 80 documents that were chosen [12].

The major information regarding the acquired bibliometric data is summarized in Table 1. There are 80 papers in all, with 8 review papers, 63 papers, and the remainder being conference abstracts and other material. Twenty previously mentioned publications (out of a total of 80 articles) were chosen for qualitative analysis to map sub-themes in the current research field of health education prevention and control of myopia, particularly family education and school education. The next parts will give the data a title and a qualitative analysis.

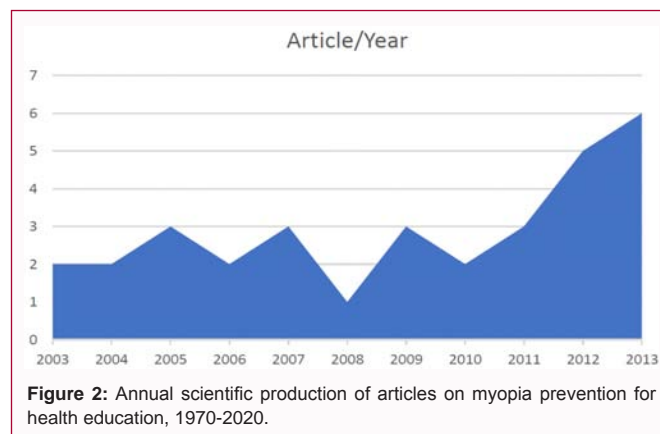
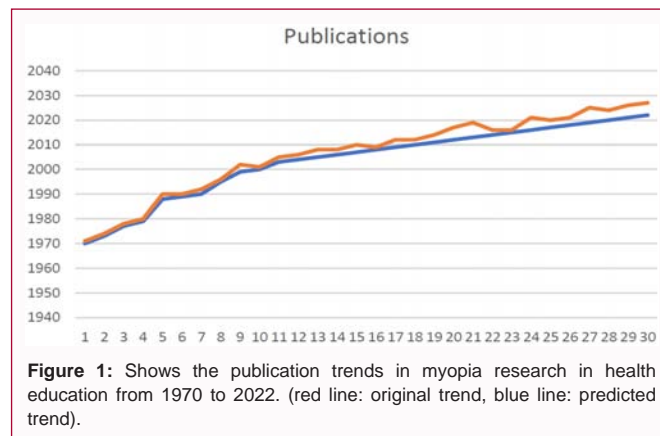
### Quantitative

#### Analysis of publication years

From 1970 through June 8<sup>th</sup>, 2020, Figure 2 depicts the annual scientific output of published publications on health education and myopia prevention. There was a total of 80 papers published during this time period, comprising 63 articles, 8 review pieces, 1 monograph, and 2 conference papers. From at least one article in 1970 to five in 2013, the number of articles published has climbed dramatically. During this time, there were two major turning points. Year after year, between 2013 and 2019, the number of publications remained

**Table 1:** It is an overview of the key facts from the bibliometric data collected.

Description	Results
Timespan	1970:2022
Sources (Journals, Books, etc.)	64
Documents	80
Average years from publication	12.5
Average citations per documents	14.1
Average citations per year per doc	1.076
References	1967
article	63
conference paper	2
editorial	1
letter	2
note	3
review	8
short survey	1
Keywords Plus (ID)	824
Author's Keywords (DE)	172
Authors	292
Author Appearances	312
Authors of single-authored documents	19
Authors of multi-authored documents	273
Single-authored documents	22
Documents per Author	0.274
Authors per Document	3.65
Co-Authors per Documents	3.9
Collaboration Index	4.71



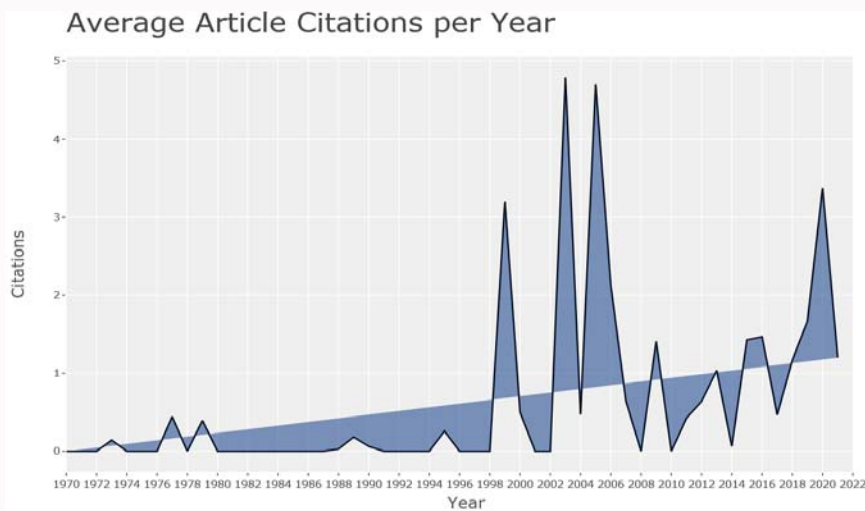


Figure 3: Average annual citations in health education in the field of myopia prevention and treatment research from 2019 to 2022.

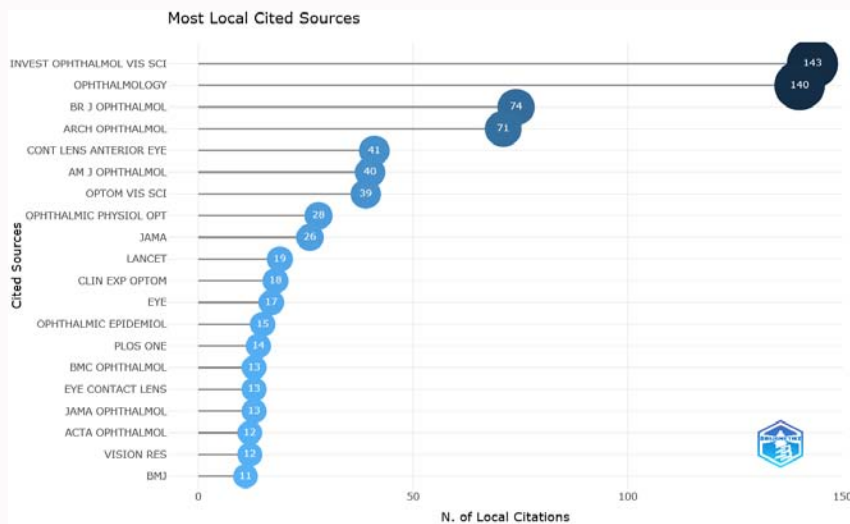


Figure 4: The 20 most cited papers in the field of health education research on myopia prevention and treatment.

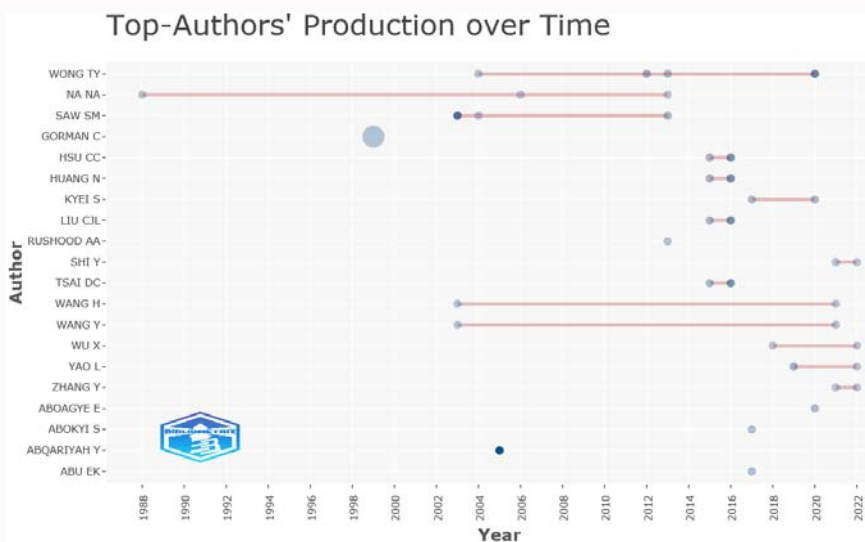


Figure 5: From 1970 to 2022, 20 writers in the field of myopia prevention research (red line: timeline of authors, bubble size: public number ions, bubble color intensity: total citations per year).

consistent. From the beginning to the present, published papers on health education and myopia prevention have showed a slow growth pattern, with more academics focused on this topic in 2013 and 2019.

Figure 3 shows the average number of citations every year from June 8<sup>th</sup>, 1970 to June 8<sup>th</sup>, 2022. According to this pattern, the highest annual average number of citations was in 2003, followed by the lowest citation rate between 2005 and 2018. Between 2020 and 2022, the citation rate increased, indicating that scholars have been paying attention to this topic in recent years.

There are 80 pieces of cited literature in this image, including articles, reviews, and conference proceedings. From 1970 through 2022, Figure 4 depicts the most cited documents. The number of records cited from the publications in the analysis set is measured by citations. The top two local citations belong Invest Ophthalmol VIS SCI and Ophthalmology, as displayed, although the majority of article citations occurred between 2002 and 2006. (Figure 3).

**Analysis of authors**

Between 1970 and 2022, a total of 80 research articles in the disciplines of myopia and health education were published. This means that a single article has 22 authors and 273 contributors. From 1970 through 2022, Figure 5 depicts the output of the most relevant authors. The author's timeline is shown in red. WANG TY wrote four articles in the subject of myopia and health education between 1970 and 2022. Among the other authors, author NA NA has the longest timeline. The size of the bubbles is proportional to the number of documents published. The number of citations every year is likewise proportional to the intensity of the bubble color. Between 2014 and 2016, a number of authors wrote highly cited publications. Among the other authors, NA NA has the longest timeline. The quantity of documents published is proportional to the size of the bubbles. The total number of citations every year is likewise proportional to the intensity of the bubble color. Between 2014 and 2018, multiple writers wrote highly cited papers. According to the graph, more researchers are studying and interested in myopia prevention.

**Analysis of source**

There are 80 sources in this category, including journals, books,

and conference program series. Figure 6 depicts the number of new sources between 1970 and 2022. The best sources of dynamics in the disciplines of myopia prevention and health education are shown in this graph. Over time, the number of journals has grown. Furthermore, after 1990, the growth of "International Eye Science" magazine halted, but after 2015, it resumed a high development trend. Despite the fact that it was not published until 1994, the "British Journal of Ophthalmology" became the second most important source of myopia prevention in 2018.

**Analysis of countries**

In the topic of study on the impact of health education on myopia prevention and treatment, there are 80 publications published in 21 countries. Figure 7 shows how the top 20 countries rank in terms of scientific output. The country with the highest number of collaborations published by authors from Chinese universities is indicated by the red line, and the country with the highest number of collaborations published by authors from Chinese universities is indicated by the blue line, where at least one foreign co-author is indicated by the blue line. Multiple Country Publications (MCPs) and Single Country Publications (SCPs) are two types of publications (SCPs). China has 24 papers, the United States has 12, and Singapore has four papers. These are the three most important countries. Without cooperation, India is the country that publishes the most papers. The authors from European countries place a greater emphasis on cooperation.

Figure 8 depicts the total number of writers associated with each publication country. The number of collaborative documents released by the world's leading countries in the fields of myopia prevention and health education is displayed. The intensity of blue in both graphs corresponds to the number of affiliated authors in each country. Each blue color represents a link between the bluest 24 authors in China and the least blue author in Spain. The most research areas for myopia prevention and health education are China and the United States. The second most productive countries are Singapore, the United Kingdom, and Australia.

The number of joint publications within each country is related to the thickness of the red line in Figure 8. Some collaboration works

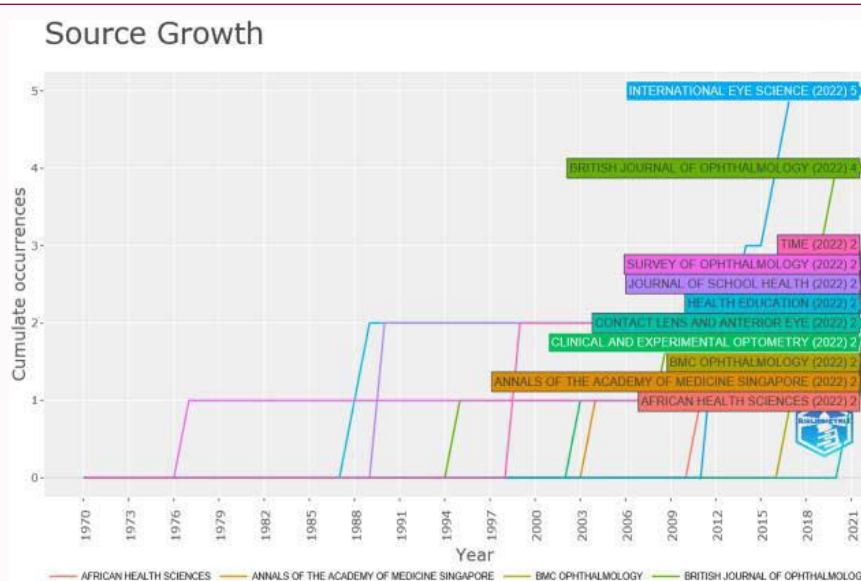


Figure 6: Shows the annual incidence of the most important health education sources for myopia prevention research from 1970 to 2022.

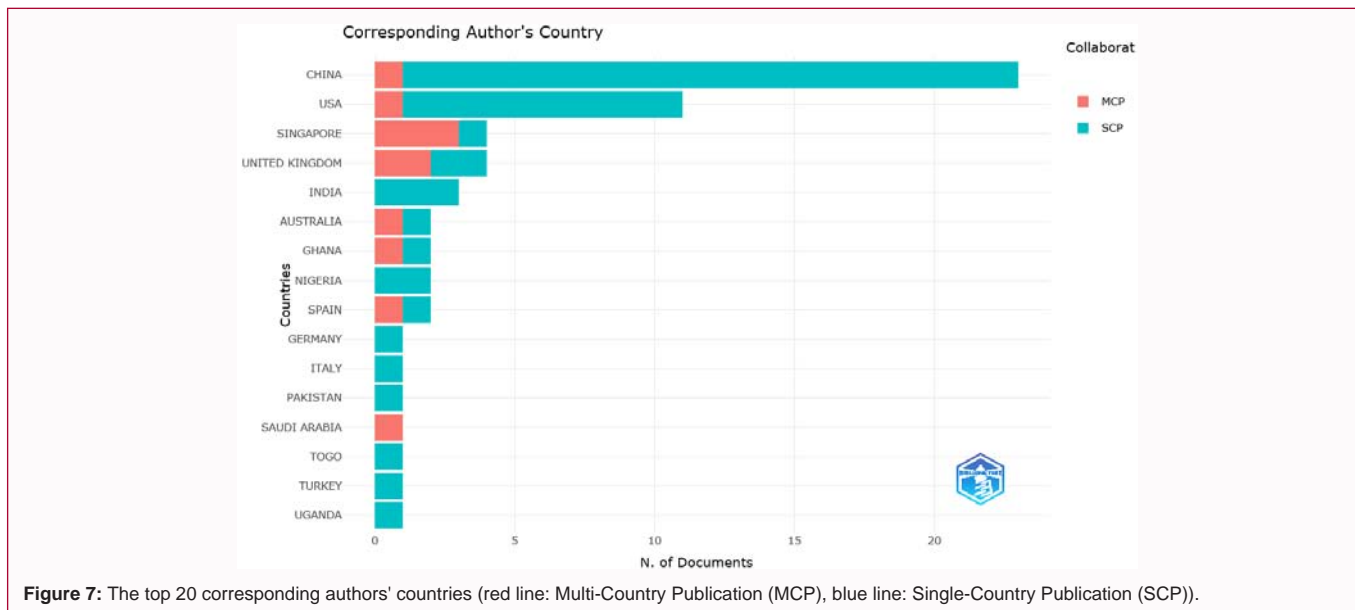


Figure 7: The top 20 corresponding authors' countries (red line: Multi-Country Publication (MCP), blue line: Single-Country Publication (SCP)).

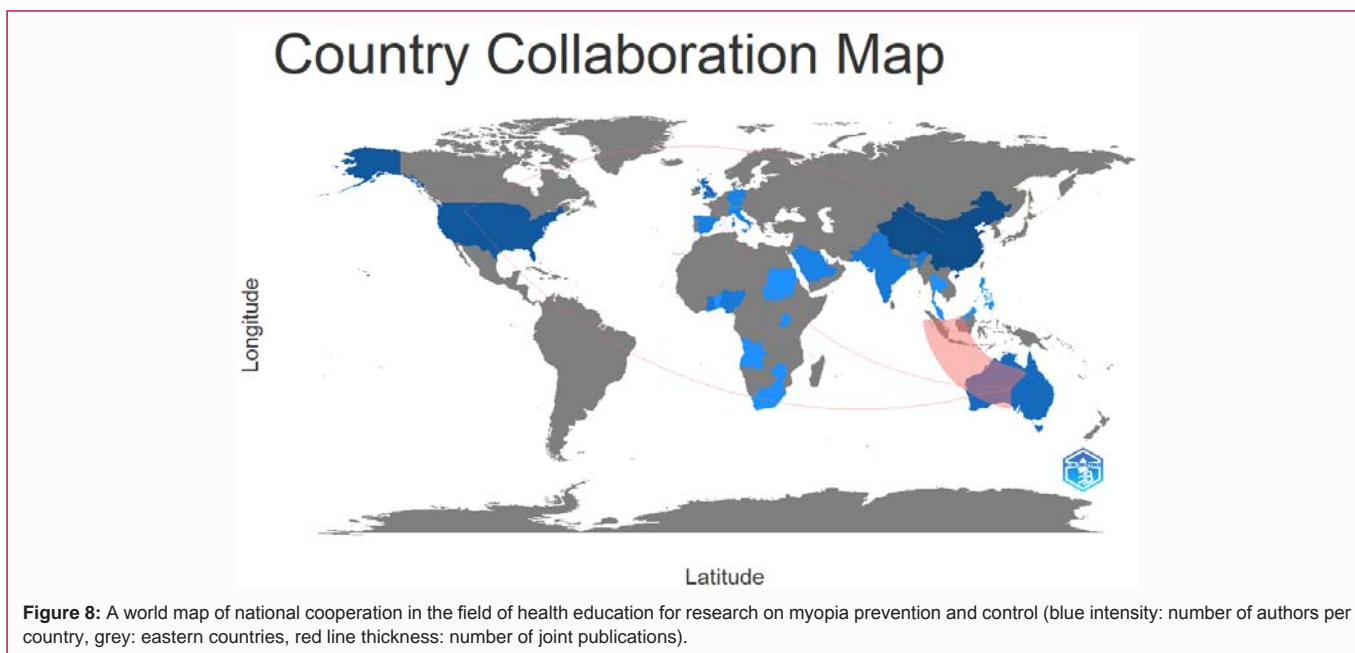


Figure 8: A world map of national cooperation in the field of health education for research on myopia prevention and control (blue intensity: number of authors per country, grey: eastern countries, red line thickness: number of joint publications).

are the thickest of each red link between countries. Between Australia and Asia, the red line has the thickest thickness. In terms of scientific productivity, as indicated in Figure 8, China and the United States are quite cooperative. Surprisingly, there are far too many shared articles in the subject of exosomes between Australia and the United Kingdom. Because there are many scientific linkages between China and other countries, China appears to be the central country for any released documents.

**Analysis of topics**

We utilized a keyword network to look at health education research subjects in myopia prevention articles. Keyword networks show how different bibliographic datasets have a lot in common. Clustering term networks can be used to highlight distinct subjects. Clustering term networks can be used to highlight distinct subjects. Each keyword is associated with a single topic. A topic map is a unique map that can represent any topic. A thematic map showing

the impact of health education on myopia prevention is shown in Figure 9. Each bubble represents a cluster of keywords in a keyword network. The single most common word is cluster name. Therefore, article, hypermetropia, glaucoma, prevalence, risk factor, myopia, visual system examination, amblyopia and health education are the most relevant theme indicators.

The size of the bubbles is proportional to the cluster word's appearance, and its position is determined by the clusters' centrality and density. In this topical myopia prevention study field, centrality and density demonstrate behavioral and thematic gains. The upper left corner of the thematic theme map contains highly developed and isolated themes, while the upper right corner contains sports themes, the lower left corner contains emerging or declining main themes, and the bottom right corner contains main and horizontal themes. Myopia, male, priority journal, questionnaire, and other keywords are represented by four clusters that appear multiple times.

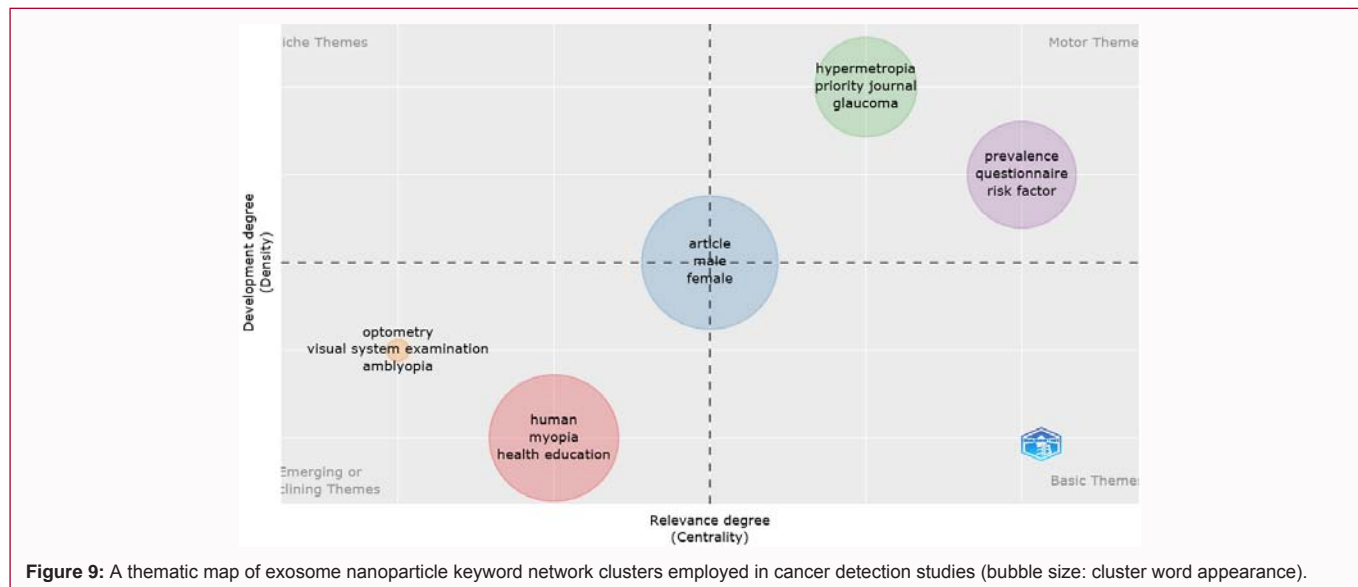


Figure 9: A thematic map of exosome nanoparticle keyword network clusters employed in cancer detection studies (bubble size: cluster word appearance).

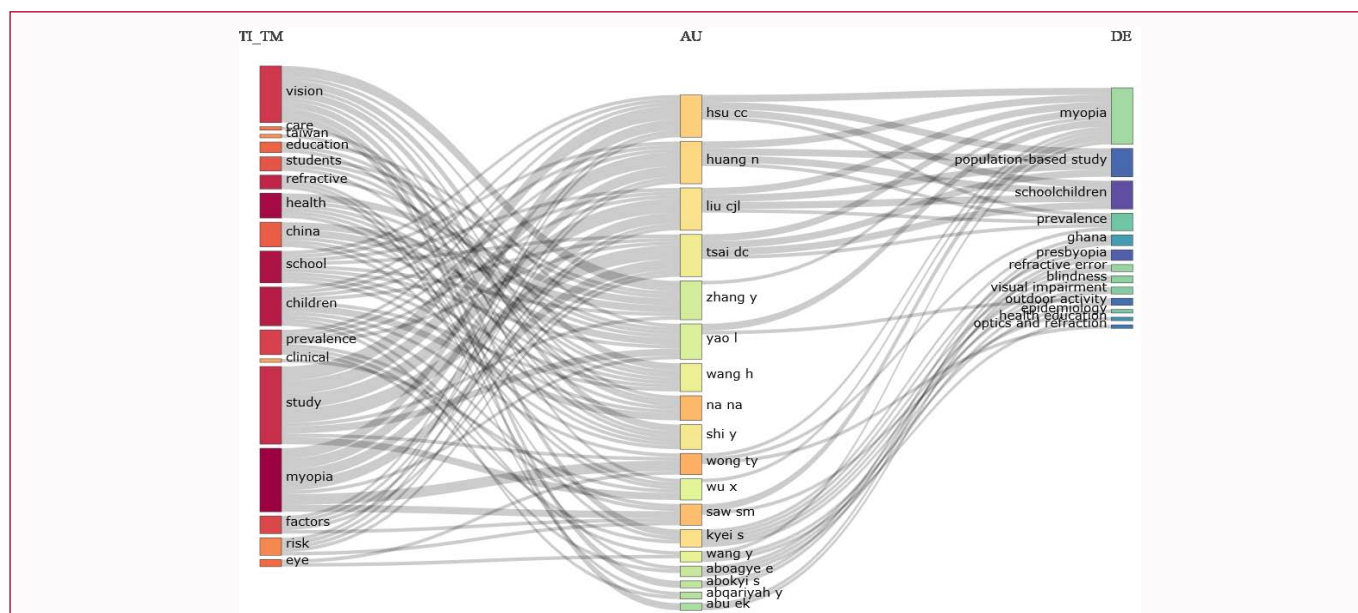


Figure 10: Top keywords (left), top authors (middle section), and top keywords (right field) for health education and myopia prevention publications are shown in Figure.

**Analysis of keywords**

A three-way diagram was developed to show the article's keywords, which included the use of health education as well as the prevention and treatment of myopia. Figures 10 and 11 illustrate that there are many of the three, with the top keywords receiving the most attention. Figure 11 is made up of three main metadata fields: The keyword is in the center, the author is on the left, and the source is on the right. Figure 10 depicts the association between top keywords, top authors, and top authors. In their papers, Hsu CC, Huang N, Liu CJL, Zhang Y, Yao I, Wang H, Na Na and Shi Y used nearly all of the top keywords.

The top relevant Keywords such as myopia, population-based study, schoolchildren, prevalence, Ghana, presbyopia, refractive error, blindness, visual impairment, outdoor activity, epidemiology, health education, optics and retraction. The top Author Keywords such as vision, care, Taiwan, education, students, refractive, health,

China, school, children, prevalence, clinical, study, myopia, factors, risk and eye.

Figure 11 was made by combining three more data fields: Author country in the center, author keywords on the left, and journal source on the right. It depicts the link between the top keys, top author countries, and top journals. Keywords are words or phrases that appear frequently in the titles of articles and are created by a machine. In Figure 11, more authors mention more keywords than in Figure 10. Top keyword analysis reflects hot research subjects in the field of myopia prevention and control, assisting readers in locating the research frontier.

Myopia-related studies have been published in journals such as BMC Ophthalmology, International Eye Science, and Annals of The Academy of Medicine Singapore, as shown in Figure 11. These publications can be found in China, Singapore, the United States, the United Kingdom, and Italy. Myopia, school children, eye disease,

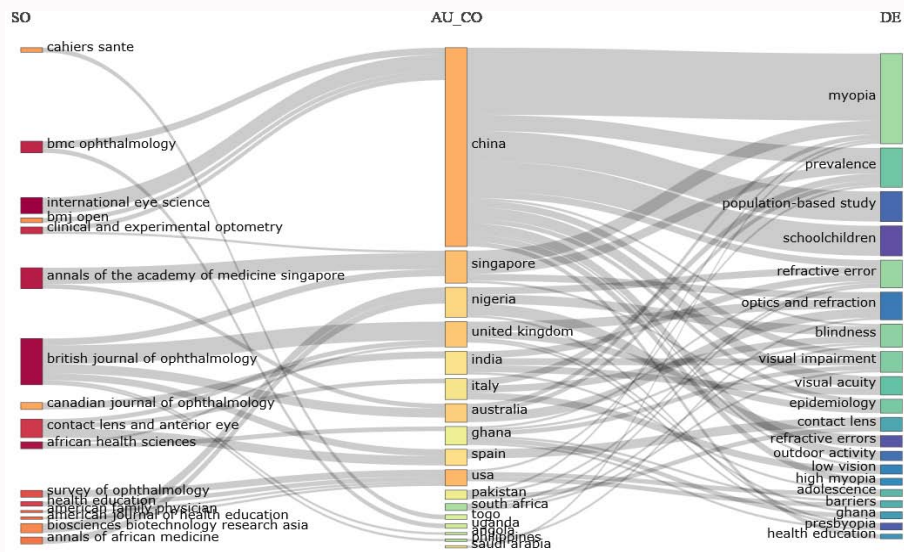


Figure 11: Three field graph title articles in health education for myopia prevention of the link between author keywords plus (right field), top author country (middle field), and top journals (right field).

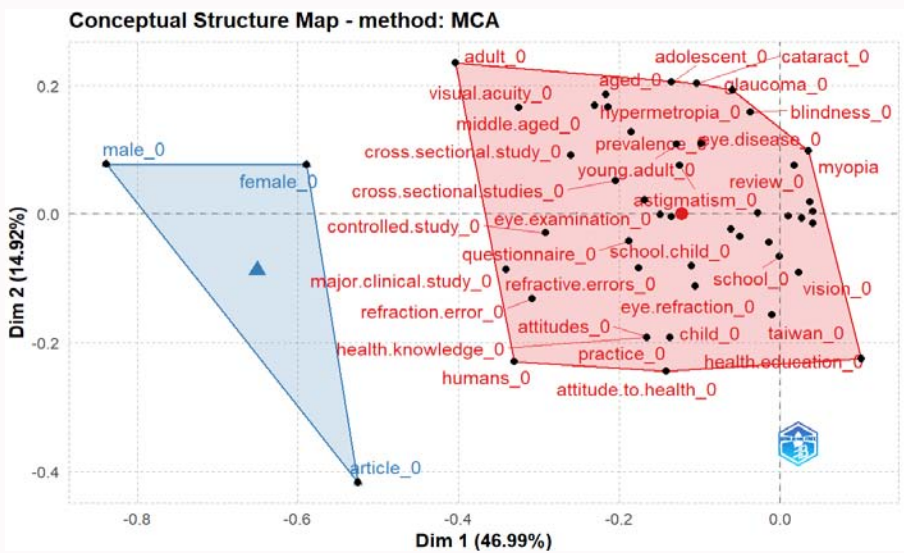


Figure 12: A conceptual model of myopia prevention and control terms found in health education materials.

excessive myopia, and teenagers were among the author keywords that were more likely to be published in the British Journal of Ophthalmology. Every major author has used it in their articles with a slew of publishers, so it's gotten a great response. Exosome research has been conducted by 80% of the top authors, and their findings have been published in journals such as Cahiers Sante, BMJ Open, and Contact Lens and Anterior Eye.

A design concept structure diagram in Figure 12 depicts the relationship between release set keywords. The average position of the articles contained in each term is represented by the two dimensions of the map, and the midpoint of the map reflects the center of research on health education for myopia prevention and control. In a conceptual structure graph, each document's words are connected by a network. This word network layout aids readers in comprehending the research field's issue and locating the research front (the most prominent new problem). Subdomains can be detected using data reduction techniques such as factorial analysis and network analysis.

The map was stitched in the building of the conceptual pillars using Correspondence Analysis (CA), a dimensionality reduction technique. The factorial method's goal is to minimize the data's dimensionality and express it in a low-dimensional space.

As shown in Figure 12, each hue indicates a collection of categories clustered word clusters. As a result, the keywords have been separated into two groups. The blue cluster consists of three Keywords and shows male, female and article. Almost all of the terms in this cluster are far apart. The red cluster, on the other hand, has 39 keywords and is more noticeable than the blue cluster. Keywords sets such as adult, visual acuity, middle-aged, cross-sectional study, eye examination, astigmatism, eye disease, myopia, hypermetropia, refractive errors, health knowledge, humans, major clinical study and so on.

Figure 13 depicts a tree map, which is another keyword with a conceptual structure diagram. The information in this image is the same as in Figure 12, but it is presented in a different way. Similarly,

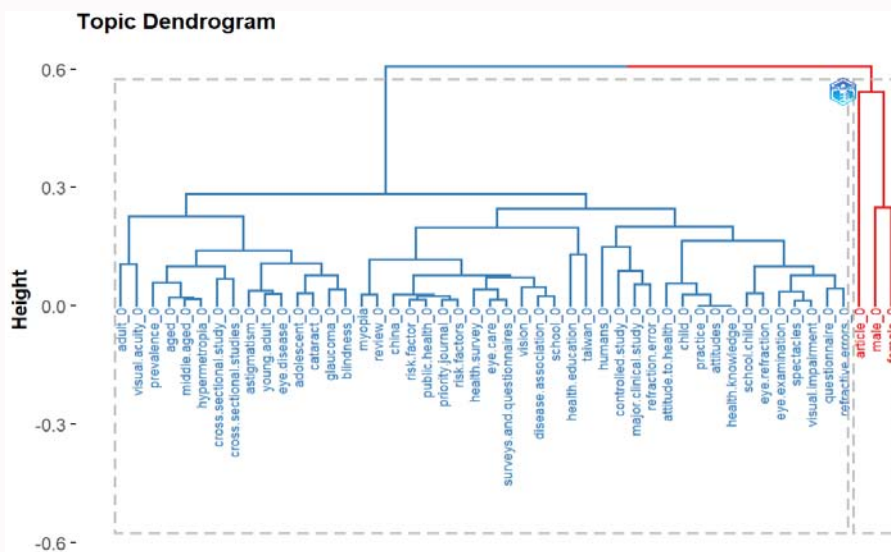


Figure 13: Concept structure tree diagram of myopia prevention and treatment in health education subject keywords.



Figure 14: A keyword cloud was created for health education on myopia prevention and control (font size: number of word occurrences).

the tree diagram of the concept structure displays two groups of terms. The distance between words or groups of words is measured by height. Each dendrogram represents a partition, with the split at the appropriate location. Distant words are keywords with distinct subjects that are rarely found in the same article.

Sometimes, a reader needs to quickly perceive the most prominent terms in his/her field of study. Word Cloud is a visual illustration of keyword metadata that instantly comments on top words. Figures 14-17 are represented by the top author's keywords, top title words, and top abstract words, respectively. The keyword plus sign is extracted from the article reference title. These words are the in-depth content of the hat to be able to reach the article. Author keywords are a list of words that match the article from the author's perspective. This analysis yielded a total of 824 keywords and 172 author keywords. While both keyword plus word and author's keywords have the same effect in terms of bibliometric knowledge exploration, author's keywords are more inclusive in terms of topic selection.

Figure 14 analysis yielded a total of 824 keywords and 172 author keywords. While both keyword plus word and author's keywords have the same effect in terms of bibliometric knowledge exploration,

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Figure 15 illustrates the authors' keywords, which include myopia, refractive error, visual impairment, blindness, prevalence, epidemiology, adolescence, visual acuity, schoolchildren, and range from 43 to at least 2 occurrences.

The most relevant keywords in the title are myopia, health, vision, study, school, factors, students, children, eye, refractive and so on, as shown in Figure 16. The top-ranked terms in the image and the finest keywords in our field of research include myopia, health, children and school.

The most common words in the abstract are myopia, refractive, eye visual, amblyopia, education, health and patients, as seen in Figure 17. In articles about health education and myopia prevention, the abstract terms at the top frequently appear. When looking at these word clouds, it's interesting that the author, title, and abstract keywords didn't follow the keyword-plus-word cloud pattern.

From 1970 to June 8<sup>th</sup>, 2022, Figure 18 depicts the number of top keywords in health education-based myopia prevention. Extracellular vesicles have been a popular research area since 1987, and by 2012,





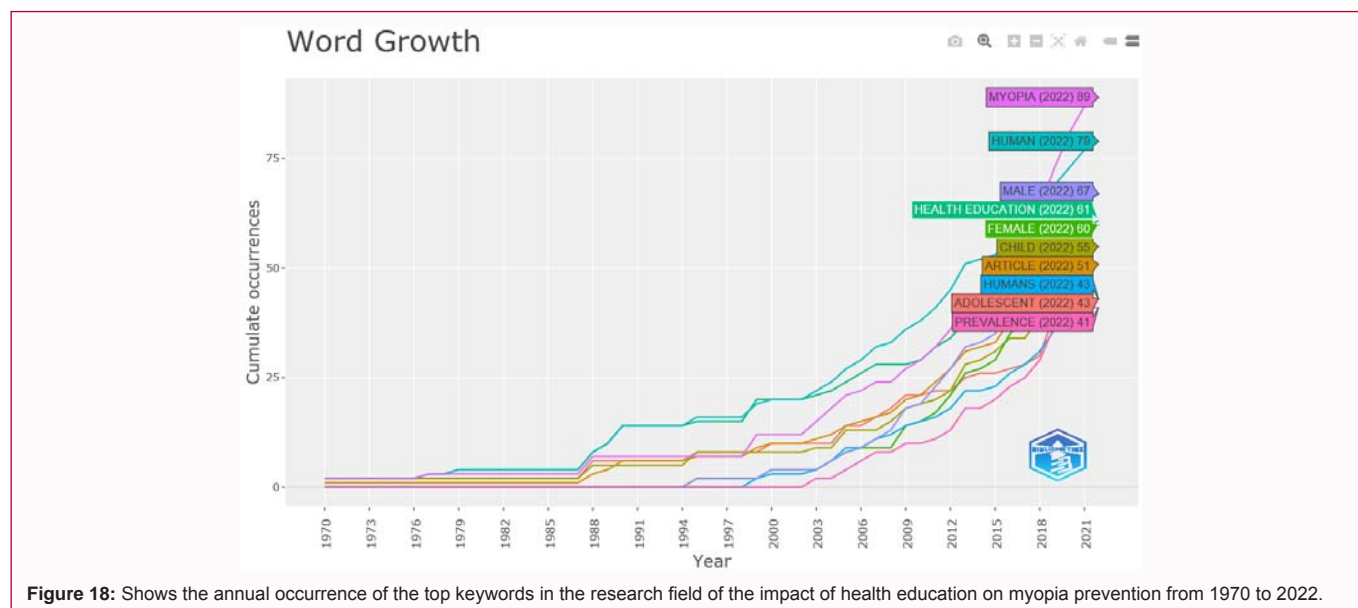


Figure 18: Shows the annual occurrence of the top keywords in the research field of the impact of health education on myopia prevention from 1970 to 2022.

### Subject

Myopia eye illness, health education, teenagers, and school children are all prominent topics in myopia prevention publications. In their case studies, every top article has mentioned or employed myopia prevention in some form. About 56.2 percent of the writers in this study focused largely on myopia and eye illness, as well as health education. Despite the fact that myopia, a common author term that has previously shown in the top keyword graph, was present in half of the cited publications.

In their case studies, every top article has mentioned or employed myopia prevention in some form. About 56.2 percent of the writers in this study focused largely on myopia and eye illness, as well as health education. Despite the fact that myopia, a common author term that has previously shown in the top keyword graph, was present in half of the cited publications [13,14].

Prevalence, which was added as the most important term, appears to be used only infrequently. School Kids and Teens are rather uncommon titles in this collection, with only a couple dedicated to them [15,16].

The writers study the causes of myopia in adolescents on a regular basis. Education on Health These highly referenced studies looked at the effects of myopia, as well as myopia prevention and juvenile myopia. In the scientific literature, there are at least 20 references to myopia prevention and control, myopia controllability, myopia impact, juvenile myopia, and myopia development [17-20]. Surprisingly, each article's goal is to combine myopia prevention and control with youth education. Some prevention and control strategies have been employed in three articles in our top collection of myopia prevention and control [21-23]. Almost every article dealing with the delivery of health education for the prevention of myopia deals with teenage myopia, making them extremely relevant [11,24,25].

### Conclusion

To evaluate academic output, bibliometric analysis employs mathematical and statistical methodologies. Although there is no research on the bibliometric analysis of "myopia prevention and control" and "health education," there are studies on the bibliometric

analysis of "myopia." This study uses Scopus data to conduct a bibliometric analysis of myopia research literature from 1970 to 2022 [12]. The findings reveal that myopia has progressed in recent years, as has the implementation of myopia-based prevention and treatment. Due to turning points in 2002 and 2022, annual publications in the fields of myopia and health education research continue to rise [26].

China, the United States, Singapore, the United Kingdom, and Australia contributed the most to these publications. In terms of paper output, China and the United States were first and second, respectively. The most relevant journals in the subject of exosome research were recognized as "International Eye Science", "British Journal of Ophthalmology" and "Time" [26-30]. Myopia and myopia prevention and control indicators are becoming more popular, whereas the prevalence of eye illnesses has decreased in recent years. Furthermore, the qualitative analysis identified myopia control and the impact of health education as the most important study topics, with the myopia surgery experiment being the most prevalent research method. The findings of this study are likely to provide a more accurate picture of future lens resection research directions as well as highlight prospective avenues for converting myopia research into clinical practice [31].

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