A systematic review for netizens' response to the truth manipulation on social media

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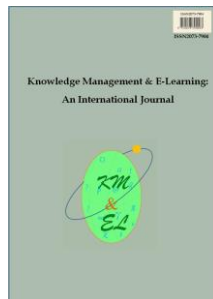Concordia University, Montreal, Canada
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Abstract: The manipulated or manufactured truth on social media platforms spreads false information to influence netizens' cognition, often resulting in fabricated social and political narratives. This study systematically reviews the literature on truth manipulation and its impact on the cognition of social media users. The primary focus is on disinformation, misinformation, fake news, and propaganda. The study appraises 162 peer-reviewed publications indexed in the Web of Science Core Collection database using the systematic review method. The data was put through a bibliometric analysis to unpack the evolutionary nuances of netizens' cognitive response to manufactured truth, informativity, and manipulation on social media. The study highlights emerging trends and issues from truth manipulation on social media. The bibliometric analysis reveals since 2017, there has been an increase in the trend of scholarly work about truth manipulation on social media and its effects on the cognition of netizens. The USA seems to be the most prominent node to contribute to the study of truth manipulation. The content analysis shows multiple aspects causing truth manipulation. This study also seeks ways and methods to prevent and counter truth manipulation on social media. It looks at the possibilities of altering netizens' cognitive abilities by improving their critical social media literacies through fact-checking. The study results show that knowledge gaps persist in truth manipulation on social media and the cognitional aspects in response to fabricated narratives. We emphasize the importance of further investigations in this domain.

Keywords: Truth manipulation; Social media; Cognition; Disinformation; Misinformation; Fake news; Propaganda

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University in Canada where his research focuses on disinformation and truth manipulation through social media causing radicalization and violent extremism; and how critical social media literacy can help prevent or counter that. He is a graduate of MA in Conflict Transformation from Eastern Mennonite University, Virginia, USA; and an Atlas Corps alumnus of the U.S. Department of State's emerging global leaders initiative in Washington, D.C., USA.

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1. Introduction

Truth manipulation through social media platforms impacts, negatively or positively, a wide array of our socioeconomic life. Digital technologies shape our identities, social relationships, and perceptions of the world around us. Gallese (2020) highlights how mediascape has shaped the world and influences meaning-making or building perceptions and social cognition. Our ways of meaning-making from words and images are changing due to the digitally mediated reality. Social media platforms have become a crucial political tool for public diplomacy at home and abroad. Netizens interpret policy declarations and opinions on social media as official statements (Duncombe, 2019). Hansen and Lim (2019) argue that social media can influence the cognition and behavior of voters, ultimately diverting the trends in democracy and political order. The information trends on social media platforms can leverage social and political cognitions for changing policy preferences (Abascal et al., 2021). The political cognition of people is strongly influenced by the language and images used in the content on media platforms.

Social media is heavily used by those who want to manipulate the truth, intentionally or otherwise, to propagate theories for their benefit. Social media gives such people or groups the platforms to fabricate information, allowing them to plan deceptive conduct (Acker & Donovan, 2019). Hameleers et al. (2020) argue that the restricted inclination of fact-checking and the intentional use of images in social media have made the digital environment prone to the unchecked spread of disinformation. The truth-manipulative groups employ a variety of visual content, including games and movies, to spread their ideology among the masses since social media users place a higher value on visual or graphic information than textual information. Abdel-Raheem and Alkhammash (2022) concluded that framing of content influences how people react to certain incidents or news stories. On the political front, there is a significant increase in using cyberspaces for state-sponsored operations against foreign political actors and institutions and domestic political oppositions (Hansen & Lim, 2019). Political misuse of social media platforms deeply affects online content's modesty and influences netizens' perceptions and cognition. During the 2016 US presidential election, Swire et al. (2017) looked examined how people processed real and incorrect political information in their minds. The results of such corrective measures are limited, notwithstanding the possibility that fact-checking

news or information online might lead to more accurate political knowledge (Garrett et al., 2013).

Amidst significant events such as the COVID-19 pandemic, people mainly rely on information from social media platforms. In many cases, their wish to stay informed about that event caused the instant spread of misinformation (Kozuh & Caks, 2021). Su et al. (2022) revealed that information-seeking activity on social media was the major driver of false beliefs regarding the Coronavirus. Such platforms must persuade users to verify online information's veracity for them to be effective (Moravec et al., 2020). Kelly (2019) constructed a framework for selecting news based on perceptions of objectivity and trustworthiness; discovered that when information from untrusted sources accords with pre-existing ideas, it is regarded as being more trustworthy and less biased. Algorithmically curated material online, such as on social media, impacts public opinion since the online ecosystem's primary goal is to catch the audience's attention (Lorenz-Spreen et al., 2020). The "truth by repetition effect", as described by Corneille et al. (2020), is the tendency for people to place greater trust in recurring assertions or ideas than in novel ones. The idea of reasoning supports identity-protective cognition, which is utilized to explain the material fitting with one's political viewpoint and is frequently cited as a push factor for individuals believing in fake news (Bago et al., 2020). Despite the availability of tools for examining the veracity of internet information, not everyone has access to or knowledge of using online sources for information (Freeze et al., 2021). It is necessary to make cross-sectoral and interdisciplinary efforts to comprehend false news as well as to develop measures to reduce the hazards associated with behavior modification through social media networks (Bastick, 2021). Despite the growing literature on the believability of manipulative truth over social media platforms, there are still gaps in the empirical research about the degree to which malicious actors can use social media to affect behavior covertly. Since even limited exposure to fake news can modify one's unconscious behavior, current approaches to mitigating fake news or disinformation online are insufficient to protect social media users from being manipulated (Bastick, 2021). Human cognition has been altered with the increased use of technology and social media, which requires reconfiguring our approach to ethically and correctly disseminating information online (Muhlmeyer et al., 2020).

1.1. Research questions

There is a need to understand how people get information, make sense of it, and shape their attitudes based on their interactions with technologically mediated information sources (Hosseini et al., 2021). Scholarly work on truth manipulation through social media, and strategies to prevent or counter that, is becoming more prevalent amidst increased misinformation and propaganda online. Amidst the dearth of systematic reviews of published scholarly work on disinformation and truth manipulation through social media, this study aimed to synthesize what aspects have already been studied and what should be taken into account for future research. Hence, the research question guiding this study was to synthesize the major causes reported about disinformation and truth manipulation through social media and how that can be prevented or countered following the recommendations of scholarly research.

By undertaking a thorough content analysis and bibliometric analysis to show how different facets of truth manipulation through social media have been researched and discussed throughout time, this study sought to complement previous studies and jot down the existing knowledge. The motivation of this study is to stimulate more scientific work

aimed at expanding the understanding of truth manipulation and identifying frameworks and approaches for monitoring, reporting, and dealing with disinformation, misinformation, and manufactured news on social media. Utilizing bibliometric and informetric analyses, this paper also highlights various solutions suggested by scholars for preventing and countering truth manipulation on social media. Finally, the article discusses research trends and highlights research gaps.

2. Definitional aspects

Social communication started on May 24, 1844, when a telegraph operator manually typed a string of electronic dots and dashes. According to the technology news website *Digital Trends*, the development of the internet allowed the launch of online communication services like CompuServe, America Online, and Prodigy in the 1980s and 1990s. These services exposed consumers to digital communication through email, message boards, and live online chat (Goff, 2013). Hence, the existence of the forms of online social media communications can be rooted back in the 1990s, the time when the internet was just emerging.

This section provides a definitional understanding of key concepts used in this study. Gibbons and Carson (2022) studied the definitional aspects of mis/disinformation and fake news. They noted *misinformation* as "false information that is spread regardless of whether there is intent to mislead" and when there is no intention to cause any harm. European Commission named *disinformation* the main reason for online falsehood and defined disinformation as "verifiably false or misleading information that is created, presented, and disseminated for economic gain or to intentionally deceive the public, and may cause public harm" (Cavaliere, 2022). They further defined *fake news* as "a nebulous term that some see as a short form to include misinformation, disinformation, and other false content". Hyzen (2021) defines propaganda as the "tangible expression of ideology in communication … to enforce ideological goals, manage opinions, and consolidate loyalties … to further ideological agendas".

Salgado (2018) highlights that the developments in media such as the emergence of social media have obscured the difference between news and propaganda which has increased the spread of false and *manipulated truth*. The space for information manipulations on social media platforms has polarized public opinions as they tend to believe in an information version that aligns with their ideologies. It causes believing in the manipulated truth as fake information which is deliberately being spread by those seeking political interests. Salgado views that social media is highly vulnerable to manipulated facts where some political factions present fake information as reality and as in public interest. Such propagandists deliberately aim "to deceive and conceal the truth … to direct public opinions in a particular way through manipulative tactics, devices, and strategies".

Furthermore, *critical media literacy* "expands the notion of literacy to include different forms of mass communication and popular culture, as well as deepens the potential of literacy education to critically analyze relationships between media and audiences, information and power" (Kellner & Share, 2007). Bergstrom et al. (2018) view that critical social media literacy cultivates skills to analyze social media conventions; abilities to criticize stereotypes, dominant values, and ideologies; and competencies to

interpret the multiple meanings and messages generated by media texts. Mobile or cell phone technologies can be used to build authentic learning environments online via meaningful knowledge construction (Fu, 2018).

3. Method

The bibliometric analysis was used to review the selected research articles systematically. The goal was to outline the relationship between social media, cognition, disinformation, misinformation, manufactured news, propaganda, and other related concepts. The systematic literature review establishes themes and trends and highlights the research gaps and promising study fields (Petticrew & Roberts, 2008; Wright et al., 2007). A systematic review process is shown in Fig. 1 (Clark & Creswell, 2015). The web of Science (WoS) Core Collection database was used to find scholarly published articles in the initial phase. The search string comprised of "social media", "disinformation", "misinformation", "fake news", "propaganda", and "cognition" was used to identify the relevant studies. From 1970 through September 2022, three indexes were chosen: Science Citation Index Expanded, Social Sciences Citation Index, and the Arts & Humanities Citation Index. Peer-reviewed English-language publications were the focus of the search. A review of the 251 articles found during the initial search was part of the second step. All the papers were vetted at this point by reading the title, abstract, and rest of the article. After a thorough screening, 89 articles were disregarded because they were irrelevant or did not fit the study's focus. The total number of published articles chosen for a systematic review was 162. (Hii et al., 2022)

The information of selected research articles were organized manually using MS Excel by specifying the author(s), publication year, citation details, research objectives and questions, context, and methodology. The third phase comprised informatic analysis using VOSviewer software version 1.6.16 (www.vosviewer.com) for bibliometric analysis, which is freely available (Van Eck & Waltman, 2010). According to Lee and Su (2010), keywords display the fundamental information included in publications and highlight distinct knowledge areas. Therefore, 162 articles imported to VoSviewer for the bibliometric analysis provide a clear picture of the research domain and its recognized patterns (Van Eck & Waltman, 2010). The information for the articles was taken in txt format from the WoS core database collection. WoS offers two kinds of keywords: one that authors provide and another known as "keyword plus" that is taken from the titles of cited references in the dataset of 162 articles. According to Lee and Su (2010), keywords plus use a co-occurrence network to identify new topics. Normalization using fractional counting was carried out to examine published papers (Van Eck & Waltman, 2010).

Bibliometric offers a mathematical view of the dataset, including regional affiliation, authorship, sources, institutions, and timeline. It includes mapping and visualizing datasets extracted for systematic reviews in a scientific manner (Van Eck & Waltman, 2010). Three different bibliometric analyses were carried out for this study: a) co-occurrence of keywords, b) co-citation of cited sources, and c) citation of countries. The bibliometric analysis technique has been used in past research conducting systematic reviews (Borges-Tiago et al., 2020; Naeem et al., 2020; Wang et al., 2019), hence utilized in this study as well. The review process took three steps: identification or search of the papers, evaluation or selection of the papers as per review criteria, and analysis for bibliometrics and themes (Zhang, et al., 2020).
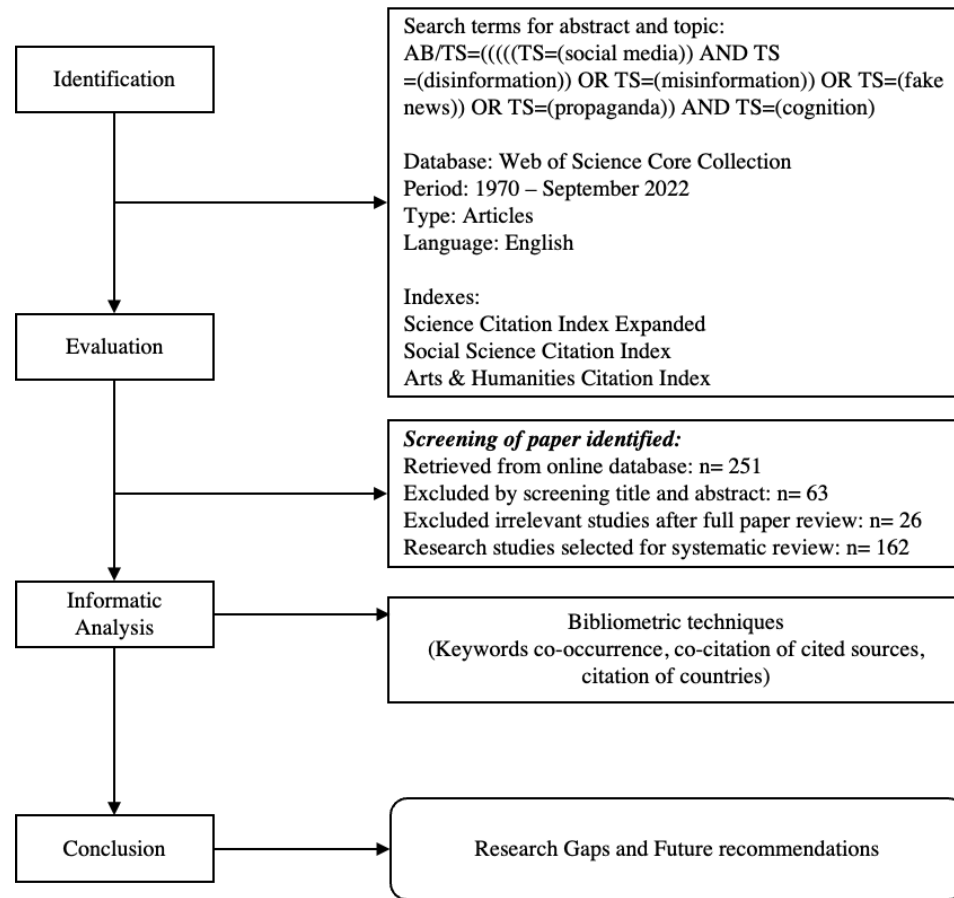
Identification

Search terms for abstract and topic:
AB/TS=(((((TS=(social media)) AND TS
=(disinformation)) OR TS=(misinformation)) OR TS=(fake
news)) OR TS=(propaganda)) AND TS=(cognition)

Database: Web of Science Core Collection
Period: 1970 – September 2022
Type: Articles
Language: English

Indexes:
Science Citation Index Expanded
Social Science Citation Index
Arts & Humanities Citation Index

Evaluation

Screening of paper identified:
Retrieved from online database: n= 251
Excluded by screening title and abstract: n= 63
Excluded irrelevant studies after full paper review: n= 26
Research studies selected for systematic review: n= 162

Informatic Analysis

Bibliometric techniques
(Keywords co-occurrence, co-citation of cited sources,
citation of countries)

Conclusion

Research Gaps and Future recommendations

Fig. 1. PRISMA chart that demonstrates the systematic review process

Content analysis was conducted using NVivo version 12. All 162 articles were imported into NVivo, where the inductive coding framework was applied. The articles were read thoroughly to generate and assign codes which were later grouped into themes and categories. The presentation of findings from content analysis gleaned from a systematic review was included in the fourth step. Sorting the data into categories or open codes was the initial stage in content analysis. Mainly, two researchers were involved in the coding of the selected articles. A third researcher validated inter-rater reliability to assure the degree of agreement among separate observers who rate, code, or analyze the same phenomena. The content analysis technique allows codes to be phrases or complete sentences (Elo & Kyngäs, 2008). Instead of offering further guidance on how these themes and categories should be constructed, the analytical approach urges researchers to interpret with the overarching purpose of reducing initially identified codes (Kyngäs et al., 2020).

4. Analysis

The analysis of this study is divided into two sections. The first section is a bibliometric analysis of selected articles. It focuses on truth manipulation through disinformation, misinformation, and manufactured/fake news on social media. Bibliometric analysis was conducted using VoSviewer software. The second part presents the results of the content analysis of 162 selected articles from the WoS database considering thematic descriptions.

4.1. Bibliometric analysis

Based on the bibliographic information retrieved from WoS, VoSviewer generated a co-occurrence map. The co-occurrence of keywords is only processed through the WoS txt file due to the mapping tools' inherent limitations. The frequency of keywords and overall link strength are shown in Table 1. It indicates the distance between nodes based on proximity and outputs a cluster diagram. Word font size simultaneously indicates the degree of focus on a certain topic.

Table 1
Occurrence of keywords

No.	Keyword	Occurrences	Total link strength
1	Misinformation	63	223
2	Cognition	48	166
3	Information	32	129
4	Memory	29	115
5	Fake news	18	67
6	Social media	16	67
7	False memories	12	56
8	Beliefs	11	49
9	Recall	10	47
10	Social cognition	09	47

The threshold for co-occurrence keywords was set at a minimum of five times to produce a map having 48 keywords appearing inside eight clusters satisfying the minimal level. A higher number would result in fewer keywords, making meaningful analysis more difficult. Fig. 2 displays bibliometric mapping based on all term co-occurrences through time from 2014 to 2022. When scores were derived on average normalized citations, the network depiction was based on the strength of linkages. The word font size denotes the number of occurrences of a certain keyword. The higher the size, the more influential the phrases. The most recurring keywords were "misinformation," followed by "fake news," "disinformation," "social cognition," and "false memories."

Citation analysis based on the 162 chosen studies is shown in Fig. 3. A co-citation analysis was carried out by providing a weighted percentage of cited papers. Using fractional counting, an annotated bibliographic map with a minimum of six criteria was made. A highly referenced item is represented by its size in nodes, and the thickness of linkages shows how strongly articles are associated with one another. According to the number of citations, the various color intensities display the strength of the linkages. It indicates citations from 2005 to 2022.
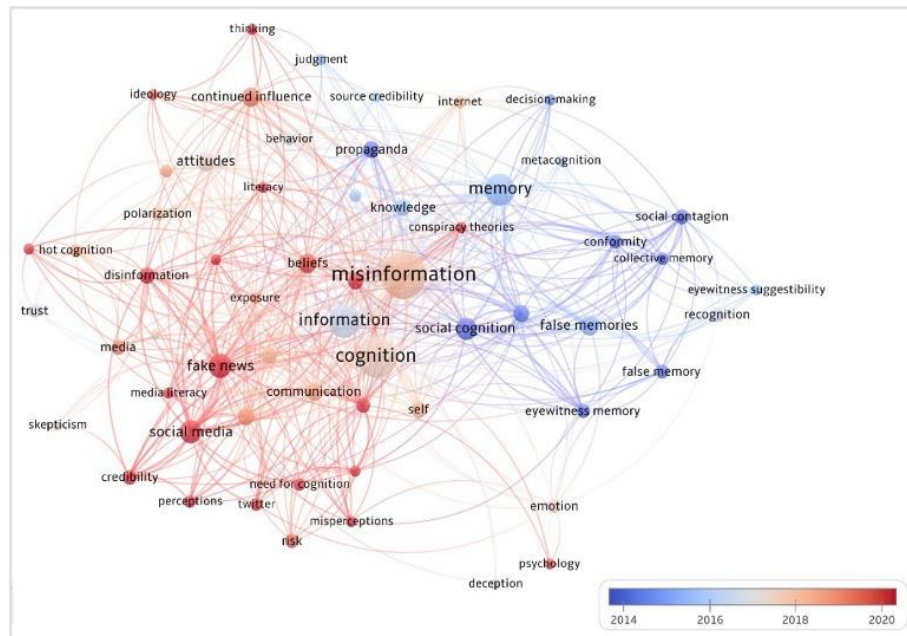
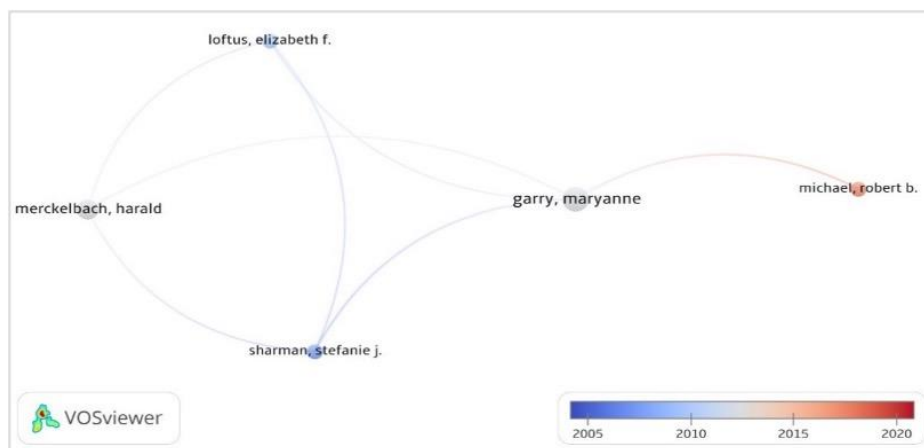**Fig. 2.** Co-occurrence network of all keywords

Fig. 3. Co-citation analysis

Fig. 4 shows the location of research on truth manipulation through social media as well as a country analysis subject to author affiliation. This data is gathered to direct academics, decision-makers, strategists, and researchers toward such centers of excellence. To achieve this finding, created a bibliometric map and displayed the connection strength. The big node and bold text from the displayed countries show greater research contributions on truth manipulation through social media. With its larger contribution to the advancement of studies on truth manipulation, the USA seems to be the most prominent node. A strong link occurred between the USA and England, China, Australia, Israel, and New Zealand for collaboration on the research on truth manipulation.
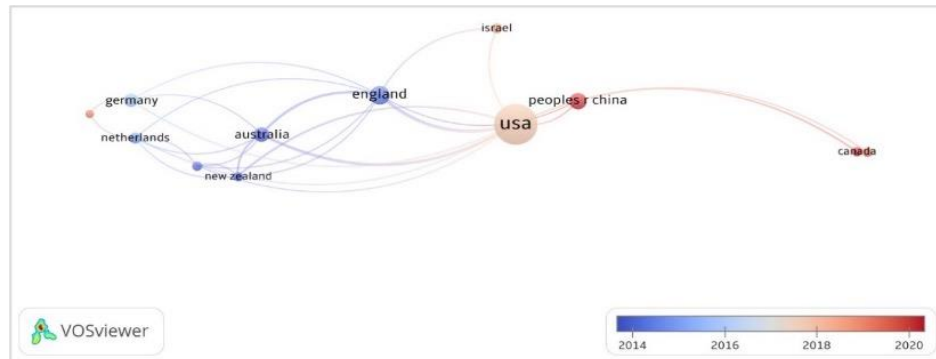
Fig. 4. Country analysis subject to authors association and research produced

From 1990 to September 2022, Fig. 5 shows the yearly publishing trend of research on truth manipulation through social media. Social media has become a strong presence since the launch of Facebook and Twitter. Earlier, there were different means of communication, such as online chatting platforms. News organizations' extensive use of social media brought a sharp rise in publication trends. Another key factor was the Presidential term of 2016-2020 in the USA when social media was heavily used for domestic and international politics. As a result, academics focused more on discussing this subject. However, there is a need for more research on disinformation from various angles.
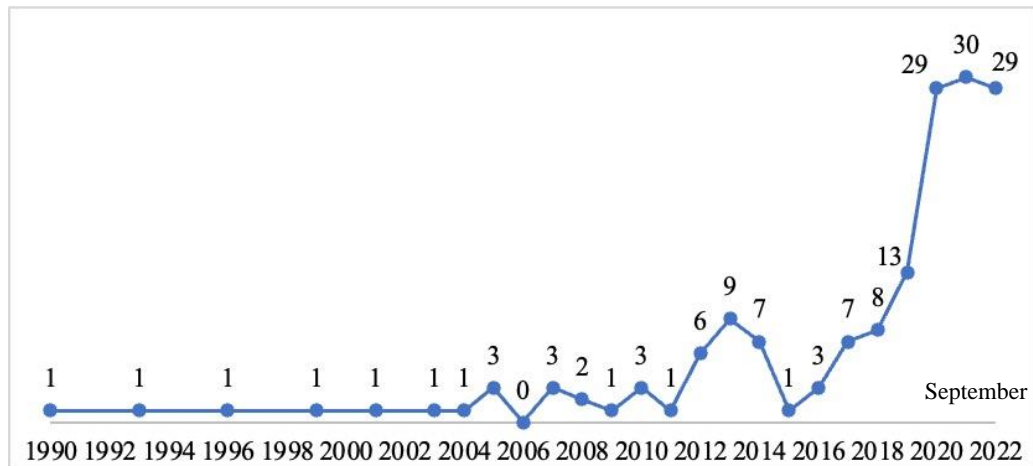

Fig. 5. Yearly trend of published articles

Fig. 6 displays published articles until September 2022, organized by WoS categories. The majority of publications covered the subjects of communication and computer science.

The top 10 journals with the most papers published on truth manipulation through social media are listed in Table 2.

According to the WoS database, Pennycook et al. (2020) is among the top 10 referenced publications in Table 3 and received 457 citations.
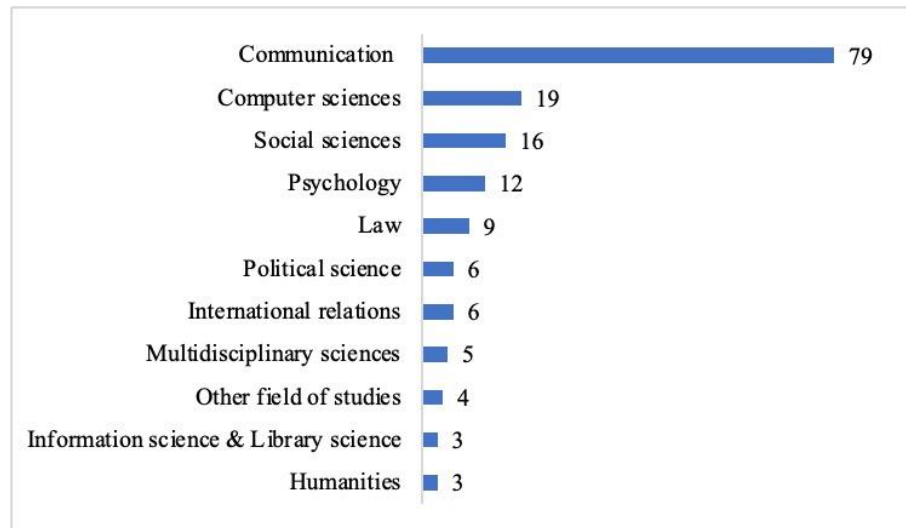
Fig. 6. Article published as per WoS categories

Table 2
List of top 10 journals where articles published

Ranking	Name of journals	Number of paper published
1	Frontiers in Psychology	5
2	Journal of Applied Research in Memory and Cognition	5
3	Acta Psychologica	4
4	Memory	4
5	Memory & Cognition	4
6	Cognition	3
7	Political Behavior	3
8	Psychonomic Bulletin & Review	3
9	Science Education	2
10	Social Media + Society	2

4.2. Content analysis

Since the online ecosystem mainly aims to capture the audience's attention, algorithmically curated content online, such as on social media, shapes public opinion (Lorenz-Spreen et al., 2020). The heavy influx of information on social media platforms facilitates truth manipulation and the spreading of false information. Such influx of manufactured/false information on social media increases during the pandemic, such as COVID-19. Many scholars labeled the pandemic as an infodemic due to the spread of misinformation at its peak. Su et al. (2022) found that misperceptions about Coronavirus were mainly fueled by information-seeking behavior through social media. The content analysis revealed that the selected articles were around two major categories, as in Table 4 below. Along with major causes of truth manipulation online, this study mainly focuses on the ways of preventing or countering truth manipulations to ensure it is a source document for remedial actions.

Table 3
List of top 10 most cited articles

Ranking	Authors	Article Title	Year	Times Cited, WoS Core as of 30 September 2022	Source Title	Research Areas
1	Pennycook, G., McPhetres, J., Zhang, Y. H., Lu, J. G., and Rand, D. G.	Fighting COVID-19 misinformation on social media: Experimental evidence for a scalable accuracy-nudge intervention	2020	457	Psychological Science	Psychology
2	Wood, T. and Porter, E.	The elusive backfire effect: Mass attitudes' steadfast factual adherence	2019	225	Political Behavior	Government & Law
3	Mills, C. M.	Knowing when to doubt: Developing a critical stance when learning from others	2013	206	Developmental Psychology	Psychology
4	Kahne, J. and Bowyer, B.	Educating for democracy in a partisan age: Confronting the challenges of motivated reasoning and misinformation	2017	150	American Educational Research Journal	Education & Educational Research
5	Dudo, A. and Besley, J. C.	Scientists' prioritization of communication objectives for public engagement	2016	139	Plos One	Science & Technology - Other Topics
6	Swire, B., Berinsky, A. J., Lewandowsky, S., and Ecker, U. K. H.	Processing political misinformation: Comprehending the Trump phenomenon	2017	135	Royal Society Open Science	Science & Technology - Other Topics
7	Walter, N., and Murphy, S. T.	How to unring the bell: A meta-analytic approach to correction of misinformation	2018	130	Communication Monographs	Communication
8	Bago, B., Rand, D. G., and Pennycook, G.	Fake news, fast and slow: Deliberation reduces belief in false (but not true) news headlines	2020	115	Journal Of Experimental Psychology-General	Psychology
9	Forgas, J. P., Laham, S. M., and Vargas, P. T.	Mood effects on eyewitness memory: Affective influences on susceptibility to misinformation	2005	105	Journal Of Experimental Social Psychology	Psychology
10	Ecker, U. K. H., Lewandowsky, S., Fenton, O. and Martin, K.	Do people keep believing because they want to? Preexisting attitudes and the continued influence of misinformation	2014	83	Memory & Cognition	Psychology

4.2.1. *Major causes of truth manipulation on social media*

4.2.1.1. *Politically biased news or information*

Politically biased news sources are popular in the media but reap unwanted consequences. Kelly (2019) developed a framework for choosing news based on the perceptions of objectivity and credibility, and found that information from unfamiliar sources is perceived to be more credible and less biased if that aligns with existing beliefs. Since the Internet and social media have connected the media world, there are higher chances that people will get exposed to unknown media sources potentially containing fake news. Kelly further found that politically selective exposure to information sources may arise from an individual's wish for unbiased news, which may not be the case. Swire et al. (2017) studied the cognitive processing of true and false political information amidst the 2016 Presential election in the USA. They found that knowing the information source had a lesser impact than perceived credibility. Their study found that people believe in their political heroes to evaluate if the information is true or false.

Table 4
Thematic analysis of truth manipulation on social media

Themes	Categories	Codes
4.2.1. Major causes of truth manipulation on social media	4.2.1.1. Politically biased news or information	• Perceived credibility of news from unfamiliar sources • Politically selective exposure to information online • Evaluating news sources per political leaders' will
	4.2.1.2. Shift to cyber-warfare	• Cognitive information domain • Shaping public opinion in power roll • Building security narratives • Disinformation for political propaganda
	4.2.1.3. Manipulations of beliefs and perceptions	• Truth by repetition effect • Cognitive influence to manipulate identity • Push factors for debate on social media • Content alignment with political ideologies
4.2.2. Preventing and countering truth manipulation on social media	4.2.2.1. Fact-checking misinformation and fake news	• The persuasiveness of tools • Politically aware initiatives • Checking information authenticity
	4.2.2.2. Cognitive responses to identify and counter disinformation	• Believability influence trust in social media • Social cognition to counter false information • Accessible and effective mechanisms for cognitive response
	4.2.2.3. Deliberation while engaging	• Mediating environment of misinformation • Distinguishing between reliable and false information • Healthy debate and consensus building
	4.2.2.4. How online technologies can help	• Web governance to empower netizens • Nudging/boosting to improve the online environment • The critical role of social media networks • Diverse/democratic design of social media networks • Flagging fake news on online platforms
	4.2.2.5. Urging netizens to think critically before engaging	• Evaluating the information credibility • Critical thinking before engaging • Improving understanding to nudge misinformation • Skepticism and looking into discourse
	4.2.2.6. A contextually aware and multidisciplinary framework	• Context-sensitive information frameworks • Cross-sectoral approach to identify fake-news • Understanding behavior modification online
	4.2.2.7. Educating netizens through social media to counter falsehood	• Educating masses with corrective messages • Promoting healthy discussions online • Countering misconceptions and stereotypes
	4.2.2.8. Improving the critical social media literacy of netizens	• Promoting media literacy among youth • Improving political awareness of netizens • Cognitive literacy to counter misinformation online

4.2.1.2. Shift to cyber-warfare

Analyzing the shift of cyberspace weapons from the physical network to the cognitive information domain, Chen et al. (2022) argue that technologies are becoming the key players in cyber warfare, such as shaping public opinions through social media. They are concerned that the emergence of social media networks may cause threats to the security

and stability of the national and international community. Social network warfare is a new field, and the confrontation of opponent countries can be observed on their social media profiles. States use social media platforms to penetrate their narratives, whereas the Internet helps them to monitor the trends and build defenses accordingly. Countries use social media to spread their political propaganda by influencing the digital information ecosystem. Amidst increased weaponization of social media, countries have started to research fundamental cognitive theories to understand how netizens are influenced.

4.2.1.3. Manipulations of beliefs and perceptions

People believe more in the repetitive statements or content than the new ones, which Corneille et al. (2020) call the "truth by repetition effect". They argue that repetition of content reduces the perception of falsehood, especially when the context is unspecified, which helps spread fake news. Hale, Shevel, and Onuch (2018) studied the belief formation of people about the factual content of significant events amidst challenged geopolitical orders. They found that identities influence cognition and how we receive, perceive, and process information. Often a debate or discussion serves as a push factor for people believing in fake news because the notion of reasoning helps identity-protective cognition, which is used to rationalize the content aligning with one's political ideology (Bago et al., 2020). People ineffectively distinguish between true and false news headlines when they rely on their personal or political perceptions. Shortland et al. (2021) assessed the association between exposure to extremist propaganda and violent cognition. They found that participants with low and medium trait aggression became more pro-social after exposure to extremist propaganda.

4.2.2. Preventing and countering truth manipulation online

4.2.2.1. Fact-checking misinformation and fake news

Various fact-checking initiatives have been launched to prevent or counter truth manipulation on social media platforms. The effectiveness of such platforms requires them to be persuasive in checking the facts about information online (Moravec et al., 2020). For example, Facebook started flagging fake or vague articles in 2017 but had to remove that feature from its platform due to its ineffectiveness. Fact-checking misinformation has become important amidst political communications at new media outlets such as social media platforms. Although there are tools to check the authenticity of information online, there is no access or understanding of everyone using online sources for their information (Freeze et al., 2021). Though fact-checking information or the news online may provide more accurate political knowledge, the effects of such corrective measures are limited (Garrett et al., 2013).

4.2.2.2. Cognitive responses to identify and counter disinformation

To reduce the influence of manufactured/fake news on social media users, Moravec et al. (2020) examined how one's cognition processes manufactured news, and found that the factor of believability influences the engagement of social media users with the information they encounter online. Kožuh and Čakš (2021) provided a model utilizing cognition and news engagement to explain the trust in news on social media platforms. Based on the

concept of social cognition, Freeze et al. (2021) found that valid and accessible mechanisms can help individuals counter misleading and false information online. It needs to be ensured that such tools are effective. Otherwise, they may wrongly label accurate information as false, which reduces the credibility of genuine news stories and their sources.

4.2.2.3. Deliberation while engaging

Humans are influenced by their social environment, which can sometimes be misleading, Edelson et al. (2014) proposed a mediation-based model combined with brain imaging to correct and counter the misinformation. The dynamic social environment allows learning new things from others while unlearning those having no or invalid influence on cognition. Lenzi (2019) studied how biased cognition and polarization about climate change influence the effectiveness and legitimacy of climate policies. Since people lack the skills to distinguish between reliable and false pieces and sources of information, deliberation may help reduce polarization about social issues such as climate change. It can further provide a platform for healthy debates and consensus building on the scalability and reality of the social problems of one's concern.

4.2.2.4. How online technologies can help

The past few years have witnessed an increase in the manipulation of truth through social media. Moravec et al. (2019) studied 83 social media users and found that social media users have increased cognitive activity when flagging fake news on social media. Such flagging was found not to affect the judgment of truth regarding believing in a particular post. The news headlines contradicting one's political opinion often get ignored, and social media users continue believing in what aligns with their political ideologies.

While arguing for the need for behavioral research to inform web governance for empowering netizens, Lorenz-Spreen et al. (2020) view technological potential such as nudging and boosting to improve the online environment for netizens amidst misinformation online. Nilan (1993) examined the dominant communication technologies concerning human cognition and how human beings organize their societies. Electronic networks have great potential for improving the richness of human cognition and facilitating democratic organizing. Nilan argues for public money to be devoted to developing online social networks with universal access while ensuring diversity and open exchange of information.

4.2.2.5. Urging netizens to think critically before engaging

Amidst conflict situations, evaluating the credibility of information online is a complex challenge. While studying the Russian-Ukrainian conflict, Pasitselska (2022) identified three practices of verifying the news or information: reliance on ideologically close sources; skepticism toward individual sources while trusting media as an institution; or institutional distrust and cynical disillusionment. The first practice of reliance on ideologically close sources is associated with the higher risks of being manipulated while not listening to the other side of the story. Amidst COVID-19, Pennycook et al. (2020) surveyed 1700 adults in the U.S. and found that respondents did not think critically before

sharing information online. Until asked about the accuracy, people were not considering if the information was true or false before sharing that on social media. Hence nudging people for critical thinking before sharing information is a simple way to prevent the spread of fake news on social media platforms.

Identifying online subversive activities such as manufactured/fake news is becoming increasingly important, requiring thoroughness and a detailed understanding of the issue being discussed online. Netizens should try to assess the associated discourses with a lens of partiality or cognitive influence to get the correct sense of online activity or piece of information (Subbanarasimha et al., 2020).

4.2.2.6. A contextually aware and multidisciplinary framework

Muhlmeyer et al. (2020) proposed context-aware frameworks to capture specific scenarios and dynamics in the information spread through social media, which can help counter truth manipulation. Cross-sectoral and multidisciplinary efforts to understand fake news are required, along with devising strategies to mitigate the risks of behavior modification through social media networks (Bastick, 2021).

4.2.2.7. Educating netizens through social media to counter falsehood

Though social media platforms allow the spread of misinformation, they also provide a space to educate the masses with corrective messages. One example is information sharing about COVID-19 by Dr. Anthony Fauci (Johnson et al., 2022). The corrective messages spread through social media can increase people's knowledge and influence their cognition for the correct version of the information. To fight misinformation online about key social issues such as vaccine hesitancy for COVID-19, Johnson et al. (2022) argue for multifacet messages through social media platforms. Amidst increased discussion on social media platforms about the higher risks of COVID-19 among people with dementia, Bascu et al. (2022) found that unscientific discussions add misconceptions and false information about dementia. Bascu et al. argue that though social media has been used to fuel stigma about dementia, it can also be used to counter negative beliefs, stereotypes, and false information. Similarly, Allem et al. (2021) found the need for health education to correct or counter the misinformation or misconceptions about unproven health claims on Twitter.

4.2.2.8. Improving the critical social media literacy of netizens

Media literacy is critical for young adults to utilize new media technologies such as social media responsibly. Xiao et al. (2021) claim that a lack of studies empirically examining the relationships between new media literacy and perceptions/actions related to controversial issues. Increasing critical media literacy help reduce misperceptions induced by misinformation rampant in the new media environment. Kahne and Bowyer (2017) studied how youth judges the accuracy of controversial public issues debated online and found the need for social media literacy to improve judgments for information accuracy assessment. They conclude that political knowledge did not enhance judgment of accuracy, but social media literacy did. Howell and Brossard (2021) view literacy as critical to prevent misinformation when discussing science issues being discussed online. While highlighting that digital divides are the key structural barrier, Howell and Brossard argue

for civic literacy, digital media literacy, and cognitive literacy to counter misinformation online.

5. Conclusion

This study concludes that social media is heavily being used, intentionally and unintentionally, to manipulate and manufacture the truth about the sociopolitical realities of the current world. People having lesser trust in state institutions are more likely to believe false information and conspiracies frequently being spread through social media platforms. Through understanding community psychology, disinformation agents use social media language and imagery to target potential audiences. Under cover of the sociopolitical well-being of media users, disinformants manipulate and manufacture the truth to establish their narratives, proxies, and propaganda by spreading rumors and hoaxes about current events of public interest. The results of this study highlight the need for social media users to develop critical social media literacies to strengthen their intellect and fend off the spread of disinformation by identifying and reporting the manipulated/manufactured truth online. Though social media service providers have taken various steps to prevent and counter the manipulation of truth on their platforms, their effectiveness is minimal.

This study has significant implications for being a resource synthesizing peer-reviewed research published on truth manipulation on social media through disinformation, misinformation, fake news, and propaganda. It summarizes the reasons for manufacturing truth on social media and various ways for social media users to cognitively prevent and counter false information online during their online social experiences. The bibliometric analysis conducted in this study highlights the countries focusing on studying cognition and truth manipulation on social media, which also invites prioritized focus from other countries.

This study has certain limitations. Though the WoS database is well respected for its credibility and the quality of the research index, more studies can be published on manufactured truth, fake news, and mis/disinformation indexed in other databases. It may not be humanly possible to cover all the databases for a systematic review on a certain topic as we have to set boundaries to be specific in our studies. Since WoS is a database that indexes and manages research publications, there are chances that future technology and design updates in the database may shift the results of the same search criteria we used for this study. At the first step in the selection process, as outlined in Fig. 1, there are chances that a few relevant studies may have been skipped while screening titles and abstracts. Furthermore, in the content analysis section of this study, we have placed more emphasis on the preventing and countering measures suggested in various studies so that this study can better inform the remedial actions.

In terms of future research, this study draws attention to a knowledge gap in empirical research on the direct influence of truth manipulation through social media on societal psychology. This study points out areas requiring further investigation, such as the contribution of cognition to the facilitation or obstruction of truth manipulation on social media platforms. The article also highlights the need to study the factors leading to the ineffectiveness of remedial actions in countering truth manipulation on social media. Additionally, it is vital to research the types of cognitive reactions to truth manipulation so

that targeted recommendations can be made for the pleasant experience of social media users. Since disinformation and misinformation on social media impact users' cognition and behavior significantly, it is vital to investigate the monitoring and control indicators further. There is a need for pilot intervention studies to assess ways to combat truth manipulation on social media in the context of restricted worldviews and limited social media literacies. It would be crucial to consider societal and psychological factors in future research. The service providers should provide extended access to their platform databases for social and psychological researchers. It will help study the truth manipulation patterns through social media, which will help improve the social media literacies of netizens with skills to prevent and counter disinformation, manufactured/fake news, misinformation, and propaganda.

Author Statement

The authors declare that there is no conflict of interest.

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