

Vocal Health in China: A Scoping Review of Literature (2020–2024) Utilizing Abstract-Targeted Search Strategies

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KEYWORDS

Scoping review, research trends, vocal pedagogue, vocal health education, future vocal education, music education

ABSTRACT

This scoping review examines the state of vocal health education in China between 2020 and 2024, focusing on research trends, challenges, and opportunities for improving higher education vocal programs. Utilizing abstract-targeted search strategies in the Scopus database, 23 studies were initially identified, with 20 deemed relevant after applying inclusion and exclusion criteria. The analysis highlights significant gaps in addressing vocal health within current curricula, despite its critical role in enhancing performance and preventing injuries. Key bibliometric measures—including total citations, citations per year, *h-index*, and *g-index*—were calculated to evaluate research impact. The findings reveal that most studies are concentrated in medical fields, emphasizing the need for an interdisciplinary approach to vocal health education. The COVID-19 pandemic exacerbated vocal health issues due to mask-wearing, social distancing, and increased psychological stress, underscoring the importance of preventive strategies. This review concludes that incorporating vocal anatomy, hygiene, and injury prevention into curricula can enhance vocal performance and reduce long-term risks. Recommendations include diversifying research methodologies, leveraging emerging technologies, and addressing underrepresented vocally demanding professions to achieve holistic and sustainable vocal health education in China.

INTRODUCTION

Vocal music is one of the most primal and natural forms of musical expression for humans. It not only conveys emotions and thoughts but also nurtures an individual's temperament and character (Zhao, 2018). Vocal education holds a significant place within higher music education, serving as both an artistic discipline and a humanities subject. It encompasses various domains such as sound, music, literature, history, psychology, and physiology. This comprehensive scope significantly contributes to fostering students' overall musical competence and aesthetic abilities (Jiang & Huang, 2022; Han & Wang, 2023).

In recent years, vocal music education in China has seen improvements in course content enrichment, diversification of teaching methods, and enhancement of teaching quality (Peng, 2021). However, significant challenges persist. Issues such as unclear teaching objectives, inadequate course design, limited faculty expertise, and outdated content and methods continue to hinder the effectiveness of higher vocal music education (Yao, 2021; Zhang, 2022; Ke, 2023). These persistent challenges reflect systemic gaps that impede the growth and development of vocal music students.

A particularly pressing concern is the lack of attention to vocal health within vocal music programs. Effective singing relies heavily on vocal health, yet this crucial aspect has been largely overlooked in the design and implementation of many curricula. This neglect contributes to vocal strain and injuries among students, limiting their potential and leading to long-term consequences for their vocal performance (Chen, 2020; Zhang, 2022). Studies have shown that integrating vocal health education—such as training on vocal anatomy, vocal hygiene, and injury prevention—can significantly enhance vocal performance and reduce the risk of vocal disorders (Cirocchi et al., 2019; Shekaraiah & Suresh, 2024).

The COVID-19 pandemic has further exacerbated these issues, highlighting new challenges for vocal health. Mask-wearing, social distancing, and psychological stress have impacted voice production and mental well-being (Noel et al., 2020; Zhao et al., 2022). Additionally, vocally demanding professions such as teaching and nursing have revealed the urgent need for preventive strategies and vocal health guidelines (Song & Lee, 2024; Yang et al., 2024).

Given these challenges, this scoping review aims to explore the current state of vocal health education in China, analyze the existing gaps, and propose strategies for integrating vocal health into higher vocal music programs. By addressing these issues, Chinese universities can enhance the quality and effectiveness of vocal education, better preparing students for successful and sustainable careers in vocal performance.

Literature Review

Vocal Health in China (2020–2024) Utilizing Abstract-Targeted Search Strategies

Vocal music education is undergoing significant transformation, driven by advancements in technology and evolving pedagogical approaches. As one of the most fundamental forms of human expression, vocal music not only fosters artistic skill but also plays a crucial role in developing temperament, character, and overall musical competence (Zhao, 2018; Jiang & Huang, 2022). However, despite its importance, traditional methods of vocal instruction often fall short in addressing the challenges of modern education, such as vocal health preservation, individualized learning, and integration with contemporary music styles.

The rise of digital resources, artificial intelligence (AI), and speech recognition technologies has introduced new opportunities to enhance vocal music education. These innovations support personalized learning, real-time feedback, and remote training, offering solutions to some of the longstanding challenges faced by educators and students. Additionally, there is a growing emphasis on diversified pedagogical practices to cater to different musical genres and professional demands.

This literature review explores recent studies focusing on the integration of technology, innovative teaching methods, and the role of speech recognition in vocal music education. By examining these key areas, this review aims to identify current trends, highlight critical research gaps, and suggest pathways for enhancing vocal music education in higher education contexts. The studies discussed provide insights into how technology and modern pedagogical

strategies can be leveraged to improve vocal training, preserve vocal health, and prepare students for the demands of contemporary vocal performance.

Introduction to Abstract-Only Search Techniques

Abstract-only search techniques are praised for their efficiency in narrowing down search results. According to Peters et al. (2015), abstract screening helps to quickly eliminate irrelevant studies, reducing the burden of full-text review in systematic or scoping reviews. By focusing on abstracts, researchers can rapidly assess the relevance of a study based on core elements such as objectives, methods, and key findings. This approach is particularly useful when dealing with large databases like PubMed, Scopus, and Web of Science, which often yield thousands of search results.

Moreover, Tricco et al. (2018) highlight that abstract-only searches improve the precision of literature searches by emphasizing key terms that are most likely to appear in summaries of research articles. For studies with well-defined research questions, focusing on abstracts ensures that only studies directly related to the topic are considered.

In the context of systematic and scoping reviews, abstract-only search techniques are integral to the initial stages of literature screening. Munn et al. (2018) note that in scoping reviews, which aim to map the extent and nature of research on a particular topic, abstract searches help identify the breadth of existing literature before delving into detailed full-text analyses. This strategy aligns with the framework established by Arksey and O'Malley (2005), which recommends an iterative approach to literature searching that begins with broad abstract-based screening.

Furthermore, Colquhoun et al. (2021) emphasize the importance of transparent and systematic search methods in scoping reviews, advocating for abstract-only searches as an initial filtering mechanism to manage large datasets. This method allows researchers to balance comprehensiveness with practicality, ensuring that relevant studies are identified without the need for exhaustive full-text review at the outset.

Abstract-only search techniques offer a valuable approach to efficiently identifying relevant literature in systematic and scoping reviews. They enhance the precision and manageability of the search process, particularly when dealing with large datasets. However, researchers must be aware of the limitations of this approach, including the risk of missing relevant studies due to incomplete abstracts or keyword mismatches. By employing comprehensive search strategies and best practices, abstract-only searches can serve as a powerful tool in evidence synthesis while maintaining rigor and thoroughness.

METHODS

This study adopts a scoping review methodology to explore the state of vocal health education in China between 2020 and 2024. A scoping review is an effective approach for mapping key concepts, identifying knowledge gaps, and summarizing evidence in emerging research fields (Arksey & O'Malley, 2005; Tricco et al., 2018; Mazlan et al. 2023). The review process follows the framework proposed by Arksey and O'Malley (2005) and refined by Colquhoun et al. (2021), focusing on systematically identifying and analyzing relevant studies on vocal health contexts.

Search Strategy

The literature search for this scoping review was conducted using the Scopus database, known for its extensive coverage of peer-reviewed academic articles. The search focused on studies published between 2020 and 2024, utilizing a targeted keyword combination within the abstract field. Specifically, the search string used was: *ABS(vocal AND health AND in AND China)*. To

maintain focus and ensure relevant results, several limits were applied: the language was restricted to English, and all source and document types were considered.

This abstract-targeted search strategy allowed for a streamlined identification of pertinent studies, significantly reducing the need for full-text review while maintaining rigor and relevance (Peters et al., 2015; Munn et al., 2018). The method was particularly effective for a scoping review, enabling a rapid assessment of each study's relevance based on its objectives, methodology, and findings (Tricco et al., 2018).

To refine the search results further, specific inclusion and exclusion criteria were applied (Mazlan *et al.*, 2025; Ramdan *et al.*, 2024). Studies were included if they focused on vocal health education within higher education settings in China, were published between 2020 and 2024, and were written in English. Eligible studies also needed to address topics related to vocal health, such as vocal strain, vocal hygiene, or injury prevention in educational contexts. Conversely, studies were excluded if they were non-English, unrelated to vocal health or higher education, or contained incomplete abstracts or insufficient information for proper assessment.

The initial search yielded a total of 23 articles. Each abstract was carefully screened for relevance, and the inclusion and exclusion criteria were systematically applied. As a result, 3 articles were included in the final analysis, while 20 articles were excluded due to irrelevance or incomplete information. During the data extraction process, key details from each included study were recorded, such as the authors' names, study titles, year of publication, source titles, citation metrics, and the primary research focus and findings. This systematic approach ensured a comprehensive and focused synthesis of the available literature on vocal health education in China.

Data Collection

A total of **23 articles** were initially identified through the Scopus search. After screening the abstracts for relevance and applying the inclusion/exclusion criteria, **3 articles** were included in the final analysis, while **20 articles** were excluded due to incomplete information or lack of relevance (Figure 1). The data extraction process involved systematically recording the following information for each included study:

- Authors
- Title
- Year of Publication
- Source Title
- Citations
- Research Focus and Findings

Bibliometric Measures

Bibliometric Measures: Describe the bibliometric measures used in your analysis, such as citation counts, co-citation frequencies, or bibliographic coupling. Explain how you calculated these measures and any normalization techniques used to account for differences in citation practices across fields or periods.

Data Analysis

The analysis involved partial bibliometric measures to assess research trends, citation impact, and thematic focus. The following metrics were calculated:

- Total Citations (Dhiman, 2015)
- Citations per Year (Dhiman, 2015)

- h-Index (Vrat, 2019)
- g-Index (Vrat, 2019)
- Publication Types (Gao et al. 2013)
- Subject Areas

Tools

The data analysis was conducted using bibliMagika® software (Ahmi, 2024) for generating citation metrics, tables, and figures. Trends in vocal health research were visualized through tables and charts to highlight key themes and knowledge gaps.

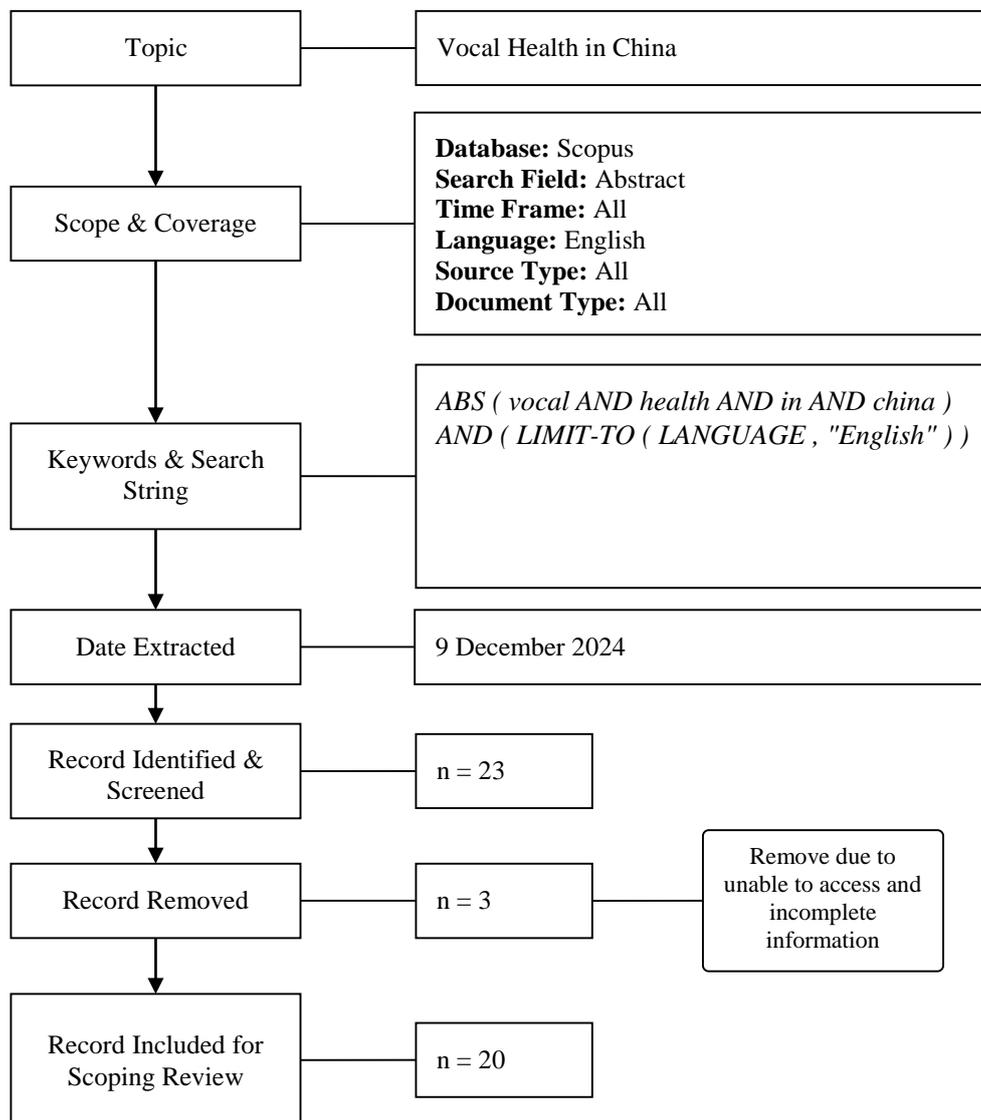


Figure 1. Flow diagram of the search strategy.
 Source: Moher *et al.* (2009), Zakaria *et al.* (2021)

RESULTS

Documents Profiles

The following section presents the bibliometric analysis of the research output, including citation metrics, document types, and source types. These insights provide an overview of the research landscape and trends for the examined dataset spanning from 1995 to 2024.

Table 1. Citation Metrics 1995-2024

Main Information	Data
Publication Years	1995 - 2024
Total Publications	20
Citable Year	30
Number of Contributing Authors	96
Number of Cited Papers	16
Total Citations	168
Citation per Paper	8.40
Citation per Cited Paper	10.50
Citation per Year	5.79
Citation per Author	1.75
Author per Paper	4.80
Citation sum within h-Core	163
h-index	8
g-index	12
m-index	0.267

Source: Generated by the author(s) using biblioMagika® (Ahmi, 2024)

Table 1 above summarizes the key citation metrics for the dataset, which includes 20 publications produced between 1995 and 2024. These publications have collectively accumulated 163 citations. The average number of citations per paper is 8.40, while the citation rate per year stands at 5.75, indicating a moderate level of scholarly impact over time. The dataset has an h-index of 8, meaning that 8 publications have been cited at least 8 times each. The g-index is 12, reflecting the distribution of citations among the most highly cited papers. The m-index, which measures the rate of growth of impactful publications, is relatively low at 0.267. These metrics suggest a consistent but modest level of research output and influence over the examined period.

Table 2. Distribution of Publications by Document Type

Document Type	Total Publications	Percentage (%)
Article	13	61.90%
Conference Paper	2	9.52%
Note	2	9.52%
Review	2	9.52%
Book	1	4.76%
Conference Review	1	4.76%
Total	20	100.00

Source: Generated by the author(s) using biblioMagika® (Ahmi, 2024)

Next, Table 2 provides a breakdown of the dataset by document type. Out of 20 total publications, the majority are journal articles (13, 61%). Conference papers, notes, and reviews each account for 2 publications (9.52%). Additionally, there is 1 book (4.76%) and 1 conference review (4.76%). The dominance of journal articles indicates a primary focus on peer-reviewed research dissemination. However, the limited number of books, reviews, and conference-related papers suggests an opportunity to diversify the types of scholarly outputs to increase the reach and comprehensiveness of the research findings.

Table 3. Distribution of Publications by Source Type

Source Type	Total Publications	Percentage (%)
Journal	18	85.71%
Book	1	4.76%
Book Series	1	4.76%
Total	20	100.00

Source: Generated by the author(s) using biblioMagika® (Ahmi, 2024)

Following with Table 3, categorizes the publications by their source type. Of the 20 publications, the majority appear in journals (18, 85.71%). Books and book series each contribute 1 publication (4.76%). The strong emphasis on journal publications reflects a focus on traditional academic dissemination channels. However, the low representation of books and book series suggests that the research output could benefit from broader dissemination through more comprehensive and thematic publications. This diversification may enhance the visibility and impact of the research within and beyond the academic community.

Table 4. Distribution of Publications by Subject Area

Subject Area	Total Publications	Percentage (%)
Medicine	13	61.90%
Health Professions	4	19.05%
Nursing	4	19.05%
Psychology	4	19.05%
Social Sciences	3	14.29%
Biochemistry, Genetics and Molecular Biology	2	9.52%
Engineering	2	9.52%
Arts and Humanities	1	4.76%
Earth and Planetary Sciences	1	4.76%
Energy	1	4.76%
Environmental Science	1	4.76%
Immunology and Microbiology	1	4.76%
Neuroscience	1	4.76%
Pharmacology, Toxicology and Pharmaceutics	1	4.76%

Source: Generated by the author(s) using biblioMagika® (Ahmi, 2024)

As illustrated in Table 4 above, categorizes the 20 publications into various subject areas, providing insight into the disciplinary focus of the research. Most publications fall within the

field of Medicine (13 publications, 61.90%). Additionally, Health Professions, Nursing, and Psychology each account for 4 publications (19.05%). The remaining subject areas are diverse, with contributions to fields such as Social Sciences (3 publications, 14.29%) and Biochemistry, Genetics, and Molecular Biology (2 publications, 9.52%). Other disciplines, including Engineering, Arts and Humanities, and various branches of science like Immunology, Environmental Science, and Pharmacology, each have 1 publication (4.76%).

The concentration of research in Medicine highlights a strong emphasis on healthcare-related topics, reflecting the primary focus of the dataset. The significant representation of Health Professions, Nursing, and Psychology suggests an interdisciplinary approach to health and well-being. However, the limited representation in other fields, such as Engineering, Environmental Science, and Pharmacology, indicates potential areas for expanding research focus. Diversifying subject areas could enhance the breadth of the research impact and facilitate interdisciplinary collaborations.

Highly Cited Documents

The analysis of the 20 publications, as illustrated in Table 5 below, reveals significant insights into the citation performance, research trends, and the thematic focus of the dataset spanning from 1995 to 2024. The articles address a variety of topics related to vocal health, laryngeal evaluations, mental health, and voice-related occupational challenges. The distribution of citations underscores the impact of clinical studies, the influence of the COVID-19 pandemic, and emerging trends in vocal health research.

The most highly cited publication is authored by Cirocchi et al. (2019) and titled “Intraoperative Neuromonitoring versus Visual Nerve Identification for Prevention of Recurrent Laryngeal Nerve Injury in Adults Undergoing Thyroid Surgery.” Published in the Cochrane Database of Systematic Reviews, this article has accumulated 33 citations with an average citation rate of 5.50 per year. This high citation count reflects the importance of preventing laryngeal nerve injuries during thyroid surgery, a critical concern in clinical practice.

Another influential study by Noel et al. (2020), titled “Laryngeal Evaluation during the COVID-19 Pandemic: Transcervical Laryngeal Ultrasonography,” has garnered 28 citations with an impressive citation rate of 5.60 per year. This research, published in *Otolaryngology - Head and Neck Surgery*, highlights the adaptations required in laryngeal evaluations during the pandemic, underscoring the relevance of non-invasive techniques in protecting healthcare workers and patients.

A noteworthy recent contribution is the 2024 systematic review by Shekaraiah and Suresh, titled “Effect of Face Mask on Voice Production During COVID-19 Pandemic.” Despite being published only in 2024 in the *Journal of Voice*, it has already achieved 26 citations, demonstrating a remarkable citation rate of 26.00 per year. This study addresses the widespread concern of how mask-wearing impacts voice production, reflecting a critical intersection between public health measures and vocal health.

Several other studies also focus on the effects of the COVID-19 pandemic. For example, Zhang et al. (2021), in the *Journal of Endocrinological Investigation*, explore thyroid surgery during different phases of the pandemic, accumulating 18 citations with a citation rate of 4.50 per year. These pandemic-related studies highlight the adaptability and challenges faced by medical professionals and patients during unprecedented times.

The dataset also includes research on the use of vocal acoustic features as biomarkers for mental health diagnoses. Zhao et al. (2022), in *Frontiers in Psychiatry*, discuss the potential of vocal biomarkers for diagnosing depression, earning 14 citations and a citation rate of 4.67

per year. This study underscores the growing interest in integrating vocal health and psychological assessments for mental health diagnostics.

At the lower end of the citation spectrum are several recent publications from 2024. For instance, Jiang et al. (2024) explored interdisciplinary competency in voice performance in *Journal of Voice*, while Zeng et al. (2024) examined knowledge and practices regarding voice disorders after thyroid surgery. These studies have yet to accumulate citations, likely due to their recent publication dates.

Additionally, older studies, such as Johnson and Turnbull (1995), which focused on women’s conferences, show minimal citation activity (4 citations, 0.13 per year). This suggests that while historical context is valuable, research impact tends to wane over time or may reflect niche interest areas.

In summary, the citation analysis reveals that clinical research, COVID-19-related studies, and interdisciplinary approaches to vocal health dominate the most cited publications. The diverse thematic focus reflects a broad interest in vocal health from both clinical and psychological perspectives. Recent research shows promise for future impact, particularly studies addressing contemporary issues in vocal health and public health. Expanding research dissemination and collaboration across disciplines may further enhance the visibility and citation impact of these studies.

Table 5. Overview of Top-Cited Publications and Citation Performance

No.	Authors	Title	Source Title	Cites	Cites per Year
1	Cirocchi R.; Arezzo A.; D'Andrea V.; Abraha I.; Popivanov G.I.; Avenia N.; Gerardi C.; Henry B.M.; Randolph J.; Barczyński M. (2019)	Intraoperative neuromonitoring versus visual nerve identification for prevention of recurrent laryngeal nerve injury in adults undergoing thyroid surgery	Cochrane Database of Systematic Reviews	33	5.50
2	Noel J.E.; Orloff L.A.; Sung K. (2020)	Laryngeal Evaluation during the COVID-19 Pandemic: Transcervical Laryngeal Ultrasonography	Otolaryngology - Head and Neck Surgery (United States)	28	5.60
3	Shekaraiah S.; Suresh K. (2024)	Effect of Face Mask on Voice Production During COVID-19 Pandemic: A Systematic Review	Journal of Voice	26	26.00
4	Zhang D.; Fu Y.; Zhou L.; Liang N.; Wang T.; Del Rio P.; Rausei S.;	Thyroid surgery during coronavirus-19 pandemic phases I, II and III: lessons learned in China, South Korea, Iran and Italy	Journal of Endocrinological Investigation	18	4.50

No.	Authors	Title	Source Title	Cites	Cites per Year
	Boni L.; Park D.; Jafari J.; Kargar S.; Kim H.Y.; Tanda M.L.; Dionigi G.; Sun H. (2021)				
5	Zhao Q.; Fan H.-Z.; Li Y.-L.; Liu L.; Wu Y.-X.; Zhao Y.-L.; Tian Z.-X.; Wang Z.-R.; Tan Y.-L.; Tan S.-P. (2022)	Vocal Acoustic Features as Potential Biomarkers for Identifying/Diagnosing Depression: A Cross-Sectional Study	Frontiers in Psychiatry	14	4.67
6	Robertson M.M.; Eapen V.; Rizzo R.; Stern J.S.; Hartmann A.; Müller-Vahl K.R.; Cavanna A. (2020)	Gilles de la tourette syndrome: Advice in the times of COVID-19	F1000Research	11	2.20
7	Vogel E.F. (2005)	Chen Yun: His life	Journal of Contemporary China	11	0.55
8	Zhang Y.; Lu Y.; Jin Y.; Wang Y. (2021)	Individualizing mental health responsibilities on Sina Weibo: a content analysis of depression framing by media organizations and mental health institutions	Journal of Communication in Healthcare	10	2.50
9	Johnson J.H.; Turnbull W. (1995)	The women's conference: Where aspirations and realities met	Family Planning Perspectives	4	0.13
10	Sun H. (2020)	Psychology of adolescents' preference for E&A vocal music and its influencing factors	Revista Argentina de Clinica Psicologica	3	0.60
11	Wang D. (2021)	Sensibility and rationality in vocal music: The issue of intonation; [Sensibilidad e	Musica Hodie	3	0.75

No.	Authors	Title	Source Title	Cites	Cites per Year
		racionalidade na música vocal: A questão da entonação]			
12	Chen S. (2020)	Intervention effect of music education on mental health of college students	Revista Argentina de Clinica Psicologica	2	0.40
13	Touzel P. (2012)	Managing environmental and social risks in China's unconventional gas sector-lessons learned and application in future developments	Society of Petroleum Engineers - SPE/APPEA Int. Conference on Health, Safety and Environment in Oil and Gas Exploration and Production 2012: Protecting People and the Environment - Evolving Challenges	2	0.15
14	Song Z.; Lee P.-J. (2024)	Voice use of nurses working in the intensive care unit during the COVID-19 pandemic	Intensive and Critical Care Nursing	1	1.00
15	Zhang W.; Wang X.; Yang K.; Zhang A.; Yu L.; Jiang Z.; Hong X.; Lei T.; Cui Y. (2024)	Psychometric Properties of the MOVES Scale for Tourette Syndrome and Comorbidities in a Chinese Cultural Context	Child Psychiatry and Human Development	1	1.00
16	Yang Y.; Tan X.; Gao J.; Liu Z. (2024)	Vocal fatigue of kindergarten teachers in China and its influential factors: a chain mediating model	European Early Childhood Education Research Journal	1	1.00
17	Jiang H.; Cheong K.W.; Wang H.; Wu W.; Wang Y. (2024)	Developing Interdisciplinary Competency in Voice Performance: A Phenomenological Study of Higher Education in China	Journal of Voice	0	0.00
18	Zeng Q.; Fu Y.; Yang J.; Yang H.; Ma	Knowledge, Attitudes, and Practices Regarding Voice Disorders After Thyroid	Journal of Voice	0	0.00

No.	Authors	Title	Source Title	Cites	Cites per Year
	T.; Pan Z.; Peng Y.; Zuo J.; Gong Y.; Lu D. (2024)	Surgery: A Cross-Sectional Study Among Patients in Southwestern Mainland China			
19	Watson P. (2012)	Health care reform and globalisation: The US, China and Europe in comparative perspective	Health Care Reform and Globalisation: The US, China and Europe in Comparative Perspective	0	0.00
20	Zhang X.; Song Y.-C.; Yang D.-G.; Liu H.-W.; Liu S.-H.; Li X.-B.; Li J.-J. (2022)	The Effect of Vocal Intonation Therapy on Vocal Dysfunction in Patients With Cervical Spinal Cord Injury: A Randomized Control Trial	Frontiers in Neuroscience	0	0.00

Source: Generated by the author(s) using biblioMagika® (Ahmi, 2024)

DISCUSSION

The analysis of the dataset provides significant insights into the scope, impact, and thematic distribution of the research on vocal health and related fields. The findings can be categorized into several key areas, including publication trends, topical focus, and the implications of the research landscape.

Publication Trends and Impact

The dataset spans a wide range of years, with research articles published between 2012 and 2024. Most of these publications are recent, reflecting a growing interest in vocal health, particularly during and after the COVID-19 pandemic. Several high-impact articles have addressed critical challenges posed by the pandemic, such as the effects of face masks on voice production and the adaptations needed in clinical practice. For instance, the review by Shekaraiah and Suresh (2024) on face mask effects in the *Journal of Voice* highlights how pandemic-related constraints have directly influenced vocal health research. The analysis also shows that many of the articles are published in well-respected, peer-reviewed journals such as the *Cochrane Database of Systematic Reviews*, *Frontiers in Psychiatry*, and *Journal of Voice*. These journals are known for their rigorous standards and broad readership, indicating that the research is reaching a substantial audience and contributing to clinical practice, mental health, and public health policy.

Thematic Distribution

The interconnected themes in vocal health research are illustrated in the Figure 2 below, highlighting the relationships between Clinical Interventions, COVID-19 and Mental Health Impacts, and Occupational Vocal Health.

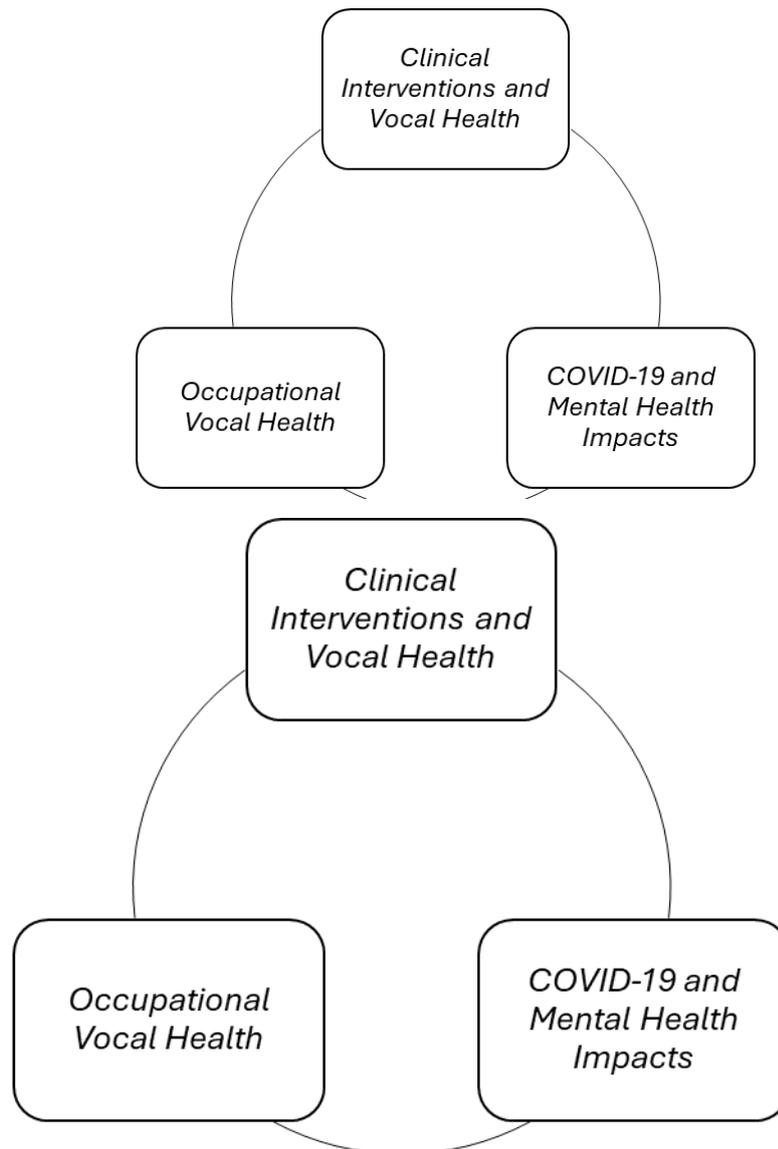


Figure 2. Interconnected Themes in Vocal Health Research

Clinical Interventions and Vocal Health

Clinical research focuses on improving surgical outcomes and preventing vocal cord damage during procedures such as thyroid surgeries. For instance, Cirocchi et al. (2019) emphasize the importance of intraoperative neuromonitoring to minimize the risk of recurrent laryngeal nerve injuries. These interventions serve as critical safeguards for maintaining vocal health during medical treatments, setting the foundation for effective clinical practices.

COVID-19 and Mental Health Impacts

The COVID-19 pandemic has introduced significant challenges to vocal health, both directly and indirectly. Public health measures like mask-wearing, social distancing, and adaptations in clinical evaluations have affected vocal function and healthcare practices. Studies such as Noel et al. (2020) highlight the need for non-invasive laryngeal evaluation techniques during the pandemic. At the same time, the pandemic's psychological toll has amplified the relevance of

vocal biomarkers for diagnosing mental health conditions. For example, Zhao et al. (2022) demonstrate how vocal acoustic features can be used to identify depression. These intertwined factors suggest that pandemic-related changes not only influence physical vocal health but also intersect with mental well-being, highlighting the need for integrated approaches to address these combined challenges.

Occupational Vocal Health

Professionals such as nurses, teachers, and call centre workers face heightened risks of vocal strain, which were exacerbated during the pandemic. Research by Song and Lee (2024) and Yang et al. (2024) underscores the importance of protecting vocal health in vocally demanding professions. These findings emphasize the need for interventions, guidelines, and support systems to prevent long-term vocal damage and related mental health issues. Ensuring occupational vocal health contributes to overall well-being and helps mitigate the psychological and physical challenges associated with professional voice use.

Research Gaps and Opportunities

Despite the breadth of topics covered in the current literature, there are notable gaps that highlight opportunities for further research and advancement in the field of vocal health. One significant gap is the **lack of longitudinal studies**. Most existing research relies on cross-sectional data, providing only a snapshot of vocal health at a specific moment in time. This approach does not offer insights into how vocal health issues evolve or resolve over extended periods. As a result, there is a pressing need for longitudinal studies to understand the long-term impacts of interventions, vocal strain, and other factors on vocal health outcomes.

Another important gap is the **under-representation of certain populations**. Much of the existing research focuses on specific groups, such as healthcare workers and educators, while other vocally demanding professions, like call center workers and performers, remain underexplored. Additionally, there is limited research on vocal health among diverse populations, such as children, the elderly, and individuals in non-clinical settings. Expanding research to include these groups would provide a more comprehensive understanding of the various challenges and risks associated with vocal health.

The integration of **emerging technologies** in vocal health research is another area that remains underdeveloped. While some studies explore AI-based vocal analysis and other innovations, these technologies are not yet widely adopted in clinical practice. There is potential for leveraging artificial intelligence, machine learning, and wearable technologies to enhance real-time monitoring, diagnosis, and treatment of vocal disorders. Further research is needed to explore how these technologies can be effectively integrated into clinical and everyday settings.

In addition, the field would benefit from more **interdisciplinary approaches**. Currently, research on vocal health tends to be siloed within specific disciplines, such as clinical medicine or psychology. Combining insights from multiple fields, including speech-language pathology, technology, and mental health, could lead to more holistic and innovative solutions for managing and improving vocal health. Interdisciplinary collaboration can help bridge the gaps between theory, practice, and technology.

Finally, there is a need to address the **cultural and regional variations** in vocal health research. Most studies are conducted in Western contexts, and there is limited exploration of how cultural differences influence vocal health practices and perceptions. Comparative studies across different regions and cultures could inform more culturally sensitive and effective approaches to vocal health education and intervention.

Implications for Future Research

Future research should focus on expanding longitudinal studies to capture the long-term effects of vocal health interventions and challenges. Efforts should also be made to include a wider range of populations, such as performers, call center workers, children, and the elderly, to create a more inclusive understanding of vocal health. Additionally, integrating emerging technologies, such as AI and wearable devices, into research and practice could revolutionize the way vocal health is monitored and treated. Encouraging interdisciplinary collaboration will be crucial for developing comprehensive solutions that address the multifaceted nature of vocal health. By addressing these gaps, future research can significantly enhance clinical practice, public health policy, and overall vocal health outcomes.

CONCLUSION

This scoping review highlights the interconnected themes within vocal health research, including clinical interventions, COVID-19 and mental health impacts, and occupational vocal health. Clinical interventions, such as intraoperative neuromonitoring during thyroid surgeries, are essential for preventing vocal cord damage and preserving vocal function. The challenges posed by the COVID-19 pandemic, such as mask-wearing and social distancing, have had significant effects on vocal health and have intersected with mental health concerns. Studies exploring vocal biomarkers for diagnosing mental health conditions like depression illustrate the growing need to integrate psychological and vocal health considerations.

Occupational vocal health remains a critical concern, particularly for professionals such as nurses, teachers, and call centre workers, who face an elevated risk of vocal strain. Protecting vocal health in these settings is crucial not only for preventing injury but also for supporting overall mental well-being and professional performance. This review identifies key research gaps, including the lack of longitudinal studies, the need to include under-represented populations, and the potential for leveraging emerging technologies like AI-based vocal analysis. Addressing these gaps through interdisciplinary research will be essential for developing comprehensive strategies that bridge clinical, psychological, and occupational aspects of vocal health.

In summary, this scoping review underscores the importance of a holistic approach to vocal health that integrates clinical practice, mental health, and occupational considerations. By addressing existing research gaps and fostering interdisciplinary collaboration, future research can enhance vocal health outcomes and improve quality of life for individuals who rely heavily on their voices.

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Not applicable

CONSENT TO PARTICIPATE

Not applicable

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GX contributed to the conceptualization and design of the study, data collection, and initial draft writing.

CANM contributed to the analysis, interpretation of results, and manuscript revision. He also provided critical feedback and acted as the corresponding author.

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During the preparation of this work the author(s) used ChatGPT in order to do the paraphrasing and some data interpretation. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.