



Foundations and knowledge clusters in TikTok (Douyin) research: evidence from bibliometric and topic modelling analyses

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Received: 12 April 2023 / Revised: 23 August 2023 / Accepted: 31 August 2023 /

Published online: 20 September 2023

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Abstract

The goal of this study is to comprehensively analyze the dynamics and structure of TikTok research since its initial development. The scholarly composition of articles dealing with TikTok was dissected via a bibliometric study based on a corpus of 542 journal articles from the Scopus database. The results show that TikTok research has flourished in recent years and also demonstrate that the authors' collaboration networks are disjointed, indicating a lack of cooperation among TikTok researchers. Furthermore, the analysis reveals that research collaboration among academic institutions reflects the North-South divide, also highlighting a limited research collaboration between institutions in developed and developing countries. Based on the keyword co-occurrence network and topic modeling, TikTok research revolves mainly around five thematic areas, including public health, health communication and education, platform governance, body image, and its impact on children and students. Based on these findings, numerous suggestions for further research are offered. As far as the authors are aware, this is the first application of bibliometrics and topic modeling to assess the growth of TikTok research and reveal the intellectual base of this knowledge domain.

Keywords TikTok · Public health · Body image · Bibliometrics · Topic modeling

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1 Introduction

The big improvements in internet technology have boosted the widespread use of social media in numerous facets of everyday life [3, 6, 18, 96, 114]. By 2025, it is predicted that 4.5 billion individuals will be using social media platforms [111]. Making friends, communicating, delivering services, advertising, buying and selling products, seeking news, and participating in politics are just a few everyday routines that social media have influenced [46, 64, 87]. Conceptually, social media refers to a set of web-based tools that facilitate users' interactions, content creation, and personal communications [17, 138]. Beyond its personal uses, social media has also significantly impacted the corporate world. Organizations can use social media to connect with customers, promote their products and services, and collect insights into their audience [46]. It has also opened up new opportunities for advertising and marketing, enabling companies to target specific demographics and reach a larger audience [84].

As one of the most famous apps on social media, TikTok has become an important platform for content creators, brands, and companies to create content and reach an audience [118]. TikTok represents a video-sharing app where users can watch and upload clips that are 15 seconds to 60 seconds in length and edit them with special effects, lip-sync templates, and soundtracks. The unique selling point of TikTok is that each user's feed is automatically curated based on their preferences and past interactions with the app [85]. Data from the United States shows that 32.5% of users are aged between 10 to 19, making TikTok popular with the notoriously difficult-to-reach age groups [45]. The bulk of its users throughout the world is likely to be preteens and young adults. TikTok has been conceived of as a one-of-a-kind video social media platform with unrivalled user adoption and own distinctive technological structures, making it a unique online app in which memetic features and imitation elements further enhance user interactivity and engagement [22, 154].

Recently, scholars from several fields have numerous approaches to study the general applications of social media platforms, including TikTok [5, 99, 134]. As a multi-user and social-technological outlet, TikTok has been the topic of various academic discussions about its marketing [13, 61, 124], management, and business applications [90, 147], as well as its use in other sectors, including education [48, 108], healthcare [86, 121, 122], and tourism [81, 82, 137, 150]. For example, Escamilla-Fajardo et al. [48] propose a new approach to teaching that uses TikTok and find that using this social media app in the classroom can boost student enthusiasm, make lessons more interesting, and stimulate the growth of skills such as inquisitiveness and creativity. Rand and Brushett [110] note that TikTok videos are a pleasant and casual method for students to stay up-to-date on all course-related information, enabling to close the gap between professors and students. Similarly, Khan [75] analyzes how TikTok has changed archaeology in terms of public outreach, museum exhibits, and classroom instruction. This online platform has the potential to serve as a useful tool for the development of educational environments, mainly via the facilitation of dialogue in the form of comments and user-generated responses. In the healthcare sector, Eghtesadi and Florea [47] discuss the potential of social media platforms like Reddit, Facebook, and TikTok to diffuse health-related information among the general public and medical professionals. Zheng et al. [149] evaluate the credibility of acne-related health information available on TikTok by assessing the top 100 videos matching inclusion criteria for content quality. The authors recommend that dermatologists be aware that teens are searching for acne-related content on TikTok and make acne education a top priority in this patient group. Song et al. [120] use a sample of 372 valid responses from TikTok

users in China to examine the relationship between user experience and affordances and to investigate the variables that influence users' desire to keep utilizing brief video applications to learn about health-related topics. Li et al. [82] explore the correlation between the format, kind, and content of the COVID-19 TikTok videos and quantitative metrics of user engagement such as view counts, comments, likes, and shares. In the marketing context, Yang and Ha [144] investigate the factors that drive young Chinese consumers to use TikTok and how those factors can be connected to the persuasion power of influence videos on purchases. A poll of 382 Chinese college students online throughout the country shows that people use TikTok primarily because of entertainment. By drawing on the message interpretation process framework, Deng et al. [41] seek to comprehend how TikTok users react to influencer-endorsed wine short videos and uncover segmentation variations based on gender and the generations represented (Gen Z and Gen Y). The findings indicate that product-related posts get the highest engagement on TikTok, followed by those relating to influencers, emotions, alcohol-drinking intent, behaviors, and skepticism. Finally, Dias and Duarte [42] investigate the relationship between TikTok influencers, brands, and followers, with an eye on the Portuguese market. The study's results suggest that TikTok influencers aim to help companies by increasing their exposure and credibility, which drives more sales while acting as positive parasocial role models for their fan bases.

While the prior studies certainly provide academics with a wealth of information, there has yet to be a comprehensive bibliometric analysis of TikTok research. This comes as a surprise as a number of researchers have lately employed bibliometric techniques to investigate many academic disciplines [1, 44, 111]. Unlike the traditional and systematic literature reviews that necessitate substantial human coding work, bibliometric techniques enable researchers to overcome the constraints of manual approaches, such as the small sample of reviewed publications, the high potential for mistakes, and the time-consuming nature of the analysis. To this end, we apply a bibliometric and topic modeling analysis to draw attention to the interconnectedness of TikTok-related publications and examine the TikTok knowledge domain as a whole. By conducting this investigation, we have contributed at least three major additions to the current TikTok literature. First, this is the first time to examine TikTok research since its inception. As a result, exploring the structure and dynamics of scholarly articles dealing with TikTok enriches the extensive body of knowledge on the applications of TikTok. Second, we broaden the research stream of bibliometrics by analyzing scholarly TikTok-related works. Several scholars have argued that bibliometric and topic modeling techniques could be leveraged to explore the status and trends of scientific disciplines and uncover the hidden thematic structure in a larger body of literature [28]. Third, by limiting our research to scholarly works on TikTok, we contribute to this area's growing body of knowledge. To be more specific, we seek to address the following research questions:

- 1). How has TikTok research progressed since its initial development?
- 2). What are the research status and the hotspots of academic works related to TikTok?
- 3). Which TikTok authors are the most prominent?
- 4). What are the primary features of collaboration between scholars and academic organizations on TikTok-related scholarly articles?

This study is structured as follows. The next section explains the four-step approach applied to the bibliometric analysis. Section 3 discusses the results. Section 4 presents

numerous suggestions for future research based on the results of the bibliometric analysis. The last section dissects the study results, implications, and limitations.

2 Methodology

Following the four-stage method proposed by Fosso Wamba and Mishra [51], we conducted our bibliometric analysis:

- 1) Select the database and the search keywords
- 2) Carry out a preliminary analysis of data
- 3) Perform the analysis of bibliometric networks
- 4) Conduct thematic and conceptual structure analyses

Bibliometrix, R software, ggplot2, rentrez, and wordcloud were some of the tools used in the study. The bibliometric networks were also generated and shown with the help of VOSviewer [129]. This software was selected because of its capacity to efficiently manage network visualization tasks by combining text mining algorithms with visualizations. This section provides an in-depth explanation of the method applied.

2.1 Database and search keywords selection

From Scopus, we collected all publications dealing with TikTok. This database represents one of the most extensive libraries of abstracts and citations of peer-reviewed materials including numerous conference proceedings and journal articles [128]. Researchers regularly use Scopus to achieve high-quality analyses due to its substantial collection of scholarly literature and its many user-friendly features that simplify the execution of bibliometric analyses [50]. Scopus boasts a broader and more inclusive database in comparison to both Web of Science (WoS) and PubMed. To illustrate, while Scopus encompasses almost 85% of the publications indexed in WoS, only 54% of Scopus' own documents can be found within the WoS database [55]. This also demonstrates our commitment to attaining a comprehensive view of the subject matter, in line with our research objectives. Data related to authors, journals, publication type, titles, abstracts, keywords, and publications' numbers were collected. Extracted data were exported to a CSV file for use in further analyses. The following search query was used in the title, abstract, and keywords fields to retrieve publications from the Scopus database: TikTok OR Douyin. These keywords were chosen based on their direct relevance to the research subject. TikTok represents the global brand, while Douyin is its Chinese counterpart. The inclusion of both terms ensures that we capture all relevant research, regardless of regional focus. Given their status as authoritative sources [109], we limited our search to English-language journal articles and reviews. On January 22, 2023, a search was performed, and 550 documents were found. The next step was to determine whether articles were relevant to the topic at hand by reviewing their titles and abstracts; this process resulted in the removal of 8 articles. As a result, a total of 542 publications were selected.

2.2 Preliminary data analysis

We retrieved the BibTex format of all articles' metadata, including the titles, abstracts, keywords, and authors. Table 1 presents the main information about the selected set. The data in the table indicates a collaboration index of 3.3. Ajiferuke et al. [2] developed the collaboration index, representing a novel measure of fractional productivity, which quantifies the extent of collaboration among the authors of the scholarly articles. The selection of this index was motivated by the need to better understand the nature of collaboration in the research field under study. A low value for this index suggests that articles produced by single authors prevail, thus shedding light on the dynamics of individual vs. collective research within the selected dataset. This insight helps in characterizing the research landscape and in understanding collaboration patterns. Scholars undertaking meta-analytic studies argue about the types of publications included in the analysis. For example, Aryadoust and Ang [8] relied on books and journal articles in their study, while Della Corte et al. [155] relied entirely on journal articles. In this study, only peer-reviewed journal articles were considered for the analysis.

2.3 Network analysis

Incorporating elements of statistics, mathematics, and computer science, social network analysis (SNA) has rapidly developed into a rigorous analysis method. Using a network-based approach to synthesis, the SNA method can reveal previously hidden connections between publications, which can aid theory building and point the way toward promising new research avenues [33, 70]. Although several statistical measures have been developed

Table 1 Data collection details

Timespan	2019-2022
Sources (Journals)	365
Documents	542
Average years from publication	1.37
DOCUMENT TYPES	
Article	513
Review	29
DOCUMENT CONTENTS	
Author's Keywords (DE)	1574
AUTHORS	
Authors	1647
Author Appearances	1811
Authors of single-authored documents	102
Authors of multi-authored documents	1551
AUTHORS COLLABORATION	
Single-authored documents	107
Documents per Author	0.329
Authors per Document	3.039
Co-Authors per Documents	3.34
Collaboration Index	3.3

for analyzing networks, the scope of this research focuses on the three most basic: network size, network diameter, and network density. SNA methods have been widely used in the academic literature. For example, co-citation networks have been the subject of prior research [58, 127]. Li et al. [80] state that the knowledge foundation and development of a given research field can be observed through the co-citation network, which symbolizes a knowledge network consisting of two articles concurrently referenced in a third article. In addition, co-citation networks can be used to evaluate the degree to which two articles or authors share a common research interest. Changes in academic domains can be uncovered by analyzing co-citation patterns over time [7, 27]. Moreover, the structure of a research domain can be illustrated by the generation of source co-citation networks [25, 36]. According to Wakefield [132], source co-citation can graphically show the knowledge trends that suggest commonalities among academic journals, including research focus or methodology. Finally, a number of bibliometric analyses make extensive use of collaborative networks [94]. Collaboration networks are a useful bibliometric tool that can be visualized as a graph with nodes representing authors, nations, or academic institutions and links between nodes representing co-authorships between authors, nations, or academic institutions. In particular, it was shown collaborative efforts among researchers could create reciprocal advantages, boost research innovation and information diffusion, and improve the quality of research output [111]. In the same vein, Glänzel and Schubert [57] find that multi-authored works are more likely to appear in high-profile journals and receive a higher number of citations than those produced by a single researcher. As Ding [43] demonstrates further, inter-university collaboration can lead to fruitful research collaborations that ultimately aid in policy development. Furthermore, the analysis of the keyword co-occurrence network enables researchers to detect signal words or major thematic areas covered in a specific knowledge domain [123]. A keyword co-occurrence network is also a useful data mining approach that helps scholars reveal the main streams of inquiry that have contributed to the formation of TikTok research [146, 147]. Each network node stands for a keyword, and its color indicates which cluster it belongs. Nodes are larger when the keyword occurs more often, and relationships between nodes are stronger when the edges connecting them are thicker.

2.4 Thematic and conceptual structure analysis

Strategic or thematic maps are built upon the metrics of centrality and density established by Law et al. [79]. Researchers can use the maps to examine how recurring keyword patterns reveal emerging themes [77, 95]. The approaches employed to generate these maps have been inspired from both financial portfolio analysis and co-word networks [151]. The power of the thematic map rests on its capacity to distinguish the density and centrality of research within a number of categories [77]. While centrality represents the breadth of connection between topics, density reveals the progress of a theme [49]. The thematic map, which is created by clustering together frequently used keywords, provides more objective insights than the conceptual structure map. The use of a thematic map facilitates the rapid and straightforward identification of core themes and lays the foundation for further research into the various categories to which themes are subsequently ascribed [68]. Several studies in the academic literature have employed thematic maps [77, 95]. Besides thematic maps, conceptual structure maps are another way of knowledge visualization. These maps are useful for segmenting a broad scientific domain into more manageable study sub-fields. Keywords are represented as dots on a map, and results are displayed in accordance

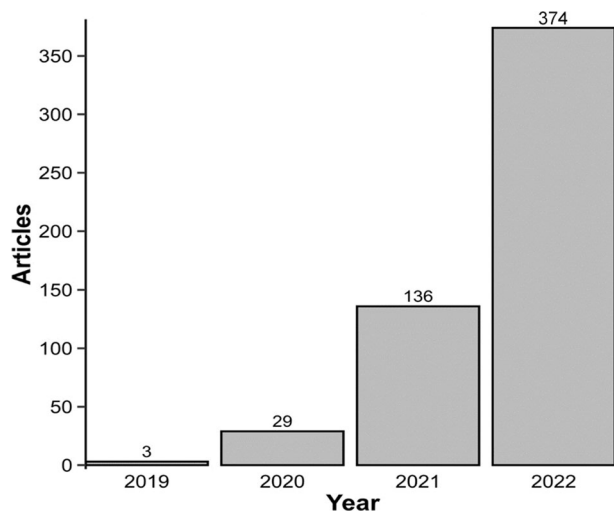
with the locations of those dots. Closer dots indicate that there are more publications addressing the concepts or ideas together, while dots that are farther apart suggest a lesser number of articles discussing the topics [35]. Therefore, this allows for the detection of keyword citation bursts or new research trends [31]. As such, it is feasible to understand better which knowledge hotspots often arise in the academic literature.

3 Findings

3.1 Scholarly output, key journals, and productive authors

We first trace the history of TikTok research and its progress. The number of articles dealing with TikTok is shown in Fig. 1. The chart shows that the number of articles published each year has increased exponentially. In 2019, only three articles were published, but the number of articles grew more than tenfold in 2020. In fact, TikTok's rise to prominence in 2020 coincided with the COVID-19 pandemic that swept the globe, but the app has a long and storied history spanning numerous incarnations. Zhang Yiming launched the company ByteDance in 2012, and in 2016, the company released the app Douyin in China, which enables users to produce and share short clips of themselves. Simultaneously, another app called Musical.ly [5] emerged from China with a similar idea but a concentration on lip-syncing and dancing. In 2015, Musical.ly surpassed Douyin to become the most downloaded app in the United States. ByteDance, on the other hand, built an algorithm that took into consideration the kinds of videos a user uploaded, shared, liked, disliked, and commented on, as well as the accounts the user chose to follow. ByteDance, which had previously acquired Musical.ly, integrated Musical.ly with Douyin and relaunched it as the worldwide app TikTok in 2018 [72]. Overall, the annual number of articles has increased significantly over the past two years. This finding is highly meaningful and significant in bibliometrics since the field had an immature base of publications from the start, witnessed tremendous expansion, and greatly influenced the academic world. Consistent with Price [104], it is expected

Fig. 1 Annual distribution of TikTok-related publications



that TikTok research will enter its vigorous growth phase as the number of publications has grown exponentially over time, and the vast majority of the literature has been published in the past few years. We can speculate that the meteoric rise of TikTok research has only begun, and it will soon have profound effects on science and technology.

A wordcloud of the most influential journals that have published scholarly articles on TikTok is shown in Fig. 2. The wordcloud is used to showcase the most prominent outlets in the TikTok field, with the size of the label reflecting the total number of citations each journal has received. According to the chart, journals such as International Journal of Environmental Research and Public Health, Health in Psychology, Social Media and Society, Journal of Medical Internet Research, Media and Communication, and Frontiers of Public Health stand out as the most impactful journals in TikTok research. Overall, we observe that health journals dominate the journal distribution in TikTok research.

Academic journal productivity can be evaluated using the Bradford law. The law arises from the need to track down the main journals that have published articles on the subject at hand during the course of a research period [24]. The law states that “if scientific journals are arranged in order of decreasing productivity of articles on a given subject, they may be divided into a nucleus of periodicals more particularly devoted to the subject and several groups or zones containing the same number of articles as the nucleus [20]”. The Bradford law in the TikTok literature is depicted in Fig. 3. Using R-Biblioshiny to apply Bradford law, the inverse connection of Bradford [20] is immediately apparent since the first zone of the graph illustrates the core zone or Bradford zone 1. This zone comprises a handful of academic (40 out of 365) journals such as International Journal of Environmental Research, Frontiers in Psychology, Social Media and Society, and Journal of Medical Internet Research. This shows that the bulk of TikTok-related publications is published mainly in eight different outlets.



Fig. 2 Main influential journals in TikTok research

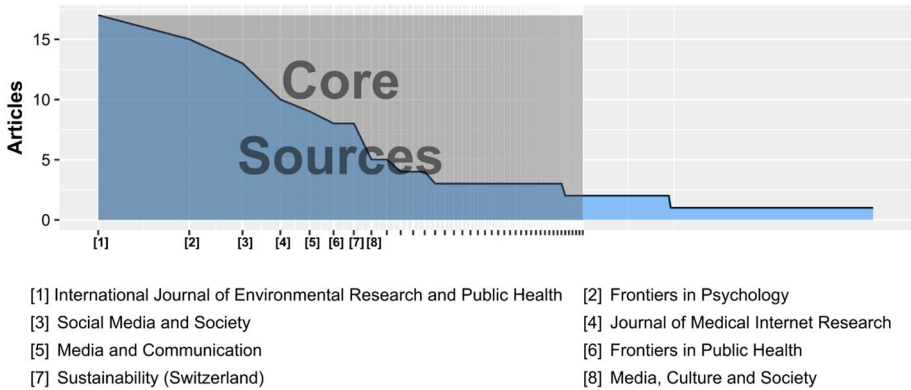


Fig. 3 Bradford’s law in TikTok research

Based on the data from the Scopus database, Fig. 4 depicts the dominance of authors in TikTok research throughout time. From 2020 to 2021, Sidorenko-Bautista, P. ruled, and from 2021 to 2022, Basch, C.H. and Fera, J. predominated.

In the present study, Lotka’s law is applied to assess the relative importance of each TikTok contributor [101]. According to the law, the authors are ranked by their number of articles, then the total number of authors should be proportional to $1/n^2$ [145]. In a nutshell, Lotka’s law states that the number of authors negatively correlates with the number of publications each author contributes to the literature [76]. With the help of bibliometrix R-package, we were able to apply Lotka’s law to TikTok research. The Lotka’s distribution is depicted in Fig. 5. The Kolmogorov-Smirnov two-sample test shows no statistically significant differences between the empirical and theoretical distributions at the standard 0.05 level of significance. Furthermore, the long tail for authors with a single publication in Fig. 5 suggests that some researchers have looked into TikTok as a subordinate research topic. Overall, the results suggest that Lotka’s law is valid

Fig. 4 Top authors in TikTok research over time

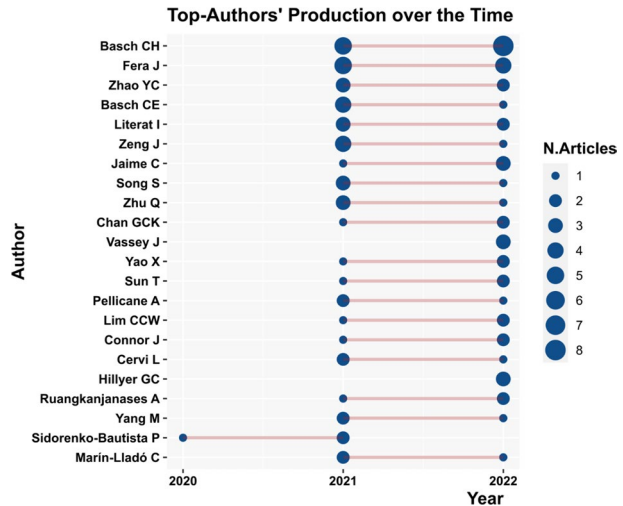
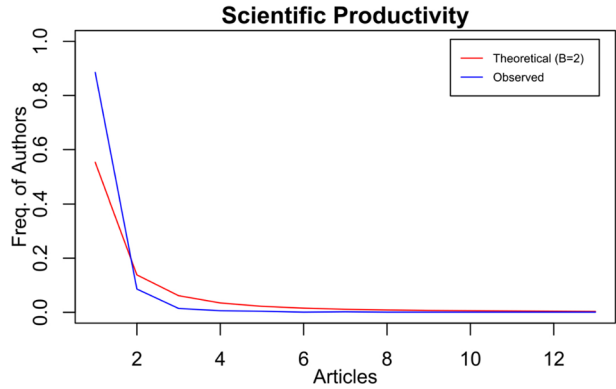


Fig. 5 Lotka’s law in TikTok research



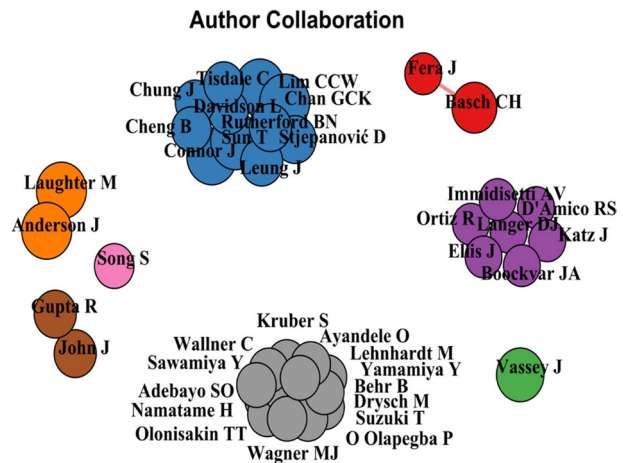
for TikTok-related publications. This pattern of results is also observed in other study fields [94].

3.2 Analysis of networks

3.2.1 Collaboration networks analysis

The collaboration networks among authors and institutions in TikTok research were obtained through the following steps using the Bibliometrix software: 1) Data Collection: Compilation of metadata, including authors and institutions; 2) Network Construction: Creation of an authors’ collaboration network and an institutional collaboration network based on the relationships identified in the data; 3) Network Analysis: Computation of network parameters such as size, density, and diameter for detailed analysis; 4) Visualization: Rendering the networks into graphical form, with interrelated research communities depicted in different colors in Fig. 6, and institutional collaboration shown in Fig. 7. The authors’ collaboration network in TikTok research is shown in Fig. 6. The size of the network is 1647, with a density of 0.0024 and a diameter of 4. A few interrelated research communities are depicted in the graphic, each represented by a different color. The pieces

Fig. 6 Authors’ collaboration network in TikTok research



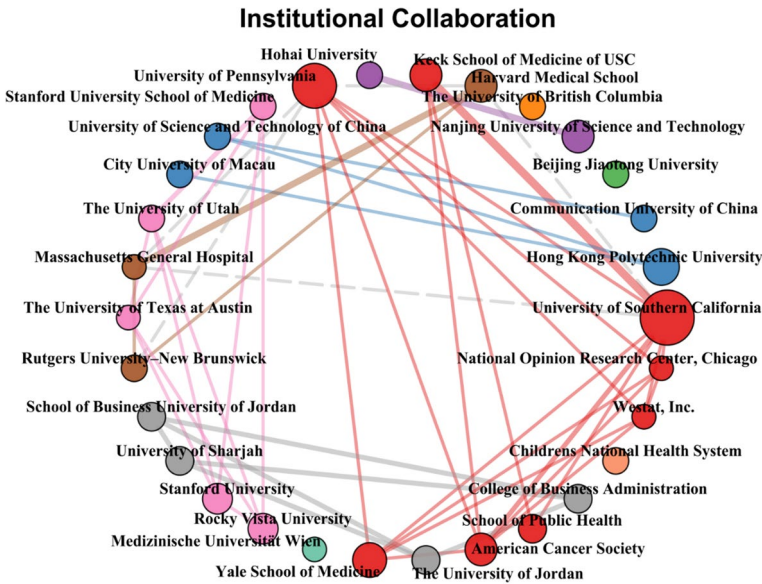


Fig. 7 Institutional collaboration network in TikTok research

of the network are fragmented, indicating that the most influential academics prefer to work independently. The participation of islands disconnected from the rest of the academic community is further supported by previous studies (e.g., [74]).

Figure 7 illustrates the network of institutional collaboration in TikTok research, with a size of 804, a density of 0.0038, and a diameter of 19. There is limited collaboration between the institutions in the network. The University of Southern California, Yale School of Medicine, and University of Pennsylvania, for example, cooperate together often. Zou et al. [153] coined the term “locally-centralized globally discrete” to describe this type of collaboration. Even though there is a strong research collaboration among US and Chinese universities, there is much less cooperation between academic institutions in developing and developed nations, reflecting a North-South divide. Intriguingly, geographic proximity and language may be the major reasons of collaboration in TikTok research.

3.2.2 Keywords and co-occurrence analyses

Keywords have been commonly used in the academic literature to identify essential information and subject trends despite their high level of abstraction [111]. Figure 8 is a word-cloud containing terms taken from the abstracts of papers dealing with TikTok. A close glance at the chart reveals that the keywords “TikTok,” “social media,” “video,” “platform,” “content,” and “health,” are among the most frequently used search terms.

Using keyword plus, Fig. 9 displays the dynamics of keyword growth. Sharp increases in keywords’ popularity reveal priorities and trends in TikTok research. COVID-19, Instagram, China, adolescents, and public health are all examples of relevant search terms. Since the body of knowledge in a certain academic discipline can be seen as a chain of ideas that develop, become more prominent for a while, and then fade away, these keywords also represent possible new directions or hotspots in TikTok research [32].

unintentionally across a population. Moreover, TikTok has been associated with the use of tobacco and vaping products. According to Rutherford et al. [115], the popularity of pro-cigarette usage and vaping-related material has been confirmed by recent content analyses of TikTok. This is despite the fact that many online communities include rules against discussing, displaying, or trading illegal substances such as alcohol, tobacco products, and drugs [115]. Purushothaman et al. [106] state that TikTok has been linked to the dissemination of pro-smoking and pro-tobacco product rhetoric. As a result, exposure to TikTok content can lead to the normalization of tobacco use and a higher willingness to engage in vaping practices [14, 93, 115, 125].

The second cluster is related to alternative social media platforms and their association with health communication and education. For example, Reuter et al. [112] highlight that Instagram distinguishes out as a platform that prioritizes visual material over text, thus having more the potential to affect users' inclination to interact with health messages. Al-Marroof et al. [4] observe that in contrast to TikTok, YouTube significantly impacts viewers' medical understanding and perception. While TikTok was created to facilitate self-expression and socialization, YouTube has a wide range of education and non-educational uses thanks to its flexibility in terms of both the content and scheduling of videos posted there. When it comes to the field of dermatology, Cooper et al. [34] posit that Twitter has surpassed all other social media platforms as the preferred means for healthcare communication. Twitter facilitates public discussion about skin conditions, which raises awareness of skin diseases, provides a secure environment for patients, and offers emotional and social support [37]. The collaborative features of Facebook have also attracted organizations and audiences interested in dermatology-related material and healthcare advice [126]. The high frequency of the keywords deep learning and AI indicates the importance of these technologies in developing content analysis models for studying TikTok and social media content [54, 62, 143].

The third green cluster focuses on TikTok research from the Chinese perspective. Most frequent keywords in the cluster include China, algorithms, platform governance, geopolitics, and identity. While the algorithms behind the information that is organized, ranked and picked for people's feeds are often secret and black boxes, they are made evident in social media users' online experiences. In this respect, algorithms function as a knowledge system about the problem(s) they are designed to address, and as such, they cannot be said to be decoupled from the environment in which they are implemented [56]. Unlike other popular social media platforms, TikTok's success does not rely as much on users' ability to interact with one another. Instead, the platform generates a never-ending supply of short videos by largely relying on algorithms, user behavior, and AI learning capabilities [9]. Although TikTok has taken a distinct de-sinicization strategy by trying to downplay or hide its ties to China and the Chinese government, the platform has become the major line of discourse for critics, investigators, and ban advocates [91]. The algorithmic-driven content moderation has raised concerns about platform governance, which has been shaped by geopolitics [59] and users' identity [71]. For example, Wang and Zhou [133] note that TikTok, through its algorithms, has punished content deemed unsavory, such as videos made by members of the LGBTQ community, creators with visible disabilities, obesity, or unattractive faces. Zeng and Kaye et al. [72] state that some of the issues faced by TikTok are attributed to geopolitics, particularly the network's Chinese origins and the inability to regulate the content posted on the platform. As a result, this illustrates the intricate relationship between TikTok, politics, and identity.

The fourth cluster (purple-colored) concentrates on several aspects of social networks, including body image, uses and gratifications (U and G), motivation, personality traits, and

self-esteem. Related to this theme, Pop et al. [102] find that students' feelings about their body esteem improved in proportion to the amount of time spent on TikTok and Snapchat. Holland and Tiggemann [66] conduct a literature review analyzing twenty studies on social network use and body image and find a correlation between body image indices and overall social network use. Pan et al. [100] establish that exposure to social media influencers is associated with a desire to alter one's physical appearance. From the perspective of uses and gratifications theory, several studies in the cluster investigate the impact of personality traits and motivations on the use of TikTok. For example, Omar and Dequan [98] indicate that self-expression, archiving, escapism, and social interaction are major predictors of TikTok use patterns, although to varying degrees and effects. Meng and Leung [89] look at how personality traits, narcissism, and gratifications-sought influence TikTok engagement behavior in China. Their findings show different gratifications sought, including fashion, escape, information seeking, entertainment, sociability seeking, money making, modality, and interactivity. Overall, the focus of the cluster is on the motives and gratifications of using social network sites.

Finally, the orange cluster emphasizes the popularity of TikTok among children and students. Given that these groups remain the major demographic involved in TikTok use, they are subject to serious predators, ranging from radicals, terrorists, and cyber-attackers, to criminals. In this vein, Weimann and Masri [136] report that the content of far-right groups has recently increased on TikTok, exposing children to hate, offense, and animosity. Similarly, De Leyn et al. [38] stress that concerns regarding children's privacy on TikTok have been sparked by the exponential popularity of the app. As a result, there is a need for effective privacy management to promote self-representation practices and the protection of sensitive data [19].

3.3 Topic modeling approach

Since abstracts are widely accepted as reflecting the essential content of publications, topic modeling was used for the abstracts of selected articles to obtain a more in-depth knowledge of the primary topics discussed in TikTok research. In the context of machine learning, topic modeling is a strategy that looks for word use patterns and gives common terms new meanings by grouping them together [60]. The use of topic modeling enables streamlining the analysis of large amounts of unlabeled texts by grouping words with similar meanings together and distinguishing how words with multiple meanings are used [152]. Generally, it is common practice to use topic modeling to unearth latent themes or topics in a collection of texts or corpus. This technique views each theme in a given text as a composite of several topics. In the current work, the Latent Dirichlet Allocation (LDA) approach was applied to reveal the latent topics concealed within the abstracts of the selected TikTok-related publications. This method has been used extensively in research analyzing Industry 4.0, the public sentiment and opinion during the COVID-19 crisis, and international trade [69, 78, 142]. First, we did some text preparation to improve the overall quality of the collected data. More specifically, we employed tokenization to split abstracts into word units and normalization to convert all capital letters to lowercase ones. Words with inflected forms were diminished via the use of stemming. Due to their lack of useful information, stop words, punctuations, and numbers were also removed [116]. As can be seen in Fig. 11, the LDA approaches yielded six overarching themes in TikTok research. In this figure, the vertical axis displays the

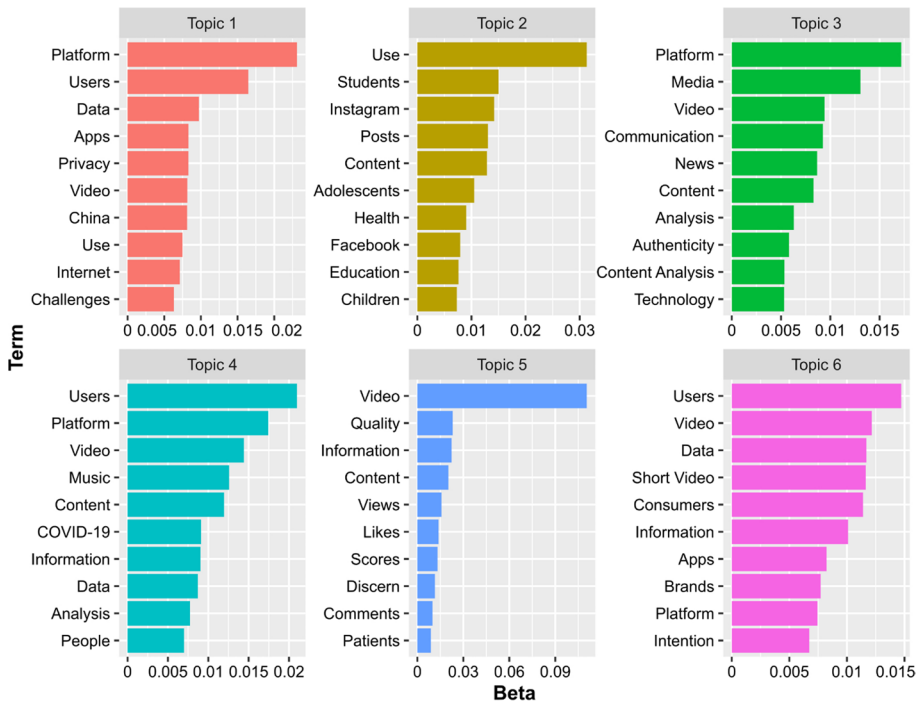


Fig. 11 Topic modeling in TikTok research applying the LDA technique

keywords representing different themes, while the horizontal axis shows the values of beta, which signifies the relevance of each keyword to the corresponding theme.

The first theme deals mostly with the privacy issues associated with TikTok use. Despite users' enjoyment of using TikTok, there are rising worries about the origins of the application and its possible privacy infractions. For example, Donald Trump, the former President of the United States, has stated a wish to prevent TikTok from being available in US app stores, including Apple's App Store and Google's Play Store [73]. Miao et al. [91] note that the Chinese origin of TikTok has led to the assumption that Internet companies in China are often subject to strong government surveillance and, as a result, are likely to communicate user data to the Chinese government, putting user privacy and potentially national security at risk in countries in which they operate. As a networked public, the dynamics of TikTok raise worries about children's safety due to the difficulties presented by safeguarding privacy on this platform and the presumptive predisposition of youth for irresponsible exposure [38]. Therefore, privacy and data protection represent one of the greatest challenges for the overseas expansion of TikTok, which requires the reorganization of the operations and governance structure of the company behind TikTok. The second topic revolves around TikTok use in education. Because of its popularity among adolescents, TikTok can effectively reach young people with messages on education and health [52]. For instance, Escamilla-Fajardo et al. [48] demonstrate that there have been beneficial educational results from using TikTok's innovative approach to teaching. According to the authors, students felt using TikTok encouraged their imaginative and inventive abilities. Sari et al. [117] note that

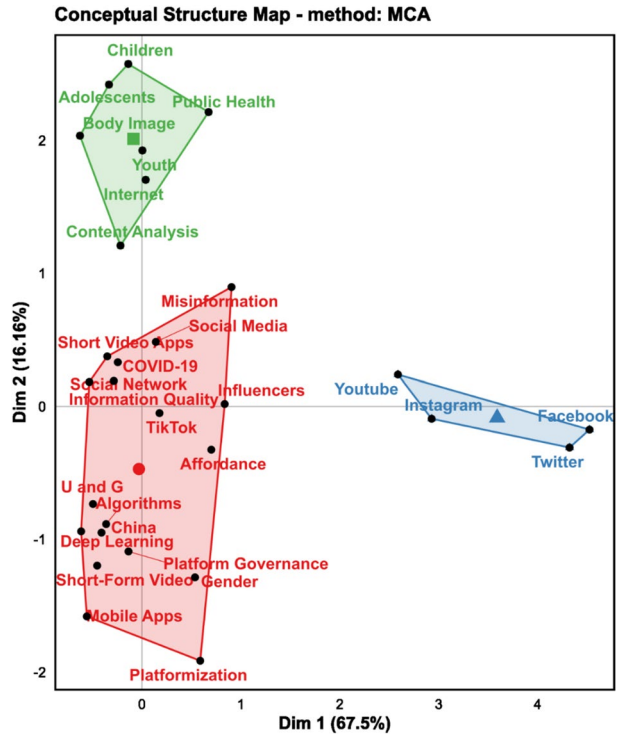
teachers in the field of physical education can leverage the video-sharing platform TikTok to explain movement concepts to their students and recap their learning activities. TikTok can be easily used to modernize education, increase outreach, and improve students' creativity and communication skills.

The third topic is related to the analysis of media news on TikTok. In this regard, Vázquez-Herrero et al. [131] perform a content analysis of 19 news media and programs with a verified profile and broad thematic scope after selecting 234 accounts based on an exploratory search of news media on TikTok across the globe. According to the findings, the media has been more included in the younger generation's news diet since 2019, with the goals of informing, establishing their brand, and adjusting to TikTok logic in a novel approach to journalism for the youth of today. Despite the influence and prevalence of TikTok, few TV news outlets are willing to take plunge and attempt to get TikTok users to switch to traditional news broadcasts. In their study, Chobanyan and Nikolskaya [29] assess the current landscape of TikTok news players and the app's potential to become a second major news outlet by analyzing the two popular NBC News and CBS News Channels on TikTok. Although young people stress the need for entertainment and brevity in any prospective TV news videos on TikTok, the research demonstrates that even serious and least enjoyable videos can acquire millions of views and likes. The fourth theme deals with the characteristics of COVID-19-related content posted on TikTok. The emergence of the COVID-19 pandemic has been instrumental in TikTok's meteoric rise, and the platform played a crucial role in disseminating factual and erroneous information regarding the pandemic [5, 99]. The fifth topic deals with the characteristics of TikTok videos, including video quality, views, comments, likes, and comments. When applied to various video-based platforms like TikTok, the DISCERN instrument has been shown to be an effective tool for evaluating the reliability and quality of textual patient health information about treatment options [11, 83]. Finally, the sixth topic discusses the use of TikTok short videos to support brands and reach consumers.

3.4 Multiple correspondence and thematic analyses

Multiple correspondence analysis (MCA) was used to investigate the conceptual structure of TikTok research. MCA was employed to construct the conceptual structure map in the R-Bibliometrix software by examining the keywords' proximity in the selected publications [40]. On the map, distributionally similar terms appear closer together [92]. In addition, we used the `conceptualStructure` function in R to obtain the authors' keywords. Taking into account the similarity of the keywords in the map, we also used k-means clustering to generate clusters with shared ideas [111]. K-means is often used for clustering, and when combined with MCA, a two-dimensional graphic is produced showing the most important keywords, their connections, and new trends and directions in the knowledge area. The conceptual structure map of TikTok-related scholarly articles is shown in Fig. 12. The graphic depicts four different clusters for the intellectual structure of TikTok research. The red cluster includes keywords that focus on three critical aspects of TikTok: information quality, use and gratification, and platformization. Information quality, misinformation, U and G (use and gratification), platform governance, and platformization are just a few examples. Related articles include Qin et al. [107], who find that information quality has a significant effect on enjoyment. Similarly, Song et al. [120] conclude that TikTok videos about the chronic obstructive pulmonary disease (COPD) have a generally satisfactory information quality even though the

Fig. 12 Conceptual structure map of TikTok research



quality differs according to the source and the quality metric used. As a result, TikTok faces challenges in ensuring information quality and combating the spread of misinformation. Similar to other social media platforms, TikTok also offers users a variety of ways to satisfy their needs and desires through the platform. In this context, Bucknell Bossen and Kottasz [23] investigate the uses and gratifications desired by the major audience (pre-adolescent and teenage groups) of TikTok and find that users' behaviors are driven by the need to broaden one's social circle as well as by the desire for self-expression, celebrity, and a sense of self-identity. Drawing on the approach of uses and gratifications, Scherr and Wang [119] examine TikTok's gratification niches and find that the app is used for four reasons: trendiness, novelty, escapist addiction, and socially rewarding self-presentation. Omar and Dequan [98] find that TikTok use is significantly influenced by individuals' motives rather than their personality traits. Users' motives, such as social interaction, self-expression, and escapism, are also identified as significant predictors of TikTok use behavior. As a product of the process of platformization, there is a need for TikTok to maintain the safety and well-being of users, protect privacy, and guarantee the quality and accuracy of the information shared on the platform. The second cluster in green contains keywords such as public health, body image, children, and adolescents. This cluster focuses on the impact of TikTok on public health and body image. Representative articles include Southwick et al. [122], who confirm the importance of TikTok video analysis in informing public health messaging and public health mitigation policies; Basch et al. [15], who conduct a cross-sectional research to explore how users of the video sharing platform TikTok are discussing a key component

of community mitigation—the usage of masks to prevent the spread of COVID-19; and Brooks et al. [21], who highlight the negative impact of TikTok as an emerging platform for the promotion of unhealthy eating. Besides public health, TikTok can impact how users perceive their bodies and body image. For example, Pop et al. [102] show that the more time students spend on social media platforms like Snapchat and TikTok, the higher their self-esteem. Pan et al. [100] demonstrate that the connection between female TikTok users’ exposure to influencers and their desire to alter their physical appearance is mediated by their self-objectification. The final cluster includes various examples of social media platforms, including YouTube, Facebook, Instagram, and Twitter. When compared to Twitter and Facebook, where users’ feeds are dominated by posts from their friends and followers, the feed of TikTok is similar to Instagram’s “Discover” feature, with almost all of its users’ time is spent within the app itself [53].

The thematic map of TikTok research is depicted in Fig. 13. The number of occurrences of each keyword in the selected articles is represented by the size of the bubbles. Cobo et al. [31] state that the motor themes quadrant has very dense and central themes that are both externally and internally developed. The niche themes quadrant contains all topics that are strongly interconnected internally but have only weak exterior links. The literature also characterizes such topics as unique and elaborate. All the themes that are low in density and centrality and have few connections to other themes fall into the quadrant of emerging or declining themes. The basic themes quadrant is characterized by high centrality and low density. It contains themes with significant external linkages and weak internal linkages. Therefore, the first upper-right quadrant contains themes with both high centrality and density. The topics discussed in this section of the research map are well-established and have the potential to shape the development of the knowledge field. As a result, themes associated with Instagram, YouTube, Twitter, Facebook, and influencers have remained fundamental and prevalent over the few years of TikTok research development and growth.

In contrast, themes related to social media and TikTok use in the COVID-19 context are characterized by high centrality and low density, suggesting that while they can influence

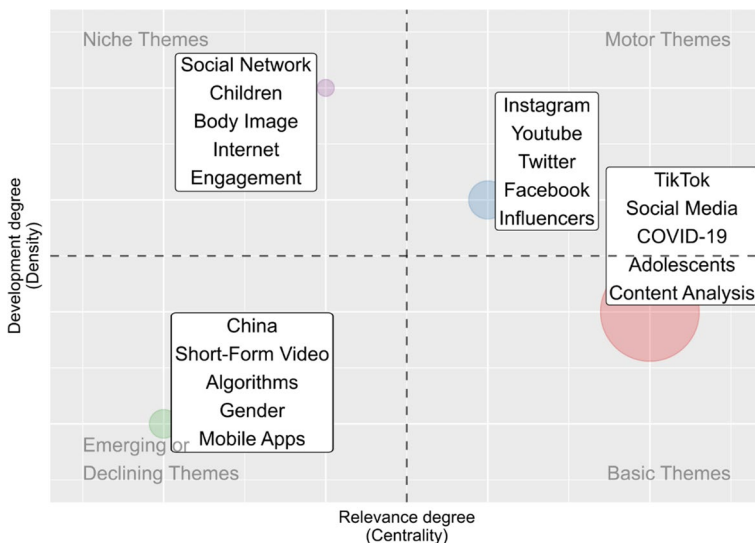


Fig. 13 Thematic map of TikTok research

other themes, they are not fully developed and may shed light on future knowledge gaps. In the upper-left quadrant, keywords like social network, children, body image, internet, and engagement indicate that the impact of social networks (e.g., TikTok) on children's body image and engagement is a niche theme in TikTok research. This theme is well-developed in terms of internal linkages but has weak external connections and low importance. Finally, keywords located in the lower-left quadrant, like China, algorithms, gender, and mobile apps, are examples of nascent and poorly developed topics

4 Discussion and future research

The progression of TikTok research from its inception reveals a fascinating panorama of technological, cultural, and academic convergence. Starting with a modest three articles in 2019, the field saw an explosive growth in 2020, corresponding with the global upheaval of the COVID-19 pandemic. This synchronicity between real-world urgency and academic response extends beyond mere coincidence, signifying a broader shift in scholarly focus towards digital platforms. The platform's historical lineage, with roots in Douyin and [Musical.ly](#), underlines the importance of recognizing digital phenomena as part of a longer continuum rather than isolated events. Moreover, the critical role of ByteDance's algorithm brings to light the complex interplay between technology and content, raising essential questions about user agency and data privacy. Looking ahead, the current exponential growth in TikTok research may lead to more specialized niches, reflecting the platform's multifaceted applications in politics, public health, and entertainment. This trajectory emphasizes that while digital platforms may seem transient, their profound effects on culture, society, and academia warrant enduring scholarly exploration.

The research status related to TikTok has evolved to encompass diverse domains, highlighting several emerging and prevalent hotspots. One of the dominant research focuses is on TikTok's impact on public health. There is evidence that TikTok has great potential as a platform for distributing public health information, especially in areas like pandemic information, mental health, eating disorders, and well-being among children [16, 88]. Concurrently, researchers are exploring TikTok's collaboration with public health professionals during the COVID-19 pandemic, its improvement of user experience among the younger generation, and how it could be utilized by healthcare organizations for patient communication [82, 120]. The possibility of TikTok as a tool for telemedicine and remote health consultation is also emerging as an important area. Additionally, understanding the interplay between user identity and algorithmic processes on TikTok has been recognized as significant, exploring how TikTok's algorithms contribute to misinformation or the formation of echo chambers [10, 12]. Furthermore, the research also emphasizes the importance of understanding TikTok's effects on body image, considering the platform's popularity and user engagement. Substantial research has been conducted on TikTok in China, particularly from the perspective of algorithms, platform governance, and geopolitics. This includes exploring how the Chinese government employs TikTok for online activity monitoring and control. These hotspots represent the central themes that are shaping the current state of TikTok-related research, suggesting that academic inquiry into this platform is multifaceted and growing in complexity, with significant potential for further exploration in both well-established and emergent areas.

The prominence of authors such as Sidorenko-Bautista, P., Basch, C.H., and Fera, J. in the TikTok research field between 2020 and 2022 suggests more than just a measure of

productivity or influence. It hints at possible underlying trends or shifts in research focus that may correspond to their areas of expertise. Are these authors pioneering new methodologies or unearthing specific insights that are driving the field forward? Their prominence could be a reflection of the evolving nature of TikTok itself, a platform that has rapidly changed and expanded since its inception. It would be valuable to explore how these authors' works align with or diverge from the overall trajectory of TikTok's development.

Regarding collaboration among scholars and institutions, the data paints a picture of fragmentation and localized focus. While the low density of collaboration among authors could be seen as a lack of cohesive direction in TikTok research, it might also be indicative of a young and still emerging field. Individual scholars might be carving out unique niches or exploring disparate questions that do not lend themselves to broad collaboration. On an institutional level, the localized collaboration and the North-South divide may reveal underlying socio-political or economic factors that shape research collaboration. It might also expose a lack of standardized frameworks or common goals that would facilitate more extensive global collaboration. The role of geographic proximity and language in driving these trends could reflect both the practicalities of research collaboration and the cultural or regional specificity of TikTok as a subject of study. The platform's variable impact and usage across different contexts might necessitate localized study, thus explaining the observed patterns.

This study suggests several future research directions based on the analysis of the keyword co-occurrence network and topic modeling:

- Future studies should thoroughly investigate the impact of TikTok on mental health and well-being, especially among children [39]. Health-harming product advertising, hateful content spread, misinformation, illness portrayal, and excessive use or addiction are all areas that need further attention from researchers [99]. Furthermore, qualitative studies on TikTok users to better comprehend how TikTok videos impact the understanding of pandemics and promote public health practices, including vaccination, social distancing, and face mask-wearing, are necessary [122]. Researchers should also study how tobacco-related content on TikTok can influence young people's perception of smoking and their propensity to try cigars and vapes for the first time [139]. The analysis of the effects of TikTok on physical health, including eating disorders [65], sleep patterns [19], and sedentary behavior [63] is encouraged for future research.
- Future research should explore the use of TikTok by healthcare organizations and professionals to communicate with patients and the public. Best practice guidelines for professionals wishing to use TikTok to convey critical and impactful health information can be improved with the help of additional multidisciplinary studies that combine data science techniques for qualitative data collection and clinical interpretation [88]. Future researchers are recommended to identify what strategies can increase user engagement in health information and education [67]. A pending research question is how algorithms and personalization can impact health information seeking and sharing on TikTok. In addition, increased attention is required to devise methods for applying the features of widely viewed videos to messages about public health. This is crucial for empowering individuals to make educated decisions about disease prevention and health promotion [14, 15]. Lastly, researchers should evaluate the potential of TikTok as a tool for telemedicine and remote health consultation.
- Substantial research has been conducted on China from the perspective of algorithms, platform governance, and geopolitics. In the future, researchers should focus on understanding how TikTok can shape public opinion and impact domestic and international

- politics. In addition, scholars may investigate how the Chinese government employs TikTok to monitor and control online activity and content. Related to algorithms, Karizat et al. [71] argue that there is little understanding of the interplay between user identity and algorithmic processes on TikTok. Therefore, there is a need to clarify how such understanding shapes user behavior on the platform. Researchers should strive to explain how TikTok recommendation algorithms operate and how they influence information dissemination and online communities' development [10]. Another interesting avenue is to explore how TikTok's algorithms can contribute to misinformation or the formation of echo chambers [12]. Since the platform governance of TikTok has been under criticism and strict scrutiny [148], future studies may examine the ability of TikTok to moderate the enormous amount of content posted and employ algorithms to promote or demote certain types of content. As algorithmic content moderation becomes the norm, online platforms are ruled more by mathematical statistics, which may lead to human costs and mistakes. Research in the future should concentrate on the individuals bearing the responsibilities and the cost. Concerns associated with visibility moderation on TikTok are not amenable to straightforward solutions or quick escapes. As a result, visibility moderation can be researched further to educate academic discussions, provide policy suggestions, and impact public dialogue regarding TikTok governance.
- Given the fast growth of TikTok and the great level of user engagement, a closer look at the impacts of TikTok use on body image is necessary. Users of TikTok can be at greater risk of being exposed to idealized body images because of the growing interest in short video apps and the high intensity with which users interact with them. However, TikTok and similar apps enable users to modify or filter their short videos to show an idealized body image. Despite the fact that TikTok may have similar detrimental impacts as Instagram and Facebook, there has been surprisingly little research concentrating on this platform's effects on body image. In addition, it is insightful to examine the role of TikTok algorithms in shaping body image and self-esteem and how these perceptions may differ from those formed through traditional media. Researchers can also investigate the influence of TikTok use in the context of other aspects, including physical activity [19, 63], nutrition [52], and overall well-being. Finally, comparing the impact of TikTok use and other social media platforms on the body images of people is another promising research direction.

5 Conclusion and limitations

This study aimed to investigate the scope and knowledge structure of TikTok research over recent years. Using bibliometric approaches, 542 articles written by 1535 authors were thoroughly examined. Unlike subjective approaches (e.g., systematic literature reviews), bibliometric approaches can objectively map a whole research field since a random selection of evidence is not wholly representative of the present state of research and favoring some articles over others introduces bias into the analysis. Thus, the use of bibliometrics can reveal the broad landscape of TikTok-related publications. To the best of the authors' knowledge, this study represents the first attempt to explore the bibliometric structure of TikTok research. In this comprehensive study, we uncovered the relevant trends, the most prolific scholars, and the leading journals in the TikTok field. In particular, we found that most of the networks analyzed have a hub-and-spoke design

[135]. As a result, a few productive scholars and academic institutions seem to drive TikTok research forward. Such academics or institutions can be thought as information brokers (i.e., conduits of knowledge) [113].

Interestingly, geographical proximity and cultural affinity have influenced the research cooperation between countries and academic institutions. This finding aligns with the conclusions of several researchers who analyzed the patterns of collaboration between scholars [105]. In line with past studies, we find that universities are the main source of publications dealing with TikTok, followed by research institutions like National Opinion Research Center, Chicago and Westat, Inc. Additionally, insufficient collaboration between developing and developed nations in TikTok research was observed in other scientific domains [130]. Concerning the TikTok field's conceptual structure, the keyword co-occurrence network and topic modeling analysis indicates that public health, health education and communication, algorithms, platform governance, and body image receive significant attention from scholars. In other words, TikTok has the potential to impact public health, convey critical health messages, algorithmically drive user experience, and shape body image perception. Scholars also place emphasis on the impact of TikTok use on children, students, and brands.

A number of insights and implications can be drawn from this study for both academics and practitioners. This article presents a comprehensive bibliometric analysis that pinpoints, organizes, and examines key aspects of TikTok research and highlights the need for further investigations. The current article objectively reveals the research performance results related to TikTok by highlighting the most productive authors, journals, countries, institutions, and main topics. The review deepens the practitioners' understanding of the fundamental concepts explored in the TikTok-related literature and adds to its historical development. Researchers may use the study's findings to learn more about the global scope and distribution of TikTok research among authors, publication outlets, countries, and academic institutions. In addition, it helps academics understand the history, evolution, and present state of TikTok research and pick out the most important trends and future research directions.

This study has certain limitations. First, using only the Scopus database may have affected the findings, potentially leading to a bias in the representation of the field, since the choice of database can influence the scope and direction of research findings. Future research may extend our findings by using other scientific databases such as the WoS and contrasting the findings with the results of this study to mitigate any bias stemming from database selection. Second, although methods such as topic modeling enable coverage of a wide variety of publications, they still cannot match human reviewers' accuracy when analyzing and interpreting content. This limitation might introduce bias in theme detection and interpretation. Through the use of keyword frequency and co-occurrence, topic modeling might help to identify common themes and establish connections across texts. The innovative suggestion of implementing more advanced techniques such as knowledge tensor-based analysis, as referenced in works such as Xi et al. [141] and Xi et al. [140], can be explored in future studies to identify important topics and differentiate between thematic areas in TikTok research. This approach may address potential biases in theme identification, providing improved clustering output and a more nuanced analysis. Moreover, by comparing TikTok's academic research landscape with other social media platforms or related fields, knowledge tensor embedding can reveal unique characteristics, trends, or patterns specific to TikTok. Finally, the bibliometric and topic modeling analysis of specific journals publishing TikTok research is encouraged. A more diversified approach in terms of methods, data sources, and journal selection can also contribute to a more balanced view

and a better understanding of the landscape of TikTok research, thereby minimizing the potential biases present in this study.

Funding Open access funding provided by Modul University Vienna GmbH

Data availability The full list of references used for this review is available from the authors upon request.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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