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Research Article

Exploring Trends and Research Hotspots in the Impact of Social Media on College Students: A Bibliometric Analysis

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ABSTRACT

The influence of social media on university students is clear. However, there are no systematic bibliometric assessments of this impact. To conduct a comprehensive bibliometric analysis of the impact of social media on university students, identifying key trends and collaboration patterns from 2007 to 2023. Data from the Web of Science Core Collection was analyzed using VOSviewer and CiteSpace for keyword and collaboration network analysis. This bibliometric analysis reviewed 1,967 publications from 104 countries, noting a marked post-2017 increase in research. The United States and China were the major contributors. The study identified key research domains including "higher education", "Internet addiction", "mental health", and "media literacy", with increasing emphasis on "Fear of Missing Out" and "Digital Literacy". Publication trends depicted a transition from initial exploration to rapid growth, with significant output in "Computers in Human Behavior" and "Journal of American College Health". Additionally, the data highlighted prevalent international collaborations, particularly between the US and China. Future work needs to further investigate the psychosocial effects of social media and integrate cross-cultural insights, informing policies and applications amidst technological evolution.

Keywords: Bibliometric, CiteSpace, College Students, Social media, VOSviewer.

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INTRODUCTION

With the advent of the digital era, social media has reached an unprecedented level of prevalence among contemporary college students. It has become a critical platform for information exchange, profoundly influencing the younger generation's learning,[1] communication,[2] and entertainment methods.[3] The widespread use of social media not only serves as a primary means for students to access information but also plays a key role in establishing and maintaining interpersonal relationships, highlighting its significance in modern education and student life.[4]

However, the impact of social media is two-fold. On the one hand, it provides students with a new learning and social environment, promoting the free flow of communication and information. Students can rapidly access information,[5] share opinions,[6] and even participate in online learning communities[7] through social media.[8] On the other hand, negative aspects of social media, such as anxiety,[9] addiction,[10] and cyberbullying,[11] have become major factors affecting students' mental health and academic performance.[12]

Social media has had a profound impact on the psychology and behavior of college students. Positively, it offers platforms for self-expression[13] and interest exploration,[14] contributing to the development of critical thinking and creativity.[15] However, excessive use or negative experiences on social media may lead to distractions,[16] declining academic performance,[17,18] and even mental health issues.[19,20]

The integration of social media into the lives of college students is deepening. It has become an inseparable part of their daily activities and learning processes, altering the ways they learn and socialize. Interactions and sharing on social media are reshaping their learning experiences and social habits, making the process more dynamic and interactive.[21]

In this context, bibliometric research on the impact of social media has emerged as a novel and significant direction of study. Bibliometrics, as a method for evaluating scientific activities and measuring literature information, enables comprehensive analysis of academic papers, citations, and keywords, revealing the developmental trends and knowledge structures of the field.

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Utilizing bibliometric analysis tools like CiteSpace and VOSviewer, researchers can visualize vast amounts of literature data, not only identifying research hotspots and academic frontiers within the field of social media but also tracing the evolution of knowledge.[22]

Although existing research has explored the impact of social media on the psychology and learning of college students, a comprehensive evaluation and systematic review of these findings are still lacking. This study aims to fill this gap, employing bibliometric methods to systematically review and summarize research on the impact of social media on college students. Through scientometric analysis and knowledge mapping, this research will explore international collaboration networks, keyword clustering analysis, research trends, and shifts within the field, providing theoretical foundations and guidance for future research.

Data source and methodology

Data Source

Primary data for this study were obtained from the Web of Science database using keywords such as "social media," "digital media," "social networking sites," along with various terms related to student academic levels, including "college student," "university student," and "graduate student." The search was conducted without time constraints across all journals on October 14, 2023. Initially, 3725 articles were retrieved. After removing duplicates, review articles, and irrelevant materials, 1967 articles remained for CiteSpace analysis (Figure 1).

METHODOLOGY

The study utilized VOSviewer and CiteSpace software for bibliometric analysis and visualization of knowledge units available in the Web of Science (WoS) database. VOSviewer, a tool for visualizing similarities between knowledge units,[23] was employed for keyword co-occurrence density visualization and global country cooperation network mapping. CiteSpace, developed within the context of scientometrics and information visualization, has been widely applied in recent bibliometric research,[22] This study harnessed CiteSpace for clustering keywords and detecting keyword emergence, providing a visual analysis of the research themes and evolutionary trends in the study of social media use and its impacts among university students globally.

RESULTS AND DISCUSSION

Annual Publication Volume Analysis

The annual publication volume is an important performance indicator for analyzing the development history and predicting future trends of a research field. It can intuitively reflect the dynamic changes in research effort within the field. Studies on cumulative publication volume trends help identify the developmental stages of a research discipline and its future trends.

In the area of research on the use of social media by college students and its impacts, the earliest work appeared in the literature in 2007.[24] From 2007 to 2011, the field was in its nascent stage with annual publication volumes not exceeding 50 papers. During the period from 2011 to 2017, there was a steady increase in the number of publications. Since 2017, there has been a significant growth in published literature, with the year 2018 seeing over 180 publications. The trend of literature published from 2007 to 2023 (Figure 2) indicates that the field of study on the use of social media by college students and its impacts has gradually gained widespread attention and recognition among domestic scholars.

According to Derek J. de Solla Price's model of scientific literature growth,[25] the growth of scientific literature can be viewed as an exponential process, with the quantity of literature growing exponentially over time. Price's model outlines three stages in the development of a scientific field: the initial phase, exponential growth phase, and mature phase. During the initial phase, the rate of literature growth is slow; this is followed by the exponential growth phase, where the volume of literature significantly increases; finally, as the field matures, the growth rate slows down to saturation.

Based on Price's model, the current field is in the exponential growth phase. This indicates that as time progresses, the quantity of research literature on the use of social media by college students and its impact will increase dramatically, reflecting rapid expansion in research interest and activities, and signaling the vibrancy of the field and its potential for future development.

Analysis of Publishing Journals

As seen in Figure 3, "Computers in Human Behavior" is the most active journal within this research field, with 97 papers published, followed by the "Journal of American College Health" with 41 papers. After these two leading journals, other publications such as "Cyberpsychology, Behavior, and Social Networking," "International Journal of Environmental Research and Public Health," "Current Psychology," "Education and Information Technologies," "Frontiers in Psychology," "Computers & Education," "Sustainability," and "PLOS ONE" have also contributed a considerable number of articles, albeit in diminishing numbers. These journals span multiple domains from environmental health research to educational technologies.

Beyond the dominant journals, others, despite a lower volume of publications, may reflect the field's diversity in research methodologies and theoretical orientations due to their variety and breadth. For instance, "Frontiers in Psychology" and "Computers & Education" often focus on the areas of psychology and educational technology. The distribution of these journals demonstrates the multidisciplinary nature of research on

college students' use of social media and its impacts, spanning psychology, environmental health, educational technology, and sustainable development. This reflects that research on the use of social media by college students and its impacts encompasses not only technological aspects but also includes comprehensive analyses of individual psychology and educational effects.

Analysis of International Research Collaboration Networks

An analysis of international research collaboration networks expands upon the basis of authorship collaboration networks by examining the cooperative networks among the countries of the authors. If authors from different countries co-sign a paper, it is indicative of a collaborative relationship between the countries represented at the time of the paper's publication. This study selects countries with more than ten publications in the field of college students' social media use and its impacts for a collaborative network analysis. Figure 4 presents a global map of research collaborations, highlighting the international cooperation in this field. The map employs node size (depicted as circles on the map) to visualize collaboration frequency, with larger nodes indicating a higher frequency of paper publication, signifying a richer research output from that country.

The international research collaboration network analysis, depicted in Figure 4, quantitatively underscores the extent of global cooperation in the study of social media's impact on college students. The United States is at the forefront with 661 publications, while China follows with 302 contributions, reflecting their dominant roles in this research domain. Iran (17 publications), Thailand (11), Indonesia (18), and European nations like Sweden (13), Finland (11), and Portugal (10) may not publish as many papers as the leading nations, yet their active participation showcases the broad international appeal of the research theme. Furthermore, countries with smaller nodes such as Ecuador (10 publications), Ghana (10), and South Africa (32) are recognized as emerging contributors to the field, indicating a diversifying research landscape.

Keyword Frequency Analysis

Keywords, as the core expression of a literature's theme, play a critical role in identifying the research field's hot topics. This study employs a co-occurrence analysis of keywords, measuring the frequency with which two keywords appear together in the

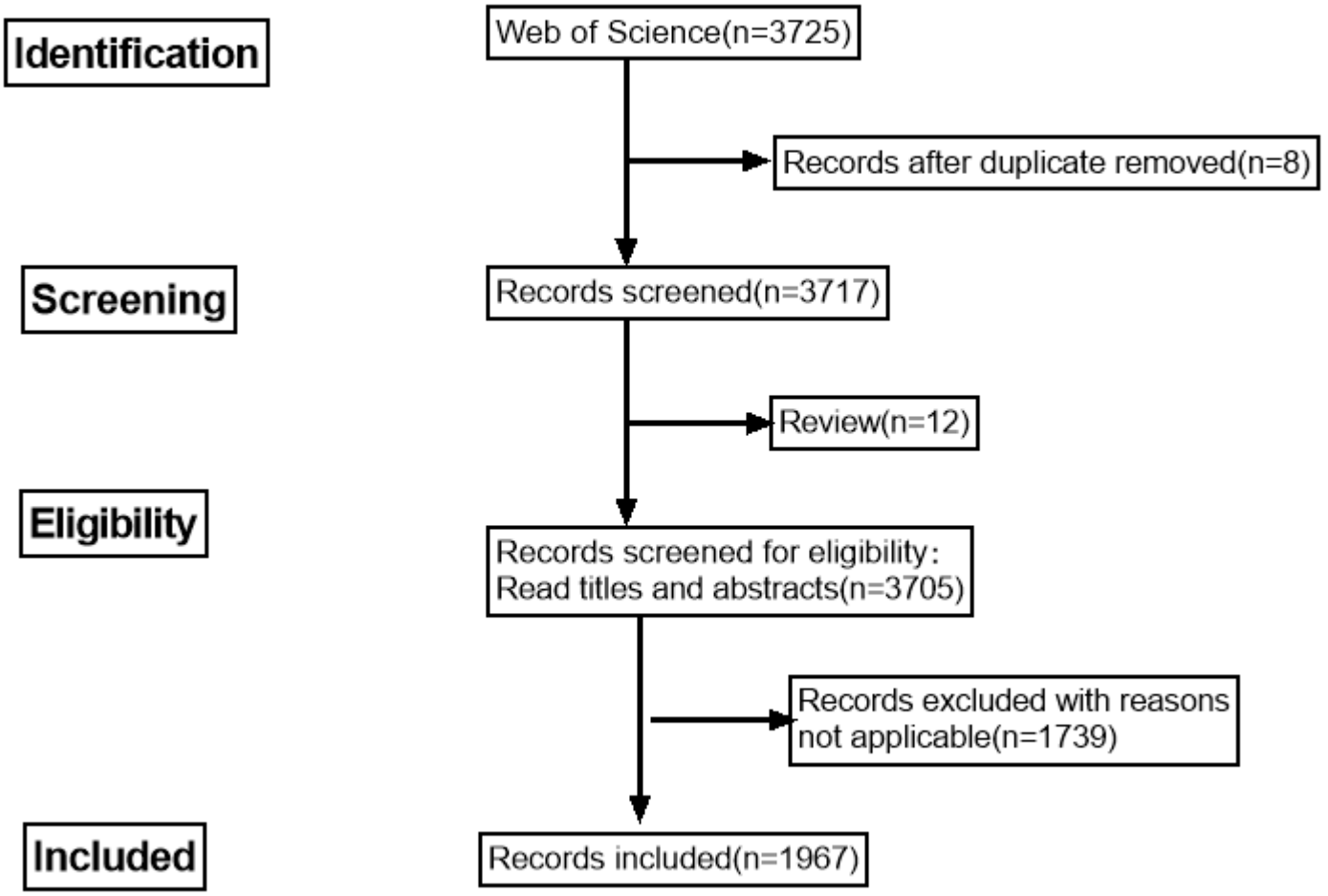

Figure 1: Literature Selection Process.

same literature, to explore the association between different research themes. Utilizing the VOSviewer tool, a density visual analysis was performed on keywords appearing more than ten times (Figure 5), during which common high-frequency search terms were excluded to precisely focus on core research hotspots. Table 1 lists those keywords that appeared more than twenty times.

Statistical analysis of high-frequency keywords (Table 1) and Figure 5 reveals that "Facebook" emerges as the most frequently discussed platform in the field of college students' use of social media and its impacts, indicating its central position in current literature. Concurrently, "Higher Education" and "Covid-19" rank as significant issues, suggesting that the influence of social media on higher education students has become a notable research hotspot against the backdrop of the Covid-19 pandemic. Additionally, keywords such as "Twitter," "Depression," "Academic Performance," "Mental Health," "Instagram," and "Internet" follow in frequency, reflecting the academic community's profound concern over the potential effects of social media platforms on students' psychological states and academic achievements. The frequent appearance of terms related to mental health underscores a primary focus of research exploring the link between social media use and college students' psychological well-being.

Further, the density visualization map created by VOSviewer software elucidates the clustering relationships between keywords like "Internet," "Facebook," "Instagram," "Higher Education," and "Covid-19," suggesting these topics often co-occur and may have strong interrelatedness within the literature. This analysis indicates that research on social media use is expanding into multidimensional explorations, including educational contexts, psychological health impacts, and unique situations during the pandemic.

Keyword Clustering Analysis

To reveal the transitions in research content and direction, as well as the intrinsic connections between various research hotspots, this study employed CiteSpace software to conduct a clustering analysis on keywords pertaining to college students' use of social media and its impacts. The relationship between research hotspots was visualized through this method. In terms of clustering effectiveness evaluation, the study leveraged the modularity Q value and the silhouette coefficient S value to assess the validity of the clusters.

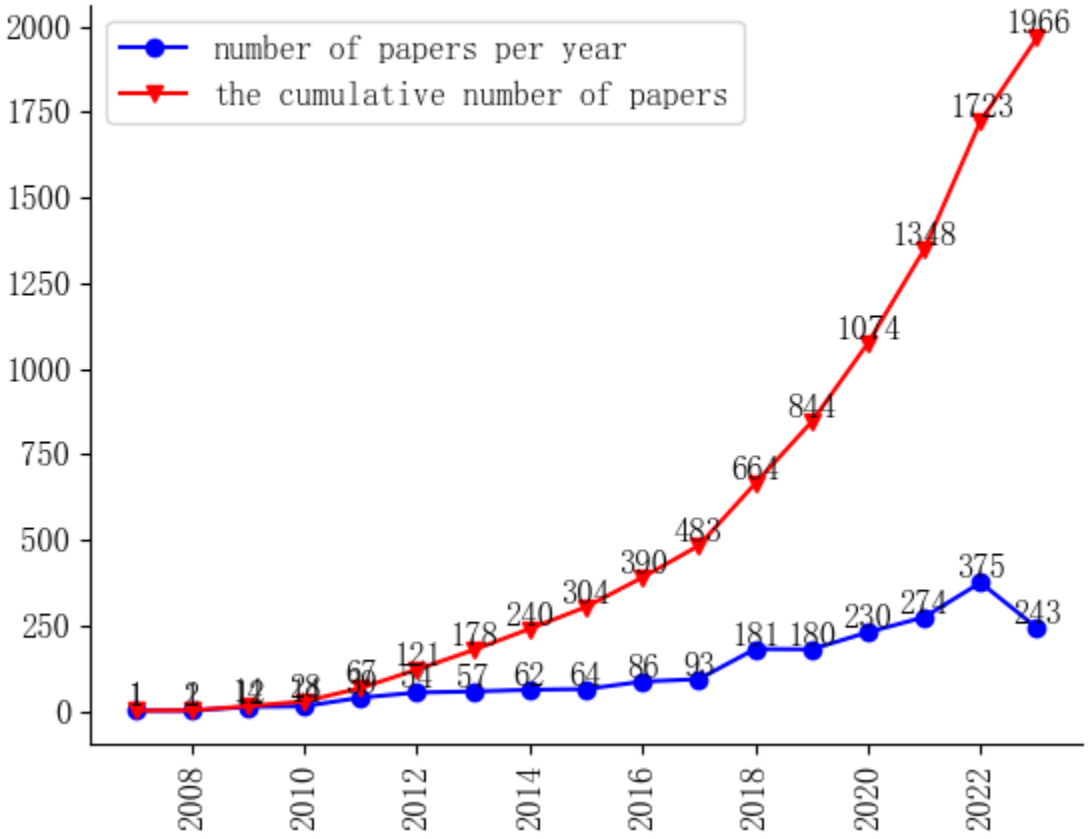

Figure 2: Annual Publication Volume Statistics.

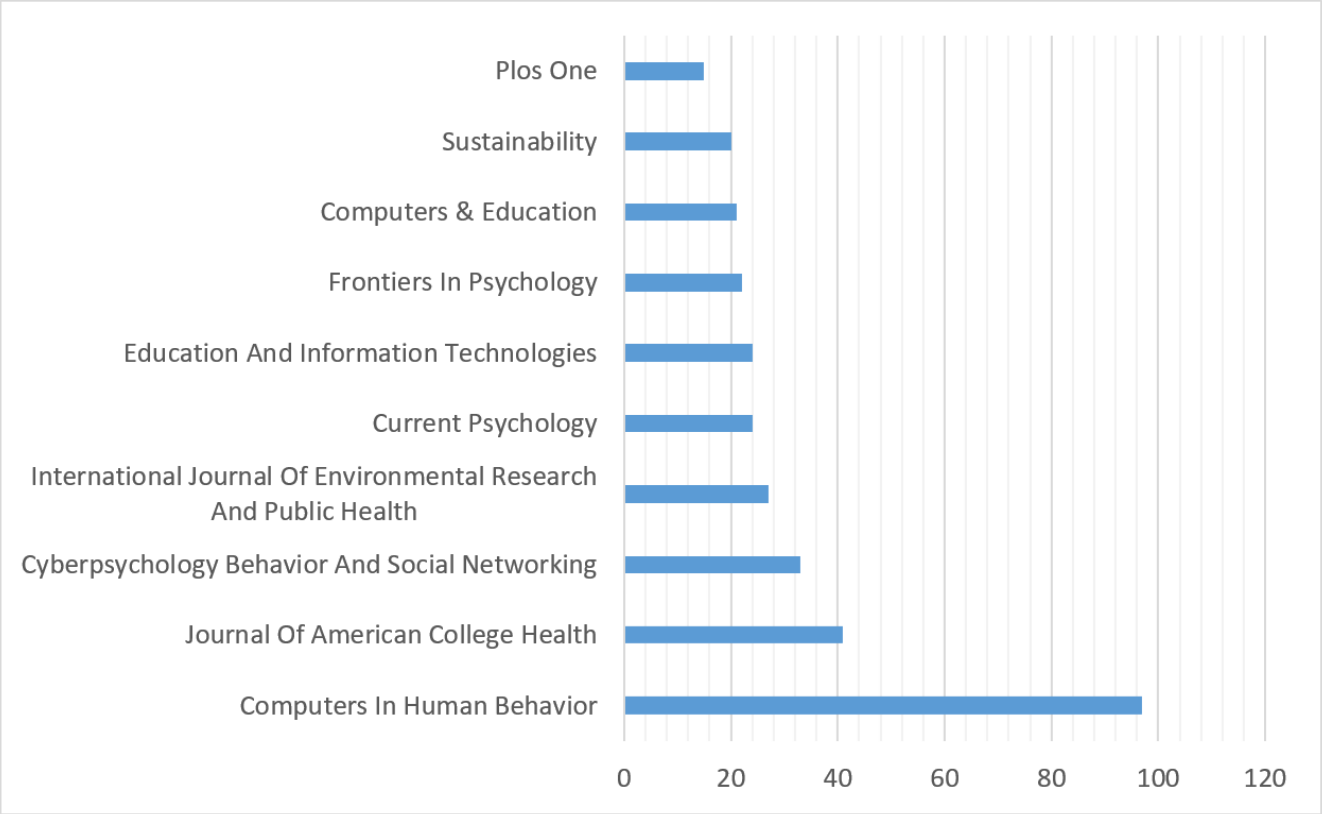

Figure 3: Top Ten Journals by Publication Volume.

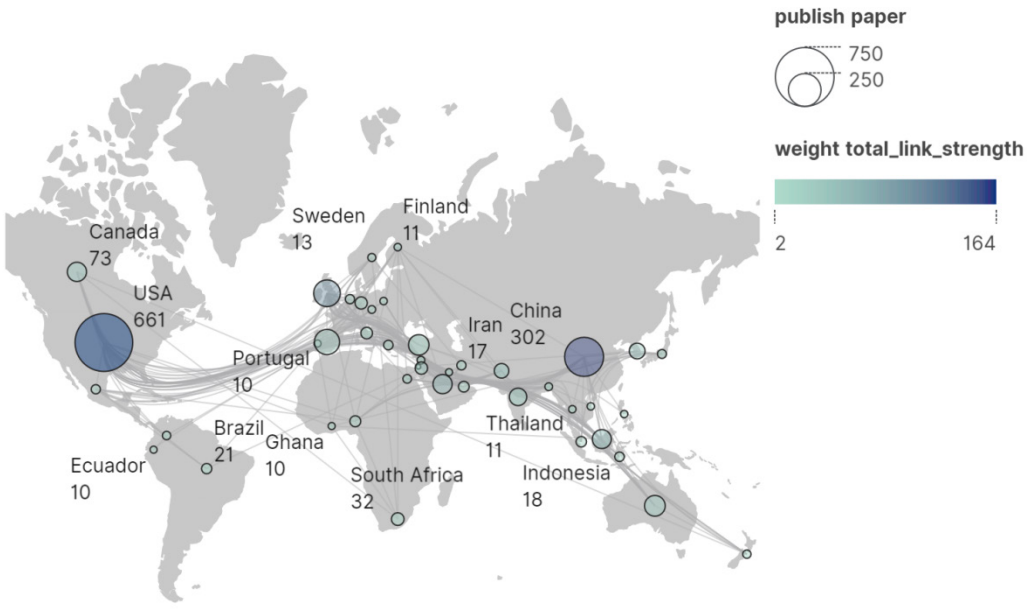

Figure 4: Global National Collaboration Network Map.

The modularity Q value is a measure of the degree to which a network can be partitioned into independent communities, ranging between 0 and 1. A Q value above 0.3 implies a significant community structure, indicating clear boundaries between clusters,[26] In this study, the Q value is 0.7526, substantially exceeding the baseline of 0.3, demonstrating strong independence and specialization among the research hotspots in this field.

The silhouette coefficient S value is another indicator of cluster quality, with values ranging from -1 to 1. An S value above 0.5 is generally considered a reasonable clustering, and a value above

Table 1: Top 20 Keywords Frequency Distribution Table.

Keywords	Count	Keywords	Count
Facebook	186	Education	36
Higher Education	107	Self-Esteem	33
Covid-19	107	Addiction	32
Twitter	66	Loneliness	29
Depression	60	Body Image	28
Academic Performance	55	Personality	26
Mental Health	55	E-Learning	26
Instagram	53	Communication	25
Internet	50	Fear Of Missing Out	25
Addiction	44	Stress	25
Anxiety	42		

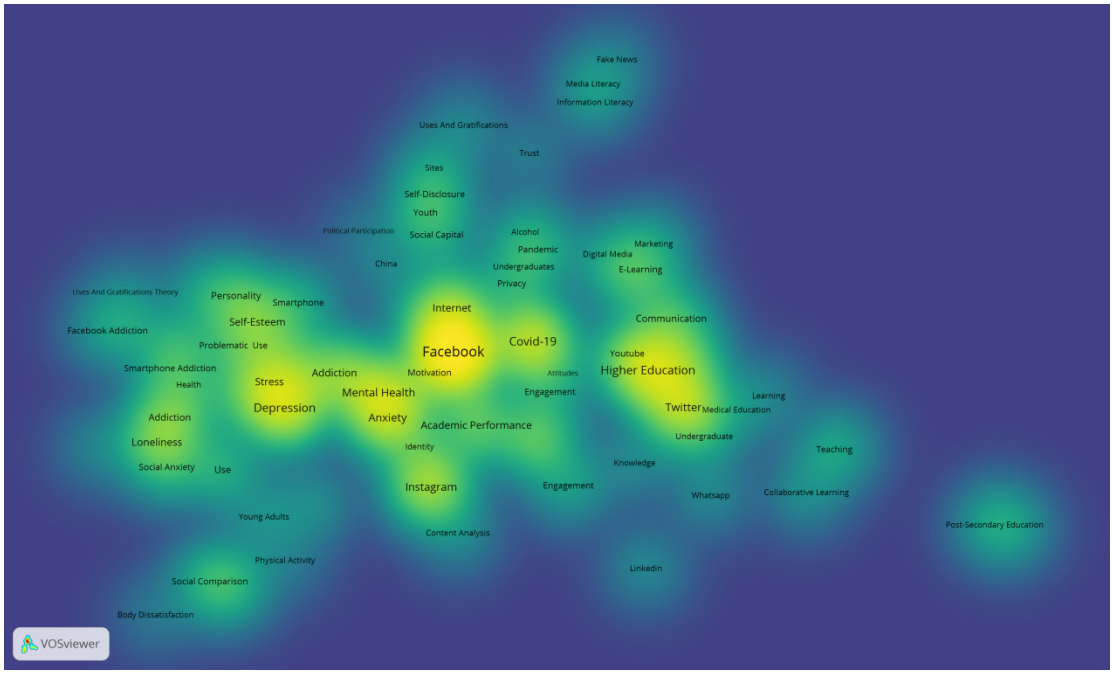

Figure 5: Density Visualization Map of Keyword Co-occurrence.

0.7 is deemed credible.[27] The average S value in this study is 0.9342, suggesting high internal consistency within clusters and good differentiation between them.

Furthermore, the Log-Likelihood Ratio (LLR) algorithm was applied to conduct clustering analysis of hotspot words, automatically extracting generated cluster labels. The LLR algorithm determines the association between words by statistically analyzing the probability of co-occurrence with other words. Its advantage lies in extracting meaningful noun phrases as cluster labels.[28] According to the information in Table 2, the clustering results highlighted important themes such as "Higher Education," "Internet Addiction," and "Mental Health," revealing the current academic focus on the impacts of social media use among college students.

From the final visualization results (Figure 6), an in-depth analysis of each research hotspot within the field of college students' use of social media and its effects is conducted. Each numbered cluster represents a research focus, with the included keywords depicting the specific contents of that focus.

Within the current academic research domain, studies on the impact of social media on young populations have been categorized into eight main clusters. Firstly, "Cluster 0" concentrates on the context of "higher education," exploring the impact of social media on students' "academic performance" and "mental health," and its interaction with other aspects of life, such as "physical activities." Following this, "Cluster 1" focuses on "Internet addiction," particularly the dependency of university students on social media and its potential impact on their "mental health." "Cluster 2" approaches the subject from a quantitative research

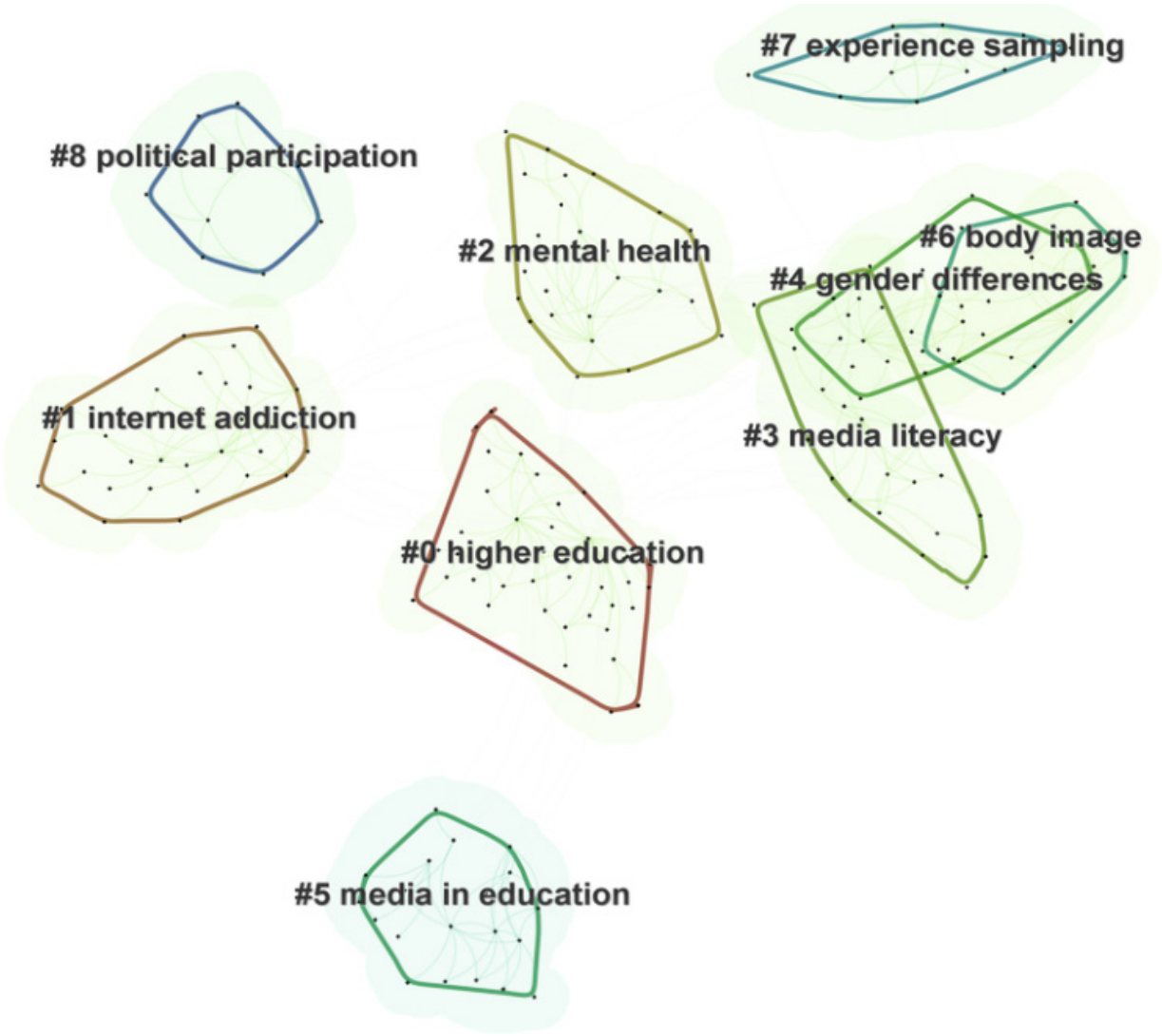

Figure 6: Cluster Analysis Diagram of Prominent Keywords.

perspective, examining the relationship between "social media use" and "mental health," emphasizing the roles of "social capital" and "social comparison." "Cluster 3" zeroes in on "media literacy," covering the importance of educating students to understand and critically evaluate information from "digital media." "Cluster 4" investigates "gender differences" in social media usage patterns and their effects on the everyday lives of "adolescents." "Cluster 5" is dedicated to media use in educational settings, exploring "teaching/learning strategies" and "educational issues." "Cluster 6" focuses on the impact of social media on university students' "body image" and "self-esteem," particularly concerning "social anxiety" and "eating disorders." Finally, "Cluster 7" and "Cluster 8" respectively explore "experience sampling" and "political participation," studying how young people engage in political activities through social media and manage the information flow from these platforms. These clusters reflect the researchers' profound interest in the multifaceted impacts of social media on young individuals across various domains.

Keyword Emergence Analysis

During the bibliometric analysis using CiteSpace, Kleinberg's.[22] burst detection algorithm was employed, integrating content analysis with a temporal series approach to track significant short-term fluctuations of specific thematic terms or keywords. This analysis reveals the rise and fall within research domains, providing profound insights into the evolution of academic focal points over time. The following five keywords can be considered the most crucial- Web 2.0, Internet Addiction, Social Comparison, Fear of Missing Out (FOMO), and Digital Literacy- based on their burst strength, time span, and the socio-cultural significance of the research fields they represent.

From 2011 to 2016, Web 2.0 emerged as a hotspot with a high intensity of 5.88, reflecting the broad impact of the rise of social media, blogs, and other user-generated content on education, business, and politics. Internet Addiction sustained prolonged attention from 2014 to 2020, underscoring the link between internet usage and psychological health issues, posing

Table 2: Details of the Nine Largest Keyword Clusters.

Cluster ID	Size	Silhouette	Mean (Year)	Cluster name	LLR
0	39	0.91	2018	Higher education	Higher education; academic performance; physical activity; young adults; mental health.
1	32	0.967	2019	Internet addition	Internet addiction; problematic use; addiction; fear of missing out; smartphone addiction.
2	25	0.945	2017	Mental health	Mental health; internet use; structural equation modeling; social comparison; social capital.
3	22	0.876	2016	Media literacy	Media literacy; digital media; information literacy; digital literacy; critical thinking.
4	20	0.887	2013	Gender difference	Media in education; computer-mediated communication; post-secondary education; teaching/learning strategies; pedagogical issues.
5	20	0.976	2019	Media in education	Gender differences; content analysis; media use; adolescence; digital habitus.
6	17	0.859	2016	Body image	Body image; social anxiety; instagram addiction; disordered eating; body dissatisfaction.
7	10	0.949	2017	Experience sampling	Political participation; hong kong; social movement; china; young voters.
8	10	0.974	2017	Political participation	Experience sampling; uses and gratifications; positive affect; negative affect; bedtime use.

a serious challenge in the public health domain. The focus on Social Comparison research from 2016 to 2021 highlighted the influence of pervasive social media on self-esteem and mental health. FOMO rapidly became a subject of research from 2020 to 2023, representing the desire and fear of social participation in a digitalized lifestyle. The brief yet intense concentration on Digital Literacy from 2020 to 2021 emphasized the importance of mastering digital skills in today's world, where remote work and learning have become the norm (Figure 7).

The analysis of these five keywords demonstrates that with the continual evolution of social media and digital technologies, their role in altering social structures, human behavior, and psychological health has garnered broad attention within the academic community.

Research Trajectory and Hotspot Analysis

Based on the annual publication volume, coupled with the aggregation and mutation of keywords, the research trajectory in the field of college students' use of social media and its impacts can be divided into the following three stages:

Emergence Phase (2007-2011)

During this stage, the annual number of publications was relatively low, indicating that it was an emerging field of study. Keywords such as "web 2.0" and "media in education" appeared in the list of bursting keywords, demonstrating an initial focus on the application of social media in education and the new possibilities brought about by web 2.0.

Rapid Growth Phase (2011-2017)

Characterized by a significant increase in publication volume, this stage reflects widespread interest and a rapid expansion of research on the topic. Keyword clusters revealed more diversified research themes, such as "Internet addiction," "media literacy," and "body image." Instead of focusing solely on educational applications, studies began to delve into the impacts of social media on college students' mental health, body image, and media literacy. Keyword mutation analysis indicated that themes like "internet addiction" and "social media" gained significant attention during this period.

Stable Development Phase (Post-2017)

In this phase, the annual number of publications has stabilized but remains at a high level, suggesting that the quantity of research has matured. Research themes began to concentrate on specific hotspots, such as "physical activity," "fear of missing out," and "body dissatisfaction." These bursting keywords suggest a focus on exploring the impact of social media use on physical activity, the psychosocial issues triggered by social media, and its influence on body satisfaction.

DISCUSSION

Annual Publication Volume Trends and Significance

Literature analysis indicates a significant increase in research volume since 2017, highlighting the growing recognition of social media's impact in higher education.[29] This trend not only

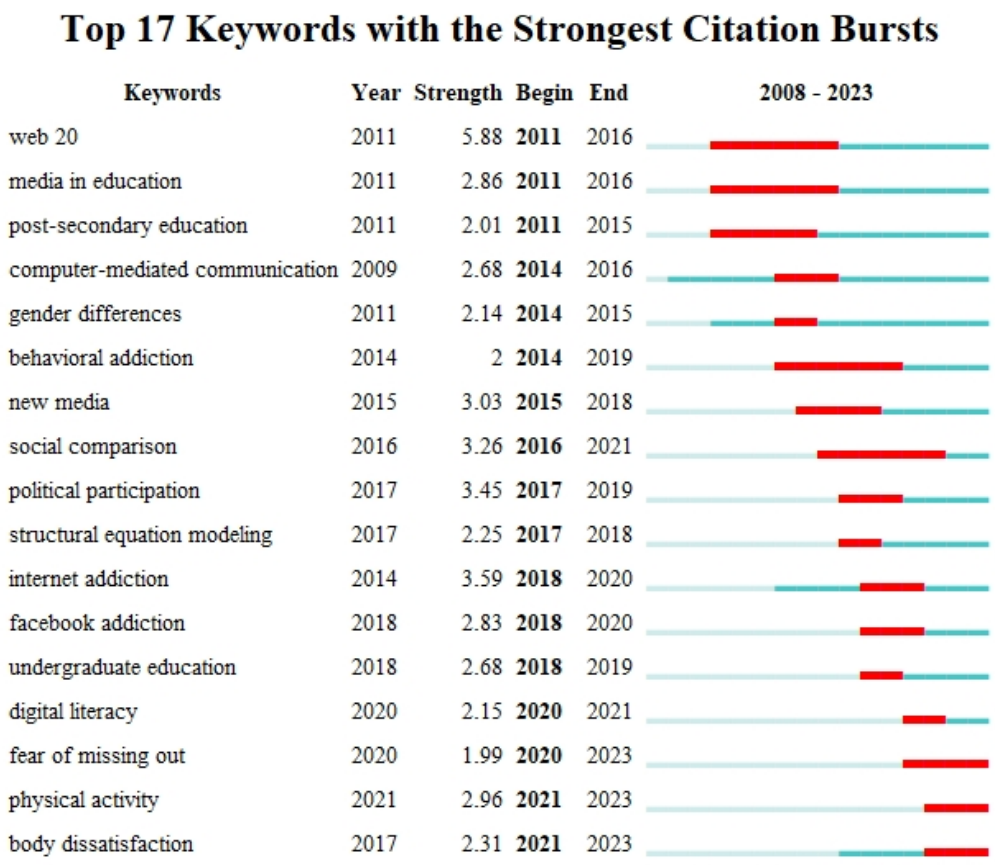

Figure 7: Start-End Years and Intensity of Keyword Bursts.

reveals the influence of social media on contemporary college students' psychology and behavior but also suggests directions for future research. For example, studies could further explore the relationship between social media usage and academic performance, or the specific mechanisms of its impact on students' mental health.

Specialization and Multidisciplinary Nature of Publishing Journals

Although journals like "Computers in Human Behavior" have contributed significantly to the field, the involvement of multidisciplinary journals indicates that research on the impact of social media is a cross-disciplinary topic. This trend underscores the necessity of using integrated approaches in future research, such as combining theories and practices from psychology, education, and information technology to fully understand the impact of social media.

Expansion and Deepening of International Collaboration Networks

The United States and China, as core participants in the research network, underscore their significant influence in the fields of technology and education.[30] However, collaborations with other countries like Iran, Thailand, and European nations indicate that the impact of social media usage can vary across different cultural backgrounds.[31] Therefore, future research should focus more on cross-cultural factors, exploring how cultural differences affect the use and impact of social media.

Evolution and Current Focus of Research Hotspots

From initial discussions on Web 2.0 to current concerns over internet addiction, media literacy, and body image, the shift in research hotspots reflects a deeper understanding of how socio-technological developments affect the lives of college students.[32-34] Especially during the COVID-19 pandemic, the connection between social media use and mental health among higher education students has been extensively discussed. This shift not only reveals the timeliness of research focus but also emphasizes the sensitivity and responsiveness to current and future societal issues.

Limitations

When reviewing social media impact studies from 2007 to 2023, it's crucial to recognize the temporal challenges due to rapid technological advancements. Early studies focused on platforms like Facebook and Twitter may not accurately reflect the current

dynamics introduced by newer platforms like TikTok. Continuous updates in theories and methodologies are necessary to keep pace with evolving social media functionalities and user interactions. Moreover, despite the leadership of the United States and China in this research area, international collaboration network analyses highlight geographical and cultural limitations, suggesting a need for more diverse and region-specific studies to enhance the global applicability and depth of research findings.

CONCLUSION

This comprehensive analysis of 1,967 articles has revealed multifaceted impacts of social media on college students' psychology and behavior, highlighting significant growth in research volume particularly after 2017. Leading dissemination platforms include journals like "Computers in Human Behavior" and "Journal of American College Health." The United States and China dominate the global research network, with study focuses transitioning from early Web 2.0 applications to contemporary issues such as internet addiction, media literacy, and mental health. Future studies should deepen exploration into the psychosocial effects of social media and incorporate cross-cultural perspectives to align with evolving socio-technological trends, thereby informing policy and practical applications.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS

All authors have read and agreed to the final version of the manuscript.

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