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RESEARCH ARTICLE

Bibliometric Analysis on Ethic Consideration in Academic Publishing Based on WoS Core Collection

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ABSTRACT

With investigating the impact on scholarly communication, this study focuses on the evolution of ethical considerations from 2006 to 2024 in academic publishing. Utilizing a dataset of 9,322 articles indexed in the Web of Science Core Collection, bibliometric techniques, text analysis, and visualization tools were employed to identify global trends of publishing ethics. This study, grounded in the Global Tri-Dimensional Model of Publishing Ethics Evolution, explores three interconnected dimensions: Platform Governance (analyzing publishers' roles in upholding ethical standards), Ethical Theme Evolution (monitoring the emergence and evolution of ethical issues over time), and Geographic Distribution (charting global trends and regional contributions). Study results stated that the evolution of academic publishing ethics is divided into four distinct stages: the Awareness Phase (2006–2009), defined by the initial recognition of ethical issues; the Deepening and Development Phase (2010–2015), marked by the formalization of guidelines; the Diversification and Global Collaboration Phase (2016–2020), emphasizing expanded ethical considerations and cross-regional collaboration; and the Integration and Innovation Phase (2021–2024), characterized by the incorporation of innovative practices and technologies. The study emphasizes the necessity of transparent dissemination practices, cross-regional cooperation, and institutional accountability to promote ethical and responsible academic publishing. It offers practical recommendations for publishers to tackle new challenges, embrace technological advancements, and strengthen the central role of ethics considerations in safeguarding the integrity and transparency of the global academic publishing landscape in scholarly communication.

1 | Introduction

From 2006 to 2024, ethical considerations in academic publishing were increasingly significant, highlighting their essential role in influencing global scholarly communication. As a sign of increased focus on ethical governance, the academic community saw a spike

in ethics-related papers listed in the Web of Science (WoS) Core Collection in 2006.The mid-2000s saw the emergence of transformational Web 2.0 technologies, which facilitated interactive platforms and improved cross-regional collaboration. Policies such as the Singapore Statement on Research Integrity (2010) and the NIH Public Access Policy (2008) have institutionalized ideas of accountability and ethical governance internationally [1-2]. Subsequent milestones, such as Plan S (2018) and the EU's Open Science Guidelines (2016), expedited the global shift towards open access and data transparency, integrating ethical standards into the core of academic publishing [3-4]. New technologies like blockchain-based verification and AI-assisted peer review systems provide potential as well as obstacles by the early 2020s. UNESCO Recommendation on Open Science (2021) stressed equal access, inclusivity, and global collaboration to appropriately handle these breakthroughs [5-6]. These developments, which span 2006 to 2024, indicate the growing status of ethical considerations in academic publishing. As digital technology and global networks continue to advance, the emphasis placed on equity and accountability has been a driving force behind the establishment of ethics as a fundamental component of contemporary scholarly communication.

The themes of ethical considerations in academic publishing, encompassing old issues such as plagiarism and data fabrication as well as emergent ones like AI-generated material and open data privacy, indicate a significant shift in the goals of scholarly communication. This trend underscores the growing intricacy of upholding transparency, institutional responsibility, and confidence in academic publishing. The introduction of digital platforms like Elsevier's ScienceDirect in 2006 represented a substantial advancement in tackling accessibility and data-sharing issues in the digital age. This platform demonstrated the significance of transparent dissemination techniques by offering seamless access to an extensive archive of scholarly work in an increasingly digital academic environment. The focus on intellectual property rights was further strengthened by worldwide initiatives like the Digital Millennium Copyright Act (DMCA) and the development of frameworks that ensure adherence to open-access and copyright norms [7]. These events highlighted the ethical challenges of balancing accessibility and author rights. Recent technological breakthroughs have presented new ethical issues and opportunities. The Springer Nature Blockchain Pilot Project (2023) addressed reproducibility issues and strengthened study outcomes by using blockchain technology to verify data [8]. The emergence of AI-generated content has ignited worldwide discussions on authorship and transparency, leading to initiatives such as COPE's 2023 AI and Publication Ethics guidance, which mandates complete disclosure of AI participation in academic manuscripts [9]. The incorporation of new technology, such as AI tools like ChatGPT and blockchain systems, presents unprecedented prospects for innovation, while also creating issues in data authenticity, authorship conflicts, and peer review transparency. These advancements require the ongoing modification of ethical frameworks to ensure institutional responsibility and promote a fair, transparent, and reliable academic publishing environment.

Mitigating geographic and cultural gaps in ethical practices is essential for advancing fairness and inclusivity in academic publication, thus fostering a more diversified and globalized framework of scholarly communication. The 2009 Toronto International Data Release Workshop created a core framework for institutional accountability by advocating for swift and open access to genetic data from publicly funded research, thus establishing an early standard for transparent dissemination methods [10]. Recent initiatives, including Plan S (2018), have successfully tackled accessibility concerns by requiring that publicly financed research be made openly accessible via open-access rules. This project, spearheaded by European organizations, has enhanced regional collaboration and promoted equitable information dissemination through the implementation of open-access principles [11]. Ethical considerations are crucial in addressing public health emergencies, environmental sustainability, and social justice, et al. Throughout the COVID-19 pandemic, journals like The Lancet adopted accelerated yet stringent peer-review processes to ensure the prompt dissemination of essential data, therefore reconciling research urgency with ethical standards [12]. The historical milestones underscore the evolving ethical considerations in academic publication, illustrating that transparent dissemination techniques, institutional responsibility, and adaptive governance frameworks are vital for maintaining confidence and integrity in scholarly communication. The importance of ethical principles in managing the intricacies of a swiftly changing global research environment is highlighted.

Advancing and harmonizing ethical norms depends much on strengthened cross-regional cooperation, which also promotes shared responsibility and confidence among many stakeholders in academic communication. Supported by organizations like UNESCO, initiatives as the African Publishing Ethics Program (2023) have given vital tools and training to improve ethical governance in publications throughout underdeveloped areas, therefore filling in institutional accountability [13-14]. Officially launched in 2018 to enable ethical data exchange and cooperation among academics all throughout Europe, the European Open Science Cloud (EOSC) Following EU values of ethical governance in academic publishing, the platform offered an infrastructure for open access to research outputs and transparent dissemination methods. With the Budapest Open Access Initiative in 2006, which set the foundation for worldwide norms in transparent dissemination [15-16], debates on open access and cross-regional cooperation acquired great impetus. These initiatives show the transforming power of group action in creating fair and inclusive environments for academic discussion.

Technologies addressing ethical issues in academic publishing have grown consistently toward higher openness, responsibility, and data integrity. Early 2000s developments in plagiarism detection tools include iThenticate and CrossCheck program of CrossRef automated the identification of academic misconduct and standardized editorial procedures. By letting academics share datasets, open data repositories like Figshare in 2011 made it clear how important it is to share information [17]. While blockchain technology provides the immutable way to verify study validity, AI-driven solutions such as Paperpal have transformed peer review by pointing up ethical issues including conflicts of interest and authorship disputes. These developments highlight how important

technology is to maintain moral standards and guarantee the integrity of scholarly communication in a publishing climate growing increasingly challenging by nature.

Breakthroughs in technology innovation, institutional governance, financial support, and editorial policy changes since 2006 have driven significant changes in academic communication, hence advancing the Global Tri-Dimensional Model of Publishing Ethics Evolution. The model gives a full and organized way to understand how hard it is to write in an ethical way. It focuses on three important areas: controlling the platform, coming up with ethical topics, and distributing the work geographically. We can see how moral issues have changed over time and in different places through it. In addition, The model examines how the ethical issues evolve as society and technology change, ensuring that academic writing stays up to date with new issues. The platform control factor makes a point of showing how important it is for writers and academic sites to follow moral rules. Ensuring that writing is open, honest, and responsible is a standard practice. This is very important for the trustworthiness of academic communication. Besides, the regional distribution feature underscores moral differences across regions, emphasizing the need for global cooperation to align local rules with international ethics. By giving everyone an organized way to assess publishing ethics, the model helps publishers, researchers, and policymakers identify areas for improvement and generate new ideas. It guides response to ethical issues and prompts responsible writing in academia.

A complete framework for examining the development of ethical concerns in academic publication is provided by bibliometric approaches, textual analysis, and visual tools. Bibliometric methods expose trends in knowledge networks, important works, and publishing output, therefore offering vital understanding of institutional accountability and open distribution policies. Crucially for fostering cross-regional cooperation, text analysis finds important themes like artificial intelligence ethics, blockchain transparency, and data-sharing practices, tracking their progress across several sectors and sites. Visualization methods clarify complex data, provide clear depictions of theme relationships, geographic dispersion, and temporal changes [18].

This work is unique in using this paradigm to investigate historical periods and offers a creative way to classify the development of ethical issues in scholarly publication. Emphasizing the need of open distribution methods, cross-regional cooperation, and institutional responsibility in promoting ethical and responsible academic communication, it also offers concrete approaches for addressing developing issues. The study emphasizes the critical need of ethics in maintaining the integrity and inclusivity of worldwide academic publication by means of new research approaches and the improvement of governance structures.

2 | Methodology

2.1 | Data Scope and Analysis Methods

The data used in this study was obtained from the Web of Science (WoS) Core Collection. This collection was chosen with the explicit goal of presenting an in depth and crucial representation of ethical issues in scholarly literature from an array of fields. Specifically, the collection was selected for the following reasons: 1) Research focus on time span rather than quantity: our primary focus is the time span of the research, not the quantity of papers. Therefore, we did not prioritize papers from the Scopus database, even though it includes more papers than WoS. The time span of WoS database creation is significantly longer than that of Scopus, and therefore, limiting our research to WoS provides a broader reflection of the academic timeline; 2) Superior visualization in WoS data: as you can see in our Figures 1 and 2, these are well-designed colored block diagrams that were directly generated by inputting specific parameters into the WoS database. The visualizations are very effective, and at present, Scopus does not offer similar high-quality visual representation. Perhaps when Scopus develops similar intuitive and high-quality visualizations as WoS in the future, we can consider incorporating Scopus papers into our research; 3) Data from WoS for visualization and analysis: For Figures 3 through 6, the data was sourced from the Datawrapper online platform and VOSViewer software. These platforms require data files, such as publisher information, institutional affiliations, nationalities, keywords, and abstracts, which can only be extracted directly from the WoS database to match and feed into the software. Scopus does not support the export of such data in a compatible format, and adjusting Scopus data to fit these platforms would require considerable time. For better efficiency in our research, we chose to use WoS; 4) Data compatibility and workflow efficiency: To streamline the research process, we relied on WoS data because it is compatible with the visualization platforms and software we used. The need for time-consuming adjustments when using Scopus data would have hindered the efficiency of our study.

The WoS database's Topic search box was used to choose publications, and the phrase "ethical considerations" was used to find articles that had it in titles, abstracts, or keywords. This search returned a dataset of 9,322 items, comprising articles and review articles, over the years 2006–2024. In 2025, the search was completed on January 14. This method ensures that the dataset appropriately reflects the evolution of ethical issues in scholarly communication, such as changes in institutional accountability, openness, and international publication norms. The dataset provides valuable insights into the development of ethical norms and transparent dissemination strategies in academic publishing due to its meticulous selection of high-impact papers. It may analyze regional inequities and highlight the necessity of cross-regional collaboration in developing inclusive and equitable systems of scholarly communication because of its broad academic and geographic reach. These methods establish a solid foundation for analyzing how concerns about ethics in academic publication have developed throughout the years.

2.2 | Theoretical Framework

With a focus on three interrelated dimensions—platform governance, the ongoing development of ethical topics, and geographic distribution—the Global Tri-Dimensional Model of Publishing Ethics Evolution offers a methodical framework for evaluating the ethical implications in academic publishing. The model was created by putting together these four main parts: 1) The model is based on a big

set of data: 9,322 articles from the Web of Science Core Collection that were indexed between 2006 and 2024. Bibliometric methods and text analysis were used in this large-scale data analysis to help find global trends and changes in publishing ethics over time; 2) Integration of ethical themes: the model considers how important ethical themes in academic writing have changed over time, such as the ethics of data sharing, the ethics of AI, and the ethics of being responsible for the environment. These themes were watched to see how they came about and changed over time, which showed how the social world is changing; 3) Global perspective: the model includes a geographic distribution variable that looks at differences in ethical practices between regions and how they contribute to global publishing ethics. This world view shows how important it is for people from different regions to work together and make sure that local rules are in line with international rules; 4) The model is based on the Global Tri-Dimensional Model of Publishing Ethics Evolution, which gives us a structured way to look at platform control, ethical themes, and regional distribution. This theoretical approach helped us see how these different aspects are linked and how they affect academic writing ethics as a whole.

This model provides a comprehensive framework for understanding the impact of institutional accountability, open communication strategies, and interregional cooperation on the cultivation of ethical behaviors. The Platform Governance Dimension emphasizes the legal responsibility of publishing platforms to maintain ethical standards through established norms and procedures, such as retraction management, peer review, and conflict of interest declarations. These forums are crucial for upholding institutional accountability by adhering to international standards, like the COPE Guidelines and the Singapore Statement. The adoption of open access models has transformed traditional power dynamics, underscoring the need for equitable and independent governance structures. Visualization tools like Datawrapper are crucial for analyzing governance processes and identifying areas for improvement, so enhancing the transparency and legitimacy of academic communication. The Ethical Theme Evolution Dimension analyzes the historical progression of ethical concerns, encompassing data-sharing ethics, AI ethics, and environmental accountability. This section analyzes the development, evolution, and decline of key themes, illustrating their adaptation to technological improvements and societal demands. Bibliometric tools like VOSviewer clarify the development of these themes, while text analysis uncovers the relationships among ethical principles and their importance across many domains. Theoretical frameworks in this context offer a thorough comprehension of the lifecycle of ethical challenges and their alignment with the changing demands of academic publication. The Geographic Distribution Dimension analyzes regional disparities and the importance of interregional cooperation in fostering inclusion and equity in academic discussions. Bibliometric analysis is often used to assess regional contributions and highlight disparities (Xu et al., 2024). In this study, it serves as a text analysis tool to examine the alignment of local legislation with global standards, particularly in the context of open scientific practices. This dimension provides a framework for understanding the global landscape of ethical behaviors, promoting mutual learning and collaboration across industries.

The three aspects—platform governance, the ongoing development of ethical topics, and geographic distribution—are put forward through the following five key points: 1) Platform governance as pillar of ethical standard: this aspect is put forward by examining the role of publishers and academic platforms in upholding ethical standards. It focuses on how these platforms maintain integrity through practices like peer review, conflict of interest declarations, and retraction management. This governance ensures transparency and accountability in the publishing process; 2) Tracking the evolution of ethical themes: the ongoing development of ethical topics is presented by analyzing how ethical concerns such as data-sharing, AI ethics, and environmental accountability have emerged, evolved, and adapted over time. The study monitors these shifts to capture their relevance to technological advancements and societal changes in academic publishing; 3) Assessing the impact of technological and societal changes: the model looks at how the development of ethical topics aligns with technological progress and shifting societal demands. It highlights how ethical issues like AI and data sharing have grown in importance, requiring publishers to continuously adapt to new ethical challenges posed by innovations; 4) Geographic distribution and regional contributions: the geographic distribution aspect is emphasized by mapping regional variations in ethical practices. It highlights disparities in how different regions address publishing ethics and the need for inter-regional collaboration to ensure that global standards are upheld; 5) Fostering global collaboration and inclusivity: The geographic distribution also underscores the importance of international cooperation in creating a unified approach to academic publishing ethics. By examining the influence of local legislation and global standards, this aspect encourages mutual learning and collaboration across regions to enhance ethical behaviors globally.

2.3 | Analysis Methods

By combining three fundamental aspects, this method improves knowledge of publishing ethics and makes it possible to find answers for new problems while maintaining the importance of ethical issues in the development of academic communication. It fosters the creation of a transparent, inclusive, and responsible academic publishing environment. In order to investigate ethical issues in academic publication, the study uses a multifaceted analytical framework and approaches, such as text analysis, bibliometric analysis, and visualization tools. Bibliometric analysis provides quantitative insights into the evolution of publishing ethics, monitoring significant publications, theme advancements, and citation trends to identify pivotal milestones and patterns. Through the identification of theme patterns and developing issues, text analysis reveals connections between ethical ideas and highlights new fields like open-access ethics and AI-driven publication. By delineating linkages between disciplines and geographies, it offers an enhanced comprehension of the processes influencing academic communication. Visualization tools augment this study by rendering complicated data in comprehensible ways, depicting geographic patterns, thematic groupings, and collaborative networks. In conjunction with one another, these methodologies provide a comprehensive perspective of the ethical environment, therefore generating insights into the factors that influence responsible academic publishing practices.

3 | Results

3.1 | Shifting Global Dynamics in Publishing Ethics: A Bibliometric Analysis of Research Growth and Geographic Expansion Across Four Historical Periods

The information in Figure 1 covers four historical periods and categorizes research in a range of fields, displaying their distribution in the Research Fields Dimension based on WoS (Web of Science) core database categories, all within the framework of the Global Tri-Dimensional Model of Publishing Ethics Evolution. The Geographic Distribution Dimension has seen a rise in multidisciplinary collaboration throughout time, particularly in the fields of public health, environmental health, and medicine, in addition to the growth of well-established ethical categories. It is obvious that a more diverse and globally integrated research environment has replaced the emphasis on biological sciences and basic ethics in previous times. With technology playing a key role in the development of the fields, the rise of computer science, digital health, and medical informatics during the Integration and Innovation Phase signifies a dramatic change in the perception of publishing ethics.

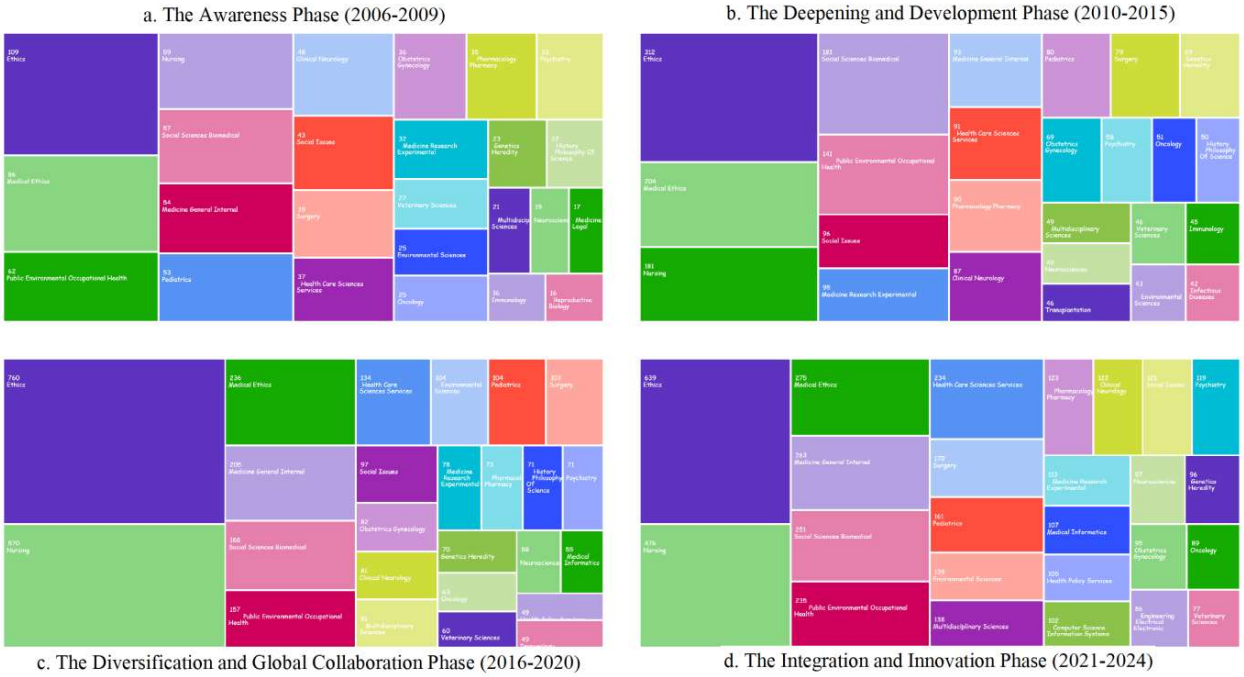

FIGURE 1 | Research fields distribution of topics in publishing ethics: A bibliometric analysis of woS core database categories (via VOSViewer software)

This bibliometric analysis shows the steady expansion of research topics, suggesting a shift toward more global and varied approaches to publishing ethics. The Awareness Phase (2006-2009) focused on the initial examination of Ethics (109 records), Medical Ethics (86 records), and Public Environmental Occupational Health (62 records), with particular attention to Nursing (59), Social Issues (43), and Pediatrics (53). The Deepening and Development Phase (2010-2015) saw increases in Ethics (312 records), Medical Ethics (204 records), and Social Sciences Biomedical (181 records), in addition to new fields such as Public Environmental Occupational Health (141 records), Health Care Sciences Services (91 records), and Pediatrics (80 records). The Diversification and Global Collaboration Phase (2016-2020) concentrated on continuing research in Ethics (760 records) and Medical Ethics (236 records), reflecting interdisciplinary and global collaboration, while expanding Health Care Sciences Services (134 records), Environmental Sciences (104 records), Oncology (63 records), and Clinical Neurology (81 records). The Integration and Innovation Phase (2021–2024) brought together earlier research categories and focused on digital health and technology, particularly Medical Informatics (107 records), while Social Sciences Biomedical (251 records) and Pediatrics (161 records) and new fields like Engineering Electrical Electronic (86 records) and Computer Science (102 records) continued to grow.

As seen in Figure 2, the Geographic Distribution Dimension has seen significant change over the past forty years, with a discernible trend toward more global participation, particularly from China, India, Brazil, and South Korea. Although the early rounds were dominated by traditional Western countries like the USA, England, and Germany, the latter stages saw the entry of additional international players, indicating that the research network had grown.

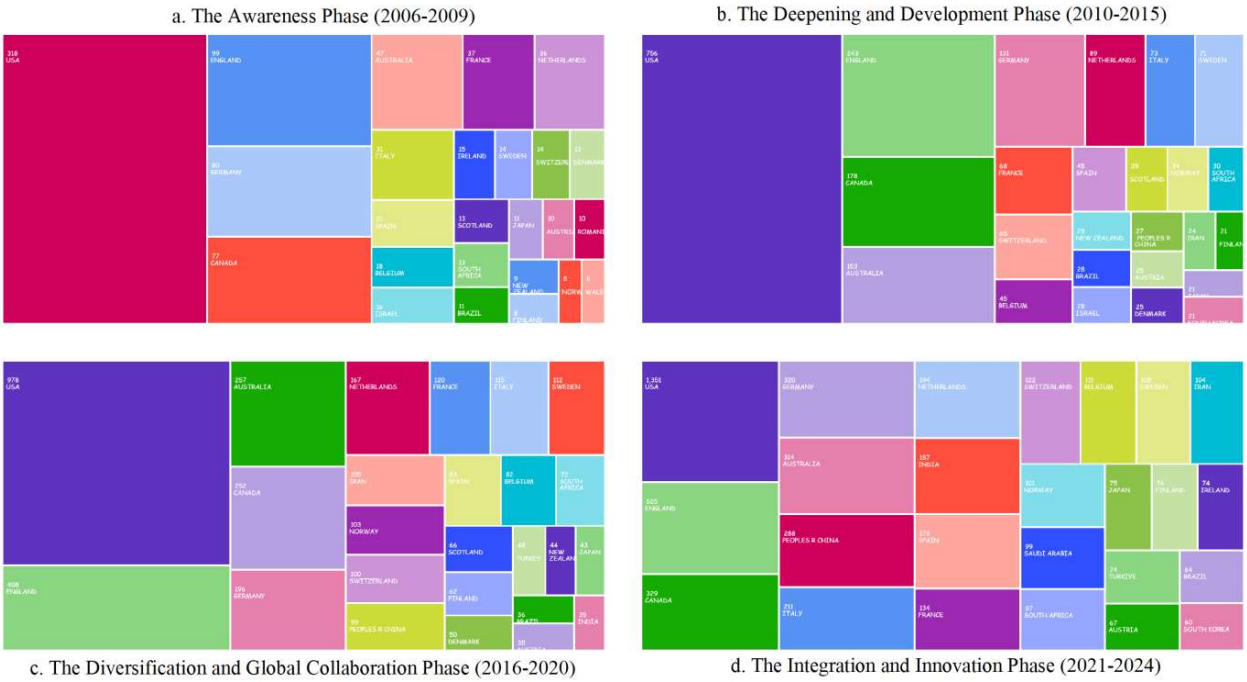

FIGURE 2 | Geographic distribution of research in publishing tthics: A bibliometric analysis of country-Based data from the WoS core database (via VOS viewer software)

The growing number of participating countries reflects the growing globalization of publishing ethics research, which emphasizes collaboration and the inclusion of diverse perspectives. According to 318 data, the USA produced the most research during the Awareness Phase (2006–2009), followed by England (99), Germany (80) and Canada (77). Australia (47 records), France (37 records), and Australia (47 records) were other notable countries. This period was characterized by a concentration of published ethical research in a few Western countries and a small number of foreign writers. During the Deepening and Development Phase (2010-2015), the United States maintained its dominance with 756 records, followed by England with 243, Canada with 178 and Australia with 153. Countries such as Germany (131 recordings), Switzerland (65 recordings), and Belgium (45 recordings) showed significant engagement during this period, suggesting an increase in international collaboration. The entry of developing nations like China (27 records) and Iran (24 records) marked the beginning of a more global engagement in publishing ethics research. During the Diversification and Global Collaboration Phase (2016–2020), the USA remained the dominant country with 978 records, followed by England (408), Australia (257) and Canada (252). During this period, notable contributions from Brazil (36 recordings), India (35 recordings), and China (99 recordings) showed a definite tendency toward international collaboration. Additionally, countries like Denmark (50 records), Turkey (48 records), and New Zealand (44 records) showed a more diverse geographic reach in publishing ethical research. In the Integration and Innovation Phase (2021–2024), the United States remained the top contributor with 1,351 records, followed by England with 525, Canada with 329, Germany with 320. China emerged as a significant force with 288 records, indicating its growing influence in the field of research. Countries like Sweden (108 records), Japan (75 records), and India (187 recordings) also shown significant engagement, indicating that a wider range of topics are being covered in the discussion of publishing ethics. The additional emerging countries of Saudi Arabia (99 records), Turkey (74 records), and South Korea (60 recordings) suggested a broader worldwide network of study.

3.2 | Geographic Distribution of Publishing Ethics Research Across Four Phases

The Geographic Distribution Dimension displays the worldwide distribution of published ethical research throughout four historical periods (Figure 3). The Integration and Innovation Phase (2021-2024) has significantly expanded the geographical scope to match the increasing diversity and globalization of publishing ethics. The expanding importance of China, India, Brazil, and South Africa is driving a more global and inclusive approach to academic publication and ethics. During the Awareness Phase (2006-2009), North America and Europe produced the vast majority of academic publications, with the United States topping the world in research output. Canada finished second, followed by European countries like France and Spain. South America contributed relatively little, with Brazil being the major contributor. Priorities for research were still being established, and ethical arguments focused on fundamental issues in the social and medical sciences. Global involvement increased significantly throughout the Deepening and Development Phase (2010-2015), notably in Asia and South America. China gained a worldwide reputation while significantly boosting its research output. Furthermore, publications grew in Brazil, India, and South Africa, signaling the start of a global discussion about publishing ethics. While North America and Europe continued to produce the vast bulk of publications, the United States and Germany made important contributions. The

rising participation of African and Latin American countries highlighted how ethical questions are becoming more prevalent in both developed and emerging economies. Throughout the Diversification and Worldwide Collaboration Phase (2016-2020), the map shows a considerable rise in global involvement. The increase in the percentage of academic publications from China, India, and Brazil shows greater international cooperation. Countries such as Argentina, Nigeria, and Kenya emerged, but North America and Europe continued to make substantial contributions. This suggests that the ethics of academic publishing and platform management are becoming increasingly important in these fields. The Integration and Innovation Phase (2021-2024) highlights the global reach of publishing ethics, with significant contributions to the global academic discussion from China, India, South Korea, and Brazil. Despite the United States' continued dominance, it is obvious that Africa is contributing more, with South Africa and Kenya leading the standard for academic research. Latin America saw a surge in participation, especially from Argentina and Mexico. The Integration and Innovation Phase has greatly influenced international collaboration, with more countries tackling topics like as data security, AI ethics, and digital health. Every country contributes a unique local perspective to the ongoing debates over publishing ethics.

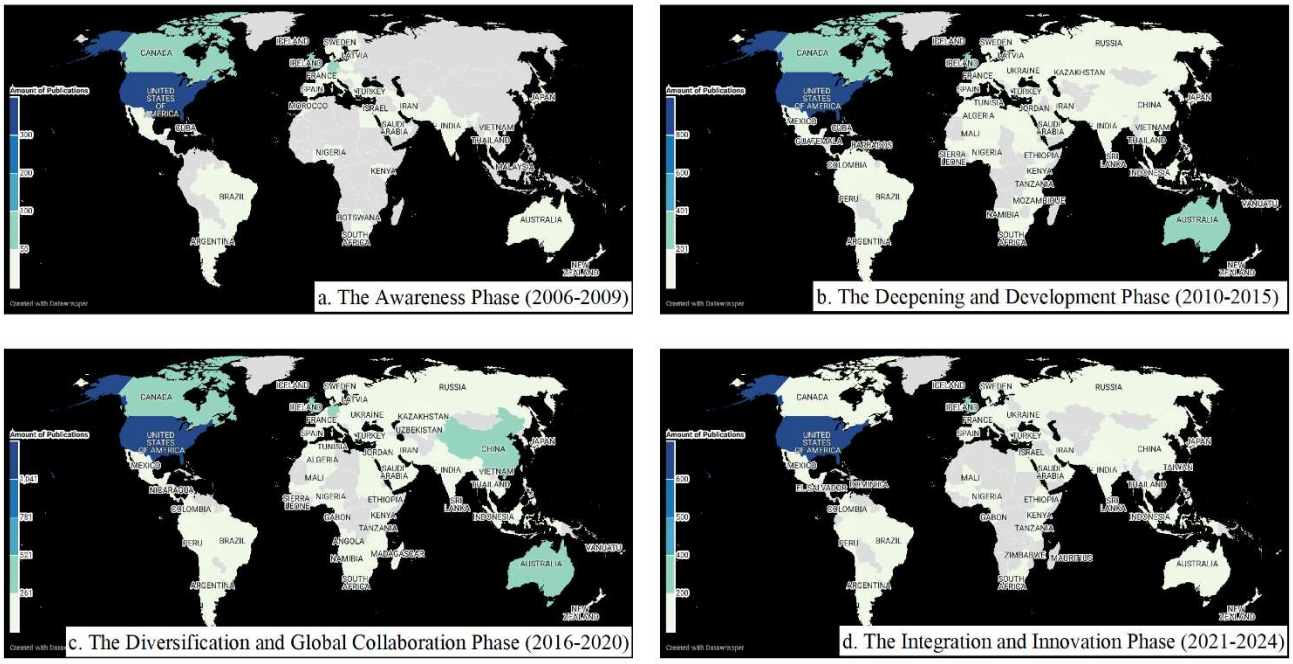

FIGURE 3 | Geographic distribution of publishing ethics research across four phases: a visualization analysis of country-based data from the wos core database (via datawrapper)

3.3 | Evolution of Ethical Themes in Academic Publishing Across Four Historical Phases

The study of both clusters and themes in academic publication ethics has evolved throughout four historical periods, reflecting the increasing complexity and specialization of ethical argumentation (Figure 4). This investigation, which used text mining techniques using VOSViewer software, looked at the title and abstract binary coupling to track the growth of themes over time, offering a precise insight of how publishing ethics evolved over these four historical stages. During the Awareness Phase (2006-2009), cluster analysis discovered a small number of clusters, typically 4. These clusters were largely concerned with basic ethical concerns such as ethics, therapy, principle, protection et al. The clusters were closely associated, indicating that ethical discourse in academic writing was in its early phases, with ethical questions that were not thoroughly explored. This time was marked by an early inquiry of publishing ethics, with a focus on key principles and research ethics. During the Deepening and Development Phase (2010-2015), the number of clusters climbed to 6, indicating more advanced and nuanced conversations. These clusters addressed topics such as diagnosis, disease, testing, guidance, and responsibility, indicating a rising specialization of ethical concerns in publication. The rise of new issues such as open access, conflict of interest, and transparency resulted in the formation of further clusters. The growth in the number of clusters throughout this time period implies that academic publishing's ethical discourse has broadened and deepened. During the Diversification and worldwide Collaboration Phase (2016-2020), the number of clusters is around 4, representing the diversity of ethical concerns and the expanding worldwide integration of research networks [19-20]. During this time, new clusters formed around participant, review, relationship, technology. While classic topics such as plagiarism, academic integrity, and peer review persisted, new clusters centered on open peer review, digital ethics, and research transparency emerged. The complexity of the ethical environment increased dramatically during this period, thanks to technological developments and global collaborations in academic publication. During the Integration and Innovation Phase (2021-2024), the number of clusters is 4, indicating the most sophisticated and advanced degree of ethical discourse. The clusters

at this phase were strongly interwoven, demonstrating the convergence of new technical difficulties with conventional ethical dilemmas. These clusters, which focused on artificial intelligence, covid, autonomy, clinical trial, nurse, and databases, demonstrated the continuous shift in the academic publishing scene brought about by digital technologies, big data, and machine learning. The expanding quantity and interconnectedness of clusters reflects the growing complexity of publishing's ethical landscape, with ethical concerns originating from technical, social, and global viewpoints. This phase demonstrates that ethical concerns now cover a larger variety of topics, including data privacy, algorithmic prejudice, and digital ethics, with varied global viewpoints contributing to the conversations.

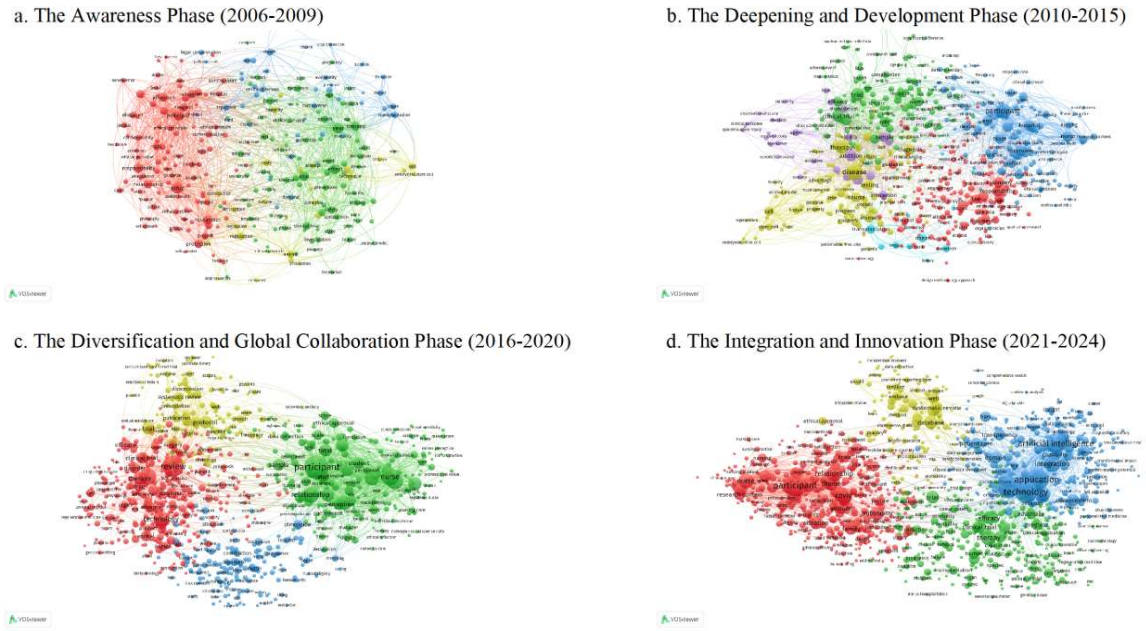

FIGURE 4 | Title and abstract field binary coupling: a bibliometric analysis of clusters and themes across four historical phases (via vosviewer software)

The research of both clusters and themes in academic publication ethics throughout four historical periods shows a clear pattern of growing complexity (Figure 5).

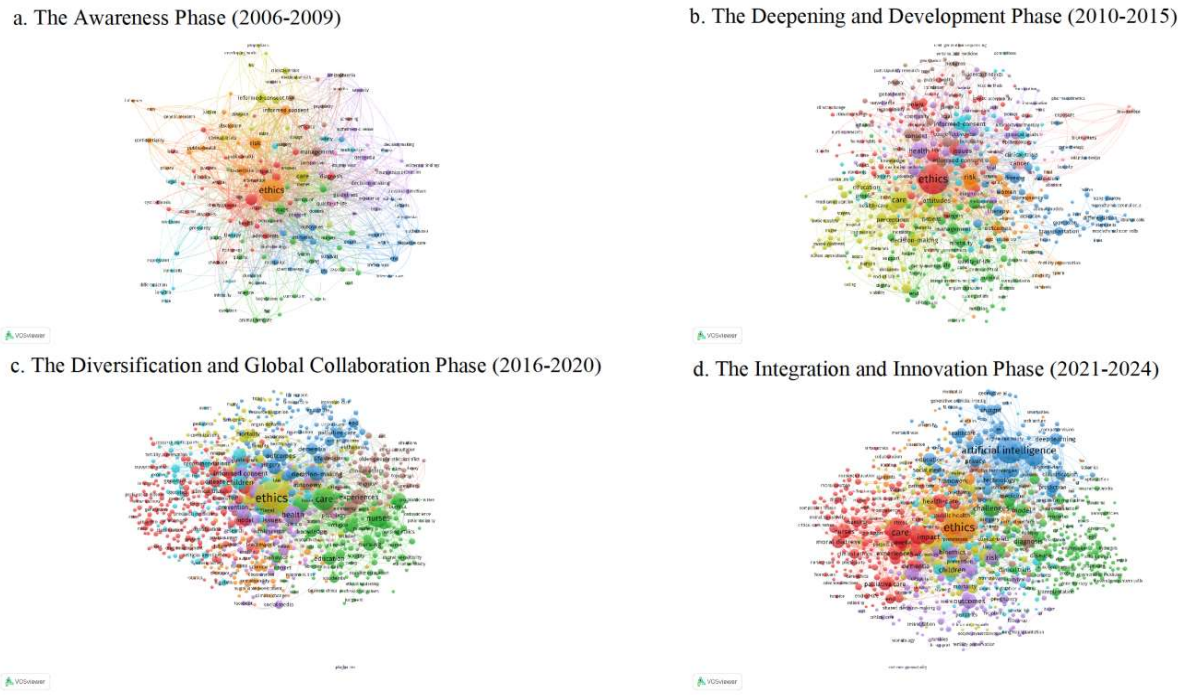

FIGURE 5 | All keywords co-occurence: a bibliometric analysis of clusters and themes across four historical phases (via vosviewer software)

This research, which used text mining techniques and VOSViewer software, looked at the co-occurence of all keywords to track the progression of themes throughout time, offering insight into how publishing ethics evolved. During the Awareness Phase (2006-2009), the cluster analysis identified roughly 7 cluster, that concentrated on fundamental ethical concepts such as ethics, risk, care, management, informed consent, et al. These topics characterized the early stages of ethical debate in academic publishing, with a focus on fundamental issues about research and publication ethics. The topics were in their early phases, with minimal depth. During the Deepening and Development Phase (2010–2015), the number of clusters increased to 8, reflecting more sophisticated and specialized conversations. The themes grew to health, women, decision-making, as well as new subjects including pregnancy, cancer, transplantation, mortality, et al. This time saw an expansion of ethical discourse, with greater emphasis on the ethical obligations of researchers and publishers. During the Diversification and worldwide Collaboration Phase (2016-2020), the number of clusters increased to 10, representing the diversity of ethical concerns and worldwide integration of research networks. Autonomy, children, education, dementia, and sustainability evolved alongside conventional problems such as plagiarism and academic integrity. New clusters centered on open peer review, research transparency, and digital ethics underlined the growing complexity of the ethical situation, fueled by technical breakthroughs and worldwide cooperation in academic publication. During the Integration and Innovation Phase (2021-2024), the number of clusters peaked at 12, indicating the most complex and integrated ethical landscape in academic publishing. The focus changed to cutting-edge topics including artificial intelligence, diagnosis, outcomes, bioethics, palliative care, moral distress, privacy, et al. The interconnectedness of clusters centered on themes such as algorithmic bias, digital ethics, and social responsibility demonstrated the incorporation of new technology and ethical issues. This time represents the continuous development of publishing ethics, as global and technical issues increasingly collide, showing the growing sophistication of ethical frameworks in academic publishing.

3.4 | Evolution of Platform Governance Across Four Phases of Research Development

It is evident from the depth and sophistication of platform governance debates that the dimension of platform governance evolution spans time (Figure 6). This paper investigates how platform governance has changed across four historical periods using organizational publishing data and VOSViewer software. From five in the Awareness Phase (2006–2009), two in the Deepening and Development Phase (2010–2015), and nine in the Integration and Innovation Phase (2021–2024) the number of clusters consistently grew. Beginning with basic ethical issues, this expansion shows the change of platform governance discussions at colleges including the University of Sydney, the University of Pittsburgh, Johns Hopkins University, Stanford University, the University of Alberta, and others. The increasing number of clusters reflects a global conversation in which academics, business leaders, and politicians work together to solve issues of managing digital platforms in the context of quick change. During the Awareness Phase, when companies first started debating the ethics of digital platforms, the study found a few clusters emphasizing key platform governance structures. Growing interest in topics such platform accountability, data governance, and ethical online platform regulation drove the number of clusters to rise throughout the Deepening and Development Phase. Industry leaders and academic institutions started working together at this time to create platform governance models and guidelines.

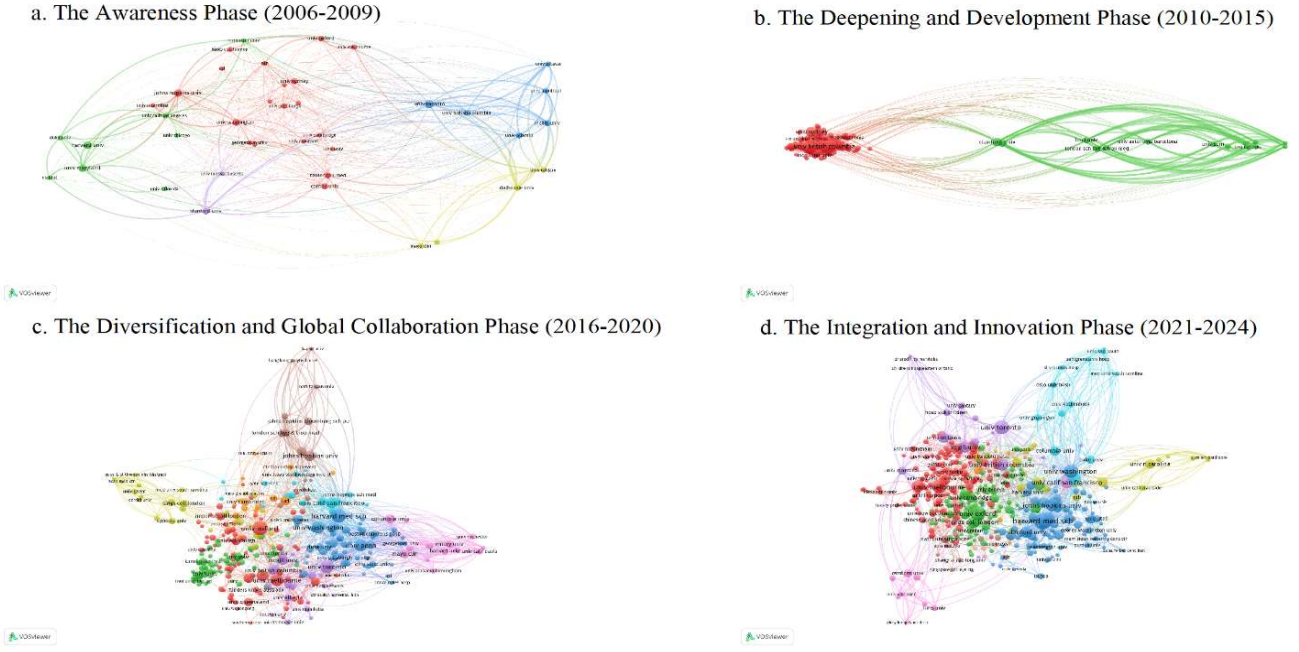

FIGURE 6 | Organizations bibliographic coupling: a visualization analysis of clusters and platform governance across four historical phases (via vosviewer software)

The Diversification and Global Collaboration Phase saw notable expansion of the clusters, suggesting more worldwide participation in platform governance. Other groups examined foreign policy, platform control, and data security. Many industries were increasingly connected during the Integration and Innovation Phase, which underlined the convergence of academic research, industry practices, and regulatory frameworks, in order to solve the issues given by growing technology and international policy frameworks. The fast development of clusters shows how crucial platform governance is becoming in the linked and digital environment of today.Examined using VOSViewer and sources bibliographic coupling data, platform governance research clearly shows a development in this dimension (Figure 7). The Awareness Phase (2006–2009) focused on digital ethics and data integrity, with few clusters reflecting the early stage of platform governance. From 4 clusters in this phase, the study expanded to 6 clusters in the Deepening and Development Phase (2010–2015), with a focus on data governance and regulatory systems, signaling closer engagement with platform governance issues. During the Diversification and Global Collaboration Phase (2016–2020), the number of clusters grew to 10, as international contributions increased and new themes like AI control and ethical use of technology emerged. By the Integration and Innovation Phase (2021–2024), the number of clusters reached 12, highlighting the growing complexity of platform governance, with a focus on digital rights, algorithmic transparency, and AI governance. This increasing complexity reflects the interconnectedness of global collaboration and evolving technology in platform governance. The changing sources of publications across these four historical periods illustrate the evolution of platform governance in scholarly publishing. Between 2006 and 2009, the coverage of fundamental medical and nursing ethics, as well as the legal consequences of healthcare ethics, included publications like the Journal of Medical Ethics, Nursing Ethics, and the Journal of Law, Medicine, and Ethics. During the Deepening and Development Phase (2010–2015), sources expanded to include Nursing Ethics, BMC Medical Ethics, Bioethics, and Clinical Trials, reflecting a broader spectrum of ethical concerns in healthcare and clinical research. Clinical Trials showed increased attention to the ethical regulation of medical research and data management, while BMC Medical Ethics and Bioethics emphasized ethical issues surrounding clinical procedures and biomedical research. In the Diversification and Global Collaboration Phase (2016–2020), sources like the Journal of Medical Ethics, BMJ Open, Science and Engineering Ethics, and Nursing Ethics were prominent. The shift towards BMJ Open and Science and Engineering Ethics marked the growing intersection of ethical discussions with scientific and technological research, supporting global health initiatives. This period saw the ethical debate expand to include data stewardship and the moral implications of medical and technological innovations. These shifts in sources highlight the continuous evolution of platform governance to address emerging challenges in technology, health, and international collaboration.

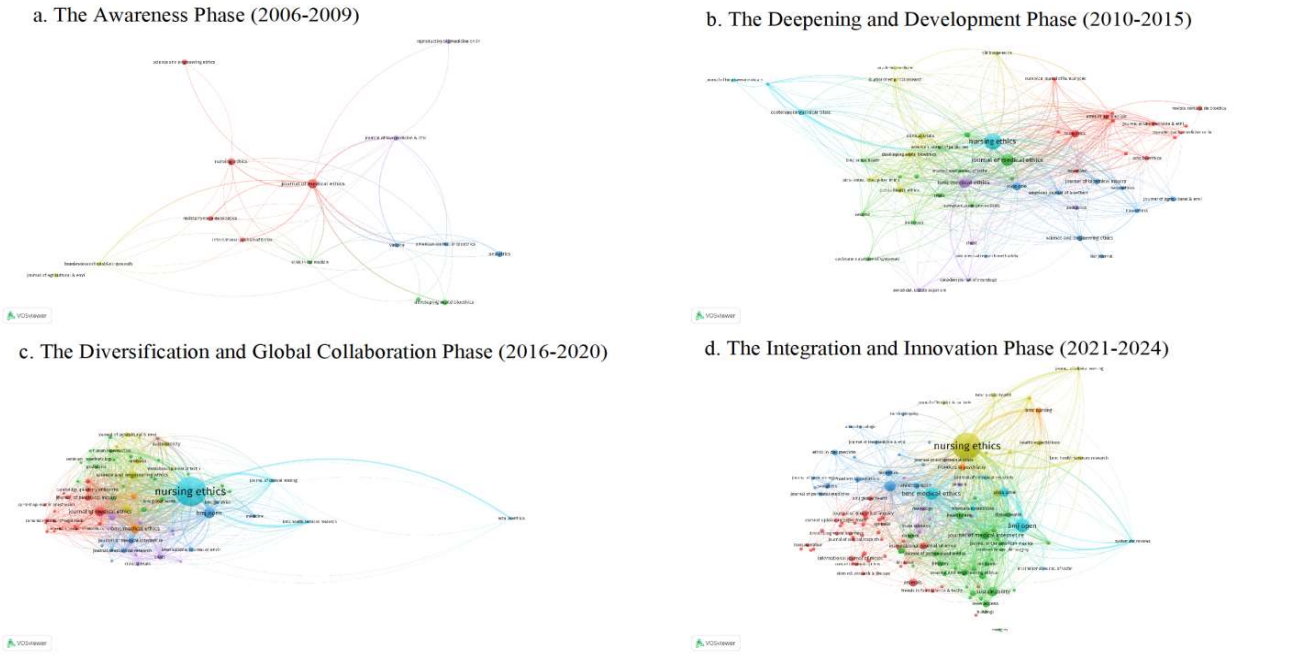

FIGURE 7 | Sources bibliographic coupling: a visualization analysis of clusters and platform governance across four historical phases (via vos viewer software)

3.5 | From Traditional Concerns to Global Collaboration the Changing Landscape of Publishing Ethics

The theme evolution aspect illustrates how moral objectives shift in reaction to societal influences and advances in technology. During the Awareness Phase, discussions centered on more traditional topics such as conflicts of interest, plagiarism, and authorship disputes, frequently looking at specific instances of misconduct in industries like medicine. The Deepening and Development Phase expanded the scope of ethical concerns to encompass systemic

issues like as data management, open access, and the consequences of digital publication in response to increasing demands for transparency. The Diversification and Global Collaboration Phase witnessed the expansion of ethical discourse into new areas, including technical ethics, international collaboration, and environmental responsibility, driven by the rapid rise of AI and big data. During the Integration and Innovation Phase, important concerns around algorithmic bias, AI ethics, and the regulation of generative content emerged, underscoring the challenges presented by evolving technology and the requirement for flexible and forward-thinking ethical frameworks. The section on geographical distribution highlights persistent disparities and the emergence of new global hubs while showcasing the changing contributions of different locations to ethical discourse in academic writing. During the Awareness Phase, the majority of research production was concentrated in North America and Europe, which were the primary regions. During the Deepening and Development Phase, Asia and South America made substantially greater contributions due to globalization and growing participation in international research collaborations. Programs aimed at disseminating moral principles helped places like China gain prominence during the Diversification and Global Collaboration Phase. Due to international initiatives like the UNESCO Recommendation on Open Science (2021) and the Sustainable Development Goals (SDGs) of the UN, Africa and Latin America contributed much more during the Integration and Innovation Phase. These modifications demonstrate a consistent move toward an academic publishing environment that is more inclusive and decentralized, supported by shared ethical responsibility and interregional collaboration. The aforementioned characteristics and historical periods, which highlight the interplay of legal frameworks, thematic advancements, and geographical factors, may provide a comprehensive understanding of the evolution of publishing ethics. In order to promote a more moral and just international academic communication system, this framework emphasizes the need for openness, cooperation, and creativity (Figure 8).

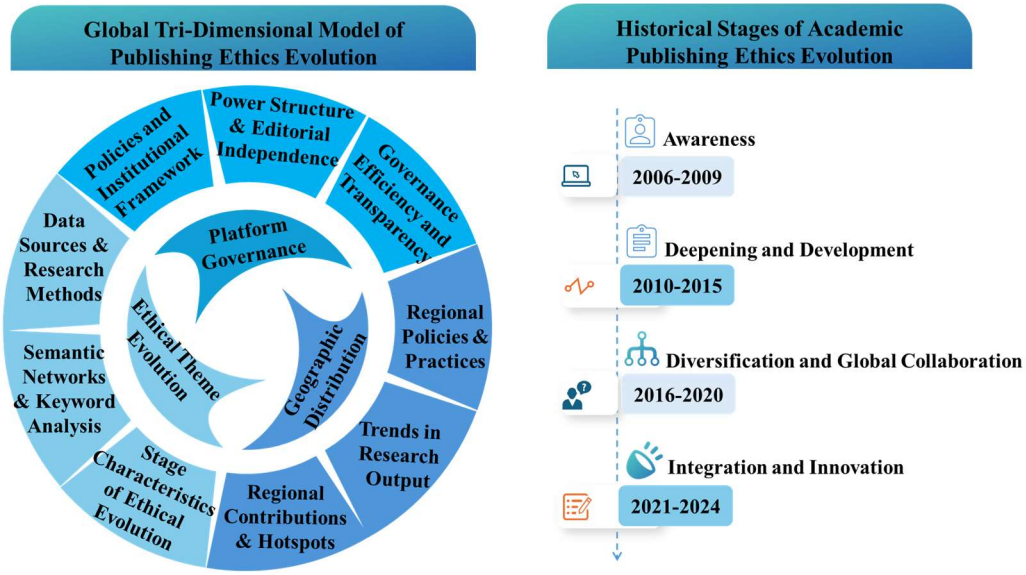

FIGURE 8 | From traditional concerns to global collaboration the changing landscape of publishing ethics

4 | Discussion

4.1 | The primary drivers of the phase

The Awareness Phase marked a significant shift in understanding the importance of ethical considerations in scholarly publications. This was the period when the World Conference on Research Integrity (2007) took place, sparking global discussions about how to handle research misconduct and create frameworks for regulations that would standardize moral conduct. The Uniform Requirements for Manuscripts, established by the International Committee of Medical Journal Editors (ICMJE) (2008), also established significant rules for authorship transparency and conflict-of-interest disclosures [21-22]. Another noteworthy development that addressed early problems with research data management and encouraged ethical data-sharing practices in the biological and environmental sciences was the creation of the Dryad Digital Repository (2008). Furthermore, the COPE flowcharts (2006) provided an orderly approach to regulating editorial ethics, including cases of plagiarism and retraction. Together, these developments transformed ethical concerns from isolated problems to a systematic focus on accountability, laying the foundation for structured governance and cross-disciplinary collaboration that paved the way for the Deepening and Development Phase.

During the Deepening and Development Phase, governance structures developed, and ethical behaviors were institutionalized. The ORCID project (2012) revolutionized author identification by ensuring transparency and reducing disputes over authorship and contribution. The Royal Society's 2012 "Science as an Open Enterprise" report, which encouraged openness and interdisciplinary research, highlighted the importance of data accessibility. Another important event was China's Measures for the Prevention and Handling of Academic Misconduct (2014), which addressed the rising need for ethical reforms in expanding research economies.

Additionally, by focusing on transparency and ethical rigor, the founding of the open-access journal PeerJ (2013) encouraged improvements in peer-review practices. By standardizing instruments, rules, and frameworks, this phase expanded the global reach of ethical governance and introduced new institutional practices. This set the global academic community up for a wider variety of problems in the next stage.

Throughout the Diversification and Global Collaboration Phase, emphasis was placed on transdisciplinary ethical issues and regional inclusiveness. The OpenAIRE Advance project (2018) shown a commitment to data transparency and equitable access by providing the infrastructure required to meet open-access criteria across disciplines in Europe. The UK's Committee on Standards in Public Life outlined guidelines for transparent research financing in its 2018 report, which also linked financial accountability and ethical governance. The 2019 framework on AI governance from the World Economic Forum, which set rules for responsible technology integration, placed a strong emphasis on the ethical implications of AI research [23-24]. The American Chemical Society's Green Chemistry policy (2019) brought publishing ethics and the environment together by including sustainability into research dissemination practices. This period strengthened the foundation for technological integration and adaptive governance during the Integration and Innovation Phase and expanded the ethical considerations in academic publications by addressing global challenges and promoting regional engagement.

During the Integration and Innovation Phase, the transformative potential of state-of-the-art technology and adaptable governance frameworks was showcased. The Japanese Society for Medical Science's AI Guidelines (2022) provided a framework for responsibly incorporating AI technology into research processes, given the ethical complexity of AI-driven advancements. The PLOS Transparent Peer Review initiative (2023) addressed long-standing concerns about editorial bias by promoting accountability and openness in peer review. In 2024, the International Science Council's Framework for Inclusive Research Integrity established global guidelines for advancing equity and inclusion in research practices. Furthermore, to improve data openness and reproducibility, Blockchain Open Access Repositories began providing decentralized, immutable storage choices for research outputs in 2023. These advancements ensured that moral values-maintained pace with technological advancements by bridging the gap between innovation and governance. In order to manage the complexity of contemporary scholarly communication, the era made clear the necessity of openness, accountability, and inclusion, opening the door for a robust publishing environment.

The development of ethical issues in academic publication from 2006 to 2024 shows a path influenced by technical breakthroughs, legislative changes, and interregional cooperation. Institutional accountability was strengthened, and ethical conundrums were progressively resolved as new processes and tools were implemented at each stage (Figure 9).

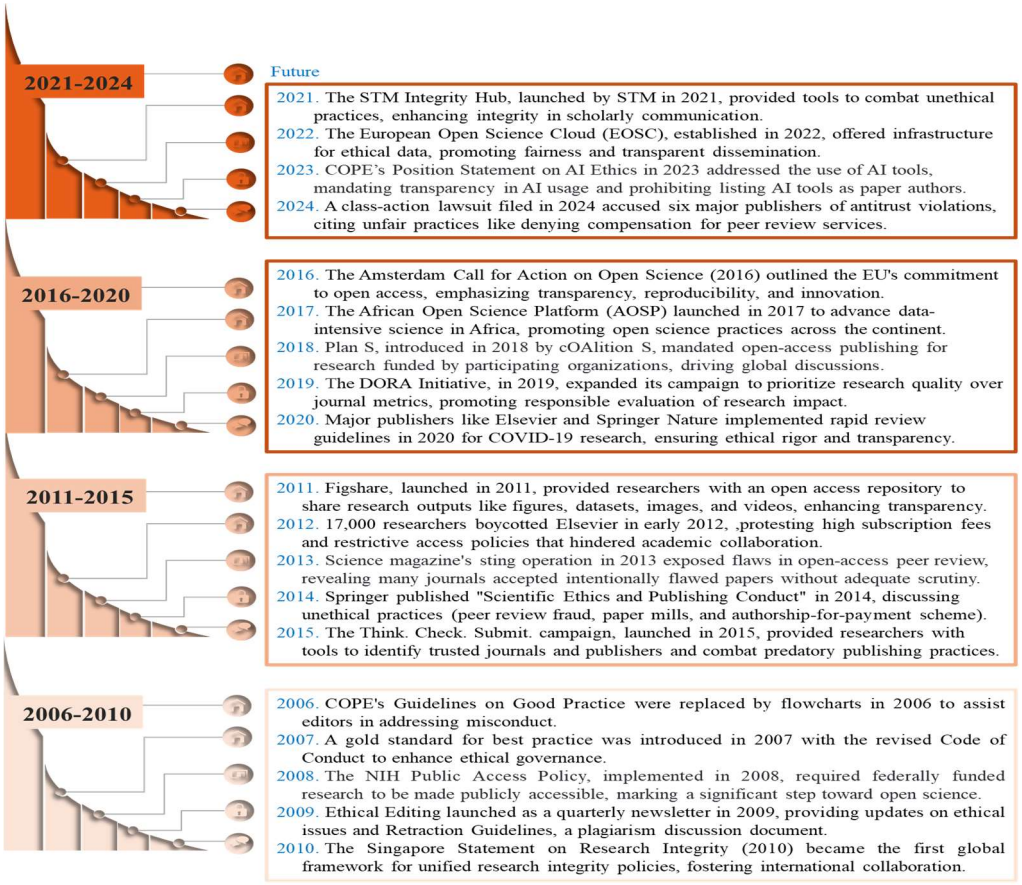

FIGURE 9 | Major milestones of ethical considerations in academic publishing (2006–2024)

The academic community has established a strong basis for open, inclusive, and morally guided academic publication by broadening geographic involvement and accepting creative solutions [25-26]. These advancements offer a road map for overcoming upcoming obstacles and guarantee that ethics will always be at the heart of a vibrant, international system of academic communication.

4.2 | Necessity of transparent dissemination practices, cross-regional cooperation, and institutional accountability to promote ethical and responsible academic publishing

The study's findings underscore the need of transparent dissemination practices, interregional cooperation, and institutional responsibility in promoting ethical and responsible academic publishing. In scholarly discourse, openness is fundamental to legitimacy and trustworthiness. The evolution of ethical practices, from retraction rules in the Awareness Phase to AI-assisted peer review in the Integration and Innovation Phase, has consistently underscored the imperative for transparent, accessible, and equitable research dissemination, as evidenced throughout the four historical stages. Transparent processes, such as retraction protocols, data-sharing rules, and conflict-of-interest disclosures, not only mitigate ethical problems but also enhance the confidence of the public, publishers, and researchers. To address global disparities in publication ethics, cross-regional collaboration is essential. The findings of the Geographic Distribution Dimension indicate that emerging regions are progressively contributing, particularly during the Diversification and Global Collaboration Phase. Initiatives like the UNESCO Recommendation on Open Science (2021) and regional adaptations of international standards have facilitated a more equitable dissemination of ethical research methodologies. To enable all sectors to participate in and benefit from global advancements in publishing ethics, collaborative frameworks addressing deficiencies in infrastructure, resources, and expertise remain essential.

The results under the Platform Governance Dimension indicate that institutional accountability remains a crucial element of ethical governance. Platforms have increasingly embraced their responsibility as ethical custodians, beginning with the establishment of COPE in 1997 and advancing with the integration of blockchain and AI technologies that provide automated peer review and data transparency. This result underscores the necessity for robust institutional structures that uphold accountability through transparent rules, unbiased editing processes, and efficient mechanisms for addressing misconduct. Alongside maintaining ethical standards, institutional accountability fosters a culture of responsibility and continuous improvement in academic publishing. The three components—accountability, cooperation, and transparency—function synergistically to establish a unified framework that addresses the numerous ethical challenges in contemporary academic publishing. The academic community may maintain ethical and responsible practices in research dissemination by cultivating a sustainable and equitable environment for scholarly communication via the alignment of these principles.

4.3 | Practical recommendations for publishers to tackle new challenges, embrace technological advancements, and strengthen the central role of ethics considerations

The outcomes of this study provide a framework for publishers to tackle increasing challenges, utilize technological advancements, and enhance the significance of ethical considerations in academic publishing. The findings suggest that the development of publishing ethics is characterized by a continuous interplay of historical milestones, technological progress, and evolving thematic interests. To effectively resolve these difficulties, publishers must adopt proactive measures grounded on transparency, inclusivity, and institutional accountability. Initially, to confront new difficulties, publishers must emphasize adaptive governance structures that meet rising ethical issues, like AI-generated content, algorithmic prejudice, and data privacy. The results from the Integration and Innovation Phase highlight the transformative impact of technologies like AI and blockchain in automating peer review and ensuring data provenance. Publishers may utilize these enhancements by establishing rigorous validation methods for AI-driven tools and creating clear guidelines for the ethical usage of generative AI in academic discourse. Active engagement with initiatives such as COPE's guidelines for AI-generated content ensures adherence to international ethical standards while preemptively addressing any challenges. Secondly, implementing technological advancements requires a balanced approach that aligns innovation with ethical principles. Research demonstrates that tools like CrossRef, AI-based plagiarism detection systems, and blockchain verification techniques have significantly enhanced governance efficiency. Publishers should invest in scalable technologies that improve operational transparency and accountability while fostering global collaboration. Employing blockchain to create immutable records of peer-review processes and use AI to identify patterns of misconduct may simultaneously improve efficiency and maintain ethical integrity. Nevertheless, the incorporation of these tools necessitates stringent control to avert unexpected repercussions, like the reinforcement of biases or the erosion of researcher autonomy.

Enhancing the prominence of ethical concerns requires fostering a culture of accountability and collaboration. The findings from the Geographic Distribution Dimension underscore the need for interregional cooperation in addressing worldwide disparities in publication ethics. Publishers can greatly enhance regional capacity-building initiatives, facilitate information exchange, and execute localized modifications of global ethical standards. Furthermore, open practices—such as the public disclosure of retraction grounds, conflict-of-interest declarations, and peer-review documentation—can bolster confidence among stakeholders. By incorporating ethics into their operations, publishers maintain the integrity of scientific communication while enhancing their reputation and societal impact. In conclusion, publishers must adopt a proactive and cohesive strategy to tackle ethical issues, welcome innovation, and maintain the primacy of ethics in academic publishing. These pragmatic recommendations correspond with the study's findings and offer implementable tactics for traversing the intricate and dynamic realm of publication ethics.

4.4 | Limitations and Future Research Directions

The Global Tri-Dimensional Model of Publishing Ethics Evolution provides important insights into the development of ethical considerations in academic publishing, particularly concerning institutional accountability, open dissemination practices, and cross-regional collaboration; however, it inadequately addresses the complexities of scholarly communication. A primary limitation of the model is its reliance on historical data, which aids in recognizing previous patterns but may be inadequate for forecasting future developments in academic publishing ethics. The advent of sophisticated technologies like blockchain and artificial intelligence has led to a progressive evolution of the academic publishing sector [27-28]. While these technologies are revolutionary, they present new ethical dilemmas that a historical viewpoint is inadequately prepared to address. The academic publishing industry is undergoing swift transformation, necessitating a more flexible and responsive framework to anticipate and tackle ethical dilemmas. The method predominantly utilizes quantitative data, including bibliometric analysis, to investigate the evolution of ethical themes and governance frameworks. While bibliometric tools effectively reveal patterns in publishing trends and subject evolution, they frequently neglect qualitative dimensions of ethical issues, including the perspectives of researchers and editors. The most effective approach for investigating matters like authorship disputes, peer review bias, and the ethical implications of AI-generated material is through qualitative methods, including case studies and interviews, which the model fails to fully address. The model's approach to interregional cooperation raises further difficulties. Although it acknowledged the growing significance of worldwide participation in academic publication, it did not sufficiently address the issues encountered by areas with weak research infrastructures or restricted access to new technologies. Notwithstanding the increasing importance of developing nations like Africa and Latin America, the plan inadequately addresses the obstacles impeding their engagement in global academic debate. Challenges such as inconsistent access to digital technologies, inadequate financing, and variations in research resources and skills necessitate customized solutions to foster fairness and inclusion in global academic publishing. Furthermore, the model underscores institutional accountability, crucial for fostering ethical governance, while overlooking the difficulties of enforcing ethical norms at the individual researcher level. Ethical behavior is influenced by the activities of individuals inside the system and the organizations that support it. The approach complies with institutional governance and policy changes efficiently; nonetheless, it may benefit from a more thorough analysis of the ethical challenges encountered by individual writers, editors, and peer reviewers. Additionally, we plan to compare data on these themes with other databases like Scopus, aiming to provide a broader perspective and incorporate a more comprehensive analysis of Scopus-indexed papers in future research.

Future research should employ a more complete methodology that integrates both quantitative and qualitative methodologies to overcome these constraints. Case studies, surveys, and interviews with important players in the academic publishing process, such as authors, editors, and peer reviewers, can yield substantial insights into the ethical dilemmas encountered on an individual basis. Furthermore, including a more profound understanding of regional disparities and technological accessibility into the model will improve its inclusiveness and responsiveness to global variances in academic communication practices. Subsequent iterations of the paradigm must consider the influence of advancing technology on ethical governance. Given the fast progression of AI and blockchain, it is essential to continually assess and update the model to ensure its pertinence and effectiveness in addressing the ethical challenges that arise in digital and networked academic publishing [29-30]. The model may serve as a more efficient guiding tool for researchers, publishers, and governments dedicated to preserving the integrity, transparency, and inclusivity of academic publication in the future by including these advanced characteristics.

In conclusion, while the Global Tri-Dimensional Model provides a comprehensive framework for comprehending the historical development of academic publishing ethics, it possesses certain limitations, especially concerning its capacity to anticipate future challenges and tackle ethical dilemmas at the individual level. Addressing geographical disparities, including qualitative data, and adapting to the continuously changing technological landscape would augment the model's ability to provide actionable suggestions for fostering ethical and responsible behavior in academic communication.

5 | Conclusion

This study examines the evolution of ethical issues in academic publication from 2006 to 2024, utilizing a cohort of 9,322 papers indexed in the Web of Science Core Collection. The research employs bibliometric approaches, text analysis, and graphical tools to examine global trends in publishing ethics using the Tri-Dimensional Model of Publishing Ethics Evolution. This approach highlights three interconnected dimensions: Platform Governance, Ethical Theme Development, and Geographic Distribution. The study delineates the evolution of academic publishing ethics into four historical phases: the Awareness Phase (2006–2009), the Deepening and Development Phase (2010–2015), the Diversification and Global Collaboration Phase (2016–2020), and the Integration and Innovation Phase (2021–2024). The stages signify the increasing intricacy of ethical governance, the enhancement of global cooperation, and the integration of emerging technologies, as per the research. The research underscores the critical significance of transparent communication techniques, interregional collaboration, and institutional accountability in fostering ethical and responsible academic publishing. The report outlines the growing complexity of ethical challenges in academic publishing by tracking the development of key subjects such as "data sharing," "AI ethics," and "blockchain transparency," particularly in the context of continuous technological improvements. Themes, along with the increasing global involvement in academic publishing, suggest a future where ethical governance systems must remain adaptable to emerging trends and challenges.

Nonetheless, this study acknowledges many limitations. A primary limitation is the model's reliance on historical data and quantitative methods, which mainly detect trends and patterns but fail to fully address the qualitative aspects of ethical issues. The perspectives of

individual authors, editors, and peer reviewers—essential participants in academic publishing—are often neglected in bibliometric analysis. This limitation underscores the need for future research to use qualitative approaches, such as case studies, interviews, and surveys, to improve understanding of the practical challenges in maintaining ethical standards. Moreover, the model could be enhanced by specifically tackling the distinct challenges that under-resourced regions—such as Africa and certain areas of Asia and Latin America—encounter in acquiring and implementing ethical publishing practices, despite providing insights into geographic trends and regional disparities. Moreover, the rapid advancement of technology such as AI and blockchain introduces new ethical dilemmas that were inadequately explored in this study. These technologies are transforming academic publication. To remain abreast of the ever evolving ecosystem, academics have to develop adaptive governance frameworks to address emerging concerns such as data privacy, algorithmic bias, and AI-generated content. This requires continuous evaluation of the model to ensure its relevance and applicability in a rapidly evolving digital and technological landscape.

The integration of quantitative and qualitative methods is crucial for improving our understanding of ethical dynamics in academic publishing. The incorporation of qualitative insights will assist in tackling the complex and multidimensional nature of ethical challenges that bibliometric data alone cannot sufficiently capture. Moreover, future studies should examine the specific needs of different regions to improve inclusive and equitable access to academic publishing. Researchers must assess the potential of developing technologies to improve ethical governance while reducing the related risks. This research offers a comprehensive framework for understanding the evolution of ethical challenges in academic publishing, including practical insights for publishers, scholars, and regulators. By embracing transparency, cooperation, and flexibility, the academic publishing industry can ensure that ethical standards evolve in alignment with the demands of a rapidly changing global research environment. This study's acknowledged limitations establish a basis for future research, promoting a more nuanced and thorough examination of the ethical challenges in academic communication.

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Author Contribution Statement

Jing Zhou was responsible for the conceptualization, methodology, formal analysis, and writing of the original draft.

Feining Luo was involved in reviewing and editing the manuscript.

Yingchun Han and Xiufen Long handled data collection for the study.

Yanjiao Lyu contributed to validation, text and format checking, and manuscript review.

Ethical Statement

This study does not contain any studies with human or animal subjects performed by any of the authors.

Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

Data Availability Statement

The data that support the findings of this study are available from the Web of Science, with the permission of Clarivate.

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