Online Journal of Communication and Media Technologies, 2023, **13**(4), e202346
e-ISSN: 1986-3497

OPEN ACCESS

Research Article

Using ChatGPT in academic writing is (not) a form of plagiarism: What does the literature say?

Adeeb M. Jarrah [1]
0000-0002-8216-8848

Yousef Wardat [2*]
0000-0003-2370-9808

Patricia Fidalgo [1]
0000-0002-2620-9983

[1] Emirates College for Advanced Education, Abu Dhabi, UAE
[2] Higher Colleges of Technology, Al Ain, UAE
[*] Corresponding author: yousef_alwardat@yahoo.com

Citation: Jarrah, A. M., Wardat, Y., & Fidalgo, P. (2023). Using ChatGPT in academic writing is (not) a form of plagiarism: What does the literature say?. *Online Journal of Communication and Media Technologies, 13*(4), e202346. https://doi.org/10.30935/ojcmt/13572

ARTICLE INFO

Received: 12 Jul 2023
Accepted: 3 Aug 2023

ABSTRACT

This study aims to review the existing literature on using ChatGPT in academic writing and its implications regarding plagiarism. Various databases, including Scopus, Google Scholar, ScienceDirect, and ProQuest, were searched using specific keywords related to ChatGPT in academia, academic research, higher education, academic publishing, and ethical challenges. The review provides an overview of studies investigating the use of ChatGPT in academic writing and its potential association with plagiarism. The results of this study contribute to our understanding of the use and misuse of ChatGPT in academic writing, considering the growing concern regarding plagiarism in higher education. The findings suggest that ChatGPT can be a valuable writing tool; however, it is crucial to follow responsible practices to uphold academic integrity and ensure ethical use. Properly citing and attributing ChatGPT's contribution is essential in recognizing its role, preventing plagiarism, and upholding the principles of scholarly writing. By adhering to established citation guidelines, authors can maximize ChatGPT's benefits while maintaining responsible usage.

Keywords: artificial Intelligence, ChatGPT, academic writing, academic integrity, plagiarism

INTRODUCTION

Future advancements in artificial intelligence (AI) and its computational power will majorly affect higher education. This effect could change the organization and administration of contemporary institutions, presenting both exciting prospects and severe problems for higher education professionals (Andrews et al., 2016). However, arriving at a definitive definition of AI remains elusive due to different philosophical viewpoints that have influenced its understanding since early times (Kübler et al., 2015; Niemimaa & Zimmer, 2022). Xu et al.'s (2021) definition of AI as being computer systems that imitate human intelligence by engaging in activities like learning, adaptation, synthesis, self-correction, and efficient data use is used in this study.

Since its introduction in 1956, the idea of AI has drawn interest from , leading to a variety of several fields, leading to various theoretical interpretations (McCarthy, 2007). AI encompasses many technologies that aim to replicate human intelligence in machines. Common AI applications include chatbots, voice assistants, and various other technologies.

One field within AI is machine learning, which involves developing models that can learn from data patterns without explicit programming. The exponential growth of complex data in today's world has

underscored the importance and potential of machine learning. It enables us to extract meaningful insights and make predictions based on vast information. The foundation of many machine learning models relies on traditional statistical techniques, which have been further advanced and refined over time (McKinsey & Company, 2023).

In the past, machine learning models have served the purpose of prediction, enabling us to reveal patterns and insights within datasets. However, recent advancements have given rise to generative AI models that can go beyond prediction and generate new content. This breakthrough opens new possibilities and applications in various fields, including education.

According to Chen et al. (2020), AI's integration into education has opened new possibilities by overcoming physical barriers and providing online access to learning materials. The scope of AI in education surpasses conventional educational technology applications, encompassing areas like content development, teaching methods, student assessment, and teacher-student communication. This expansion has been made possible using different platforms and applications, including interactive learning environments (ILEs), intelligent tutoring systems (ITS), adaptive learning systems, and technologies like virtual reality (VR) and 3D (McKinsey & Company, 2023).

The use of AI-generated writing in academia raises ethical concerns and moral dilemmas. The reliance on AI can undermine student learning evaluation and diminish a degree's value. Bayne (2018) demonstrates that excessive dependence on AI may lead to inadequate comprehension of the material, resulting in unpreparedness for subsequent assignments. Additionally, AI can facilitate plagiarism and cheating, compromising the integrity of the learning environment (David, 2023; Qasem, 2023).

However, when used appropriately and guided by established guidelines, AI can benefit instruction and assessment. Nevertheless, the absence of clear policies in most educational institutions poses challenges. For instance, ChatGPT, an AI tool, has the potential to increase accuracy and productivity while giving students additional chances to highlight their skills (Chen et al., 2015). However, ensuring AI is used in a way that does not unfairly favor some students is crucial. As a result, using AI in education has potential benefits and drawbacks (Cao et al., 2023).

Educational institutions frequently use AI technologies to prevent plagiarism, uphold honesty, and assist students in improving their writing skills to retain academic integrity (Gavilán et al., 2022). However, as AI technology develops and becomes more sophisticated, there is an increasing worry that students could abuse these potent tools to write excellent essays and articles on their behalf. This problem highlights the necessity for educational institutions to take proactive measures to counteract it. Considering this, this study examines how AI can affect the development of academic integrity in education (Mansilla et al., 2022).

The study opens by discussing AI and how it relates to fostering academic integrity. It then thoroughly analyses the prior research on the relationship between AI and academic integrity. Preferred reporting item for systematic reviews and meta-analyses (PRISMA) methodology, which offers a structured procedure for conducting systematic reviews, is used in the study's methods section. After a discussion and summary of the findings, the study concludes by offering insights about the connection between AI and academic integrity based on the literature review (Macdonald et al., 2023).

Study Purpose

The study's purpose is to conduct a literature review on using ChatGPT in academic writing and its implications regarding plagiarism and academic integrity. The study aims to explore the existing research on how ChatGPT, an AI-powered language model, is utilized as a writing tool in academic settings and how its use may relate to issues of plagiarism and ethical challenges. By reviewing relevant studies, the research seeks to provide an overview of the current state of knowledge and understanding regarding the use and potential misuse of ChatGPT in academic writing. The findings are intended to contribute to our understanding of the benefits and challenges of using ChatGPT in academia and shed light on the importance of maintaining academic integrity when utilizing AI technologies like ChatGPT in the context of higher education.

The study aims to highlight responsible practices and proper attribution to uphold academic integrity and promote ethical use of ChatGPT in academic writing.

LITERATURE REVIEW

Artificial Intelligence in Education

AI is now widely used in education, enabling computer systems to perform human-like functions like learning, adapting, and digesting complex data (De Lange, 2015). However, it is still unclear how AI will affect classrooms and how it can be used as a pedagogical advantage (Zawacki-Richter et al., 2019).

ChatGPT, an AI-powered chatbot created by OpenAI, has rapidly gained popularity, amassing millions of users. While concerns surrounding its implications persist, machine learning has proven beneficial across multiple sectors. The use and financial commitment to AI have grown in recent years. Nevertheless, the complete scope of generative AI's impact and associated risks remains uncertain (McKinsey & Company, 2023).

GPT-3, a system that can produce text with or without human input, is one famous example of AI (Nath et al., 2022). Through text summarization, real-time captioning, machine translation, and pre-built libraries of idioms and phrases, AI techniques are being used to rewrite words and enhance accessibility and inclusion in education (Kim, 2018). Learner models, algorithms, and neural networks provide valuable data that can inform decision-making in various aspects of education, such as learning paths, material selection, cognitive support, and student-centered dialogue. This data-driven approach offers insights that can be particularly beneficial in large-scale distance education institutions, where one-on-one human (AIEd) supports collaborative learning by facilitating adaptive group formation based on learner models and summarizing discussions. Human tutors can then use these summarized insights to guide students towards achieving course goals (Wen & Wang, 2023).

Intelligent virtual reality (IVR) and game-based learning environments provide students with authentic and engaging experiences in which intelligent virtual agents, acting as instructors, guides, or peers, can assist them in remote or online laboratories. Educators in higher education need to understand AI and its various functions, distinguishing between its supportive role and the potential for facilitating cheating. While AI advancements are significant, the value of human problem-solving, critical thinking, and questioning remains essential. It is crucial for educators to actively participate in scholarly discussions about AI in higher education to inform future initiatives. Recognizing and addressing the impact of AI on academic integrity is of utmost importance in today's higher education landscape (Rahman et al., 2023; Qasem, 2023; Yan, 2023).

Whether using ChatGPT in academic writing is a form of plagiarism is a matter of interpretation and perspective. There is an ongoing debate within the academic community regarding using AI language models like ChatGPT in scholarly work. Different researchers may have differing opinions on this topic.

Some argue that using ChatGPT without proper citation and attribution could be considered a form of plagiarism. This viewpoint is based on the belief that the generated content is not original work and should be acknowledged as a derived source (Macdonald et al., 2023).

On the other hand, some experts believe that ChatGPT can be a helpful tool for writers. They contend that using user-generated content in academic writing is legitimate and does not constitute plagiarism if it is critically analyzed, rephrased, and properly cited.

Artificial Intelligence's Contribution to Fostering Academic Integrity in Education

The advancement of academic integrity in education could be significantly aided by AI. Below are some examples of how AI could help advance academic integrity in education:

- **Detecting plagiarism:** Text may be quickly analyzed and compared using AI-powered plagiarism detection systems to find instances of plagiarism. These tools use algorithms to detect similarities between submitted work and a vast database of sources, helping educators and institutions identify potential cases of plagiarism more effectively.
- **Originality checking:** AI can assist students in ensuring the originality of their work. AI-based writing helpers can offer tips and criticism to students to help them write better while avoiding accidental plagiarism. These tools can highlight potential sources that need proper citation and offer guidance on paraphrasing and proper attribution.

- **Automated citation and referencing:** AI tools can streamline the process of citation and referencing by automatically generating accurate citations based on given referencing styles. This reduces the likelihood of citation errors and helps students maintain consistency and adhere to proper referencing practices.
- **Academic integrity education:** AI can be used to develop interactive tutorials, modules, and educational resources on academic integrity. These resources can instruct students on how to recognize plagiarism, use sources ethically, properly cite sources, paraphrase, recognize plagiarism, and properly cite sources and paraphrase. AI-based educational systems can assist in increasing student understanding of the value of academic integrity and educating them about it.
- **Proctoring and cheating detection:** AI-driven proctoring systems can monitor and analyze students' behavior during online assessments to detect potential instances of cheating or academic misconduct. These systems use facial recognition, eye-tracking, and keystroke analysis to identify suspicious activities and alert instructors or institutions.
- **Personalized feedback:** AI-powered feedback systems can provide personalized and timely feedback on academic assignments. By analyzing students' work and providing tailored suggestions, these systems can help students improve their writing skills and avoid unintentional plagiarism, thus promoting academic integrity.

Even while AI has a significant role in fostering academic integrity, it's crucial to understand that these technologies promote academic integrity. It is essential to understand that these technologies have limitations. They are not error-proof and should be used with human skill and judgment. Additionally, ethical considerations, transparency, and student privacy should be carefully addressed when implementing AI technologies in educational settings (Alneyadi & Wardat, 2023).

AI can enhance academic integrity by providing effective plagiarism detection, promoting originality, assisting with citation, referencing, supporting education on ethical practices, and detecting cheating. Its implementation should be done thoughtfully, considering the specific needs and context of educational institutions specific needs and context.

Using ChatGPT Without Proper Citation and Attribution

The viewpoint that considers using ChatGPT without proper citation and attribution could be a form of plagiarism is indeed based on the belief that the generated content is not original work and should be acknowledged as a derived source. While we cannot provide specific references to support this viewpoint, we can offer some insights based on shared understanding within the academic community (Mansilla et al., 2022).

Plagiarism is generally defined as presenting someone else's work, ideas, or words as one's own without appropriate acknowledgement. When using ChatGPT or any other AI language model, the generated content results from pre-existing data and algorithms rather than being produced by the author directly. Thus, failing to attribute the generated content to its source could be seen as claiming it as one's original work (Wardat et al., 2023).

Academic integrity and ethical writing practices emphasize the importance of proper citation and attribution. When ChatGPT is used in academic writing, it is crucial to acknowledge it as a tool or source of assistance and to cite it accordingly when incorporating generated content (Gavilán et al., 2022). Although many academic institutions accept this view, reviewing institution's or educational communities' specific rules on using AI language models and citation conventions is vital. It is essential to follow the regulations and standards established by the academic community, as institutional policies may differ.

ChatGPT as a Writing Aid or Plagiarism Without Attribution?

ChatGPT and similar AI language models as tools can aid in the writing processes. According to this perspective, if the generated content is critically evaluated, rephrased, and properly cited, its use in academic writing can be acceptable and does not constitute plagiarism (Perkins, 2023). Supporters of this viewpoint argue that AI language models can be valuable resources for generating ideas, exploring different perspectives, and overcoming writer's block. They emphasize that the writer is responsible for evaluating and

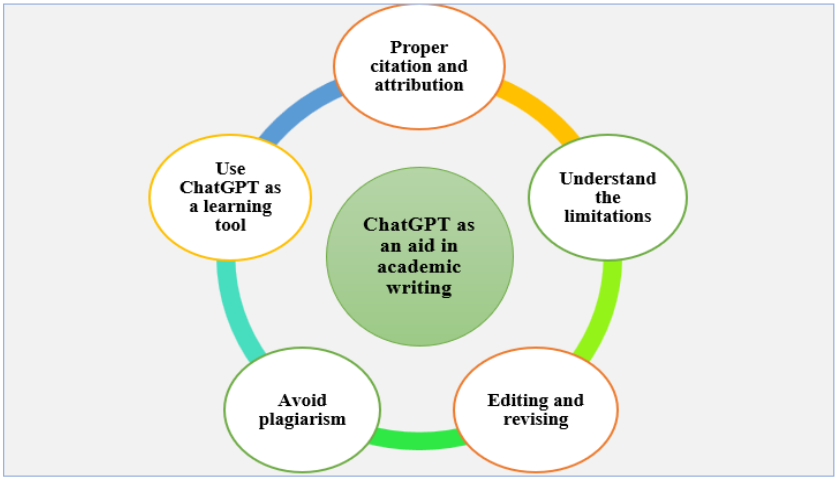

Figure 1. Guidelines for using ChatGPT with academic honesty (Source: Authors)

transforming the generated content into original work. Proponents of this perspective suggest that when using ChatGPT in academic writing, ChatGPT academic writing should be treated as a source that requires proper citation and attribution. By rephrasing and integrating the generated content into one's writing while providing precise citations to acknowledge the contribution of the language model, writers can maintain academic integrity. Johnson (2023) argues that if the generated content is critically evaluated, rephrased, and correctly cited, its use in academic writing can be acceptable and does not constitute plagiarism. **Figure 1** summarizes the guidelines for using ChatGPT with academic honesty.

Another viewpoint argues that using ChatGPT without adequate citation and attribution may be considered plagiarism. According to this perspective, since the generated content is not original work, it should be acknowledged as derived from another source (Okaibedi, 2023).

It is essential to note the dual nature of ChatGPT, as evident from the existing literature. ChatGPT serves as a valuable writing tool, helping and generating creative content, which has been acknowledged by researchers exploring its potential in language learning and facilitating the writing process (Yan, 2023).

However, ethical and academic integrity concerns arise when ChatGPT is misused without adequate attribution and citation. Studies have highlighted the importance of acknowledging the AI's contribution to avoid potential plagiarism and maintain responsible and ethical usage (Bender et al., 2021; Holland, 2023).

METHODOLOGY

This study is a systematic literature review (SLR) based on PRISMA guidelines (Moher, 2019). SLR is a rigorous research methodology that collects, identifies, and critically analyses various research studies, including articles, conference proceedings, books, and dissertations (Carrera-Rivera et al., 2022). Through a systematic procedure, an SLR aims to provide an updated overview of the existing literature on a particular subject, ensuring that the reader is informed about the most current research findings. It involves employing a predetermined set of search terms and specific criteria for selecting or excluding studies (Gough et al., 2017). Once the relevant studies are identified, the next step involves extracting and coding the data from these studies. This process enables the synthesis of findings, examining whether using ChatGPT in academic writing is or is not a form of plagiarism. This systematic review has curated 500 articles of which 20 have been included in the study for further analysis and interpretation.

Search Strategy

Inclusion and exclusion criteria were established using specific conditions for selecting studies to ensure they align with the study's purpose. The original search criteria and phrases are listed in **Table 1** and **Table 2**. Academic peer-reviewed articles on using ChatGPT for academic writing and on plagiarism were included in the search. Web of Science, Scopus, and EBSCO Education Source were some of the databases used, and the focus was on titles, abstracts, and keywords of the articles. Despite concerns about the peer-review process

Table 1. Original search criteria

No	Research topics	Search terms
1	Using ChatGPT without proper citation & attribution	Viewpoint that using ChatGPT without proper citation & attribution could be seen as a form of plagiarism is indeed based on belief that generated content is not original work & should be acknowledged as a derived source.
2	ChatGPT as a tool that can aid in writing process	ChatGPT & similar AI language models as tools that can aid in writing process. According to this, if generated content is critically evaluated, rephrased, & properly cited, its use in academic writing can be acceptable & does not constitute plagiarism.
3	ChatGPT: Writing tool or plagiarism without attribution	Exploring dual nature of ChatGPT: A valuable writing tool when used appropriately, but also a potential source of plagiarism when used without proper attribution.

Table 2. Inclusion & exclusion criteria

No	Inclusion criteria (IC)	No	Exclusion criteria (EC)
1	Inclusion criterion 1 (IC-1): Article is written in the English language.	1	Exclusion criterion 1 (EC-1): Exclusion of duplicate studies with identical content.
2	Inclusion criterion 2 (IC-2): Article introduces an educational chatbot.	2	Exclusion criterion 2 (EC-2): Exclusion of articles categorized as tutorials, posters, technical reports, review papers, short papers, or PhD theses.
3	Inclusion criterion 3 (IC-3): Article provides a comprehensive explanation of usage details of educational chatbot.	3	Exclusion criterion 3 (EC-3): Exclusion of duplicate articles that present a chatbot already introduced in another article, with only the most recent article being included.
		4	Exclusion criterion 4 (EC-4): Exclusion of articles that presented an educational chatbot but lacked empirical evidence or had insufficient empirical study to support its validity.

being raised in scientific community (Nicholas et al., 2015), only papers that were published in scholarly peer-reviewed journals were included in this research. 500 distinct records were found during the search process.

Search Process

This study was carried out between fall 2022 and spring 2023. The search for articles related to the research topic used several databases, including ACM Digital Library, Scopus, IEEE Xplore, and SpringerLink. The study questions, objectives, and existing literature were carefully examined to determine the most appropriate terms to achieve a thorough search.

The initial keywords used in the search string were “chatbot” and “education.” In addition, the keyword “plagiarism” was included to specifically address the aspect of academic integrity related to chatbot technology. For the “chatbot” aspect, keywords such as “learning”, “learner”, “teaching”, “teacher”, and “student” were used to explore the educational implications of ChatGPT when discussing issues related to proper citation and attribution.

The keywords and search string were refined iteratively throughout the search process to yield more adequate results. This iterative refinement helped enhance the search’s relevance and specificity and improved the search’s relevance and lead to more relevant articles for the study.

The researchers wanted to gather pertinent literature that tackles the convergence of chatbot technology, education, academic integrity, and the specific issues linked to correct citation and attribution by combining these keywords and repeatedly fine-tuning the search string.

Inclusion and exclusion criteria were selected to guarantee that only relevant articles related to the research questions were included in the study–the criteria assisted in lowering the amount of unconnected or unreviewed publications.

At first, 500 studies were found using a search query in the chosen databases. These studies’ metadata, which included the title, abstract, publication type, language, and keywords, were examined.

The selection process consisted of four stages to identify the relevant articles:

1. In the first stage, the researchers examined the articles’ metadata and applied inclusion criterion IC-1 and exclusion criterion EC-1. This initial screening reduced the number of studies to 400.
2. The researchers reviewed the studies’ titles, abstracts, and keywords in the second stage. They applied inclusion criterion IC-2 and exclusion criterion EC-2 to refine the selection further. This stage resulted in 300 studies.

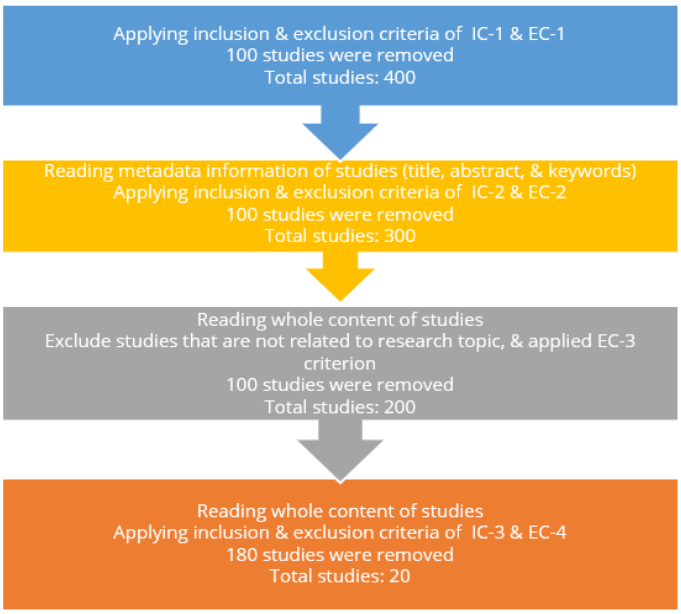

Figure 2. Flowchart of the study's selection process (Source: Authors)

3. The third stage involved eliminating articles irrelevant to the research questions. The researchers applied the exclusion criterion EC-3 to narrow the articles to 200 papers.
4. The final stage involved a comprehensive reading of the entire content of the articles, considering inclusion criterion IC-3. Additionally, studies lacking empirical evidence for the effectiveness of the educational chatbot were excluded using exclusion criterion EC-4. This final stage resulted in a last set of 20 papers.

The selection process was designed to progressively refine the articles based on relevance and empirical evidence, identifying a subset of 20 papers for further analysis. The detailed flowchart in **Figure 2** visually represents the selection process, showing how the inclusion and exclusion criteria were applied at each stage to narrow down the articles to the final set of 20 papers.

RESULTS

Using ChatGPT in Academic Writing

Table 3 presents a condensed overview of the main findings from the included studies regarding the implications of using ChatGPT in academic writing.

Table 3. Summary of main conclusions of the studies

Reference	Design & aim	Application & benefit	Risk, concerns, & limitation of ChatGPT	Suggested action & conclusions
Alkaissi and McFarlane (2023)	A study evaluated ChatGPT's performance on the US medical licensing examination to determine how well it handled sophisticated medical & clinical material.	ChatGPT as a tool that can aid in writing process.	Use of large language models, like ChatGPT, in academic writing gives rise to apprehensions regarding integrity & precision of their application. Authors propose adjusting policies & procedures for evaluating scientific manuscripts submitted to journals & medical conferences to maintain stringent scientific standards.	Ethical & acceptability aspects of using large language models in scientific writing are still subject to debate. There are concerns regarding potential creation of false experts in medical field through AI ChatGPT, which could result in harmful outcomes due to a lack of real-world experience & generation of expert opinions solely through AI. Considering these implications & risks associated with relying exclusively on AI-generated content in scientific writing is crucial, especially in areas where expertise & experience play a crucial role.

Table 3 (Continued). Summary of main conclusions of the studies

Reference	Design & aim	Application & benefit	Risk, concerns, & limitation of ChatGPT	Suggested action & conclusions
Alser and Waisberg (2023)	Show how ChatGPT usage is increasing in both academia & medical.	Using ChatGPT without proper citation & attribution.	Article expresses concerns regarding increasing use of ChatGPT in academia & medicine. Growing popularity of this tool raises essential considerations & potential implications that need to be addressed.	It is crucial to recognize & acknowledge contribution of bot in generated content without granting it authorship. Additionally, it is essential to be mindful of several types of plagiarism and biases that may be present in output produced by bot.
Anderson et al. (2023)	Tests ability of AI to produce two academic papers & an essay.	ChatGPT: Writing tool or plagiarism without attribution.	Considering potential impact of falsified references on scientific integrity, we must remain vigilant & safeguard our intellectual property within field of SEM. BOSEM, scientific publishing companies, & academic organizations should be aware of this threat & may need to explore innovative protection measures moving forward.	Tools like ChatGPT for generating natural conversational text in SEM manuscripts are worth monitoring. However, addressing ethics, equity, accuracy, & detection concerns is essential, as these factors pose potential threats to scientific integrity. It is necessary to carefully consider implications & risks associated with using such tools to ensure that scientific research maintains ambitious standards of integrity & credibility.
Bom (2023)	Investigates pros, cons, & issues of using ChatGPT in academic writing.	ChatGPT: Writing tool or plagiarism without attribution.	It is author's responsibility to ensure no issues with plagiarism happen. It may be deemed plagiarism to use AI-generated writing without providing correct citations.	By paraphrasing, ChatGPT helps to prevent plagiarism; hence author promotes its use in this context. A checklist, however, can assist authors in understanding need for responsible content assessment & editing. Reviewers should use LLMs carefully & be aware of potential problems.
Cotton et al. (2023)	This essay analyses possible benefits & drawbacks of adopting ChatGPT in higher education & opportunities & difficulties associated with doing so.	Using ChatGPT without proper citation & attribution.	It acknowledges the challenges associated with detecting & preventing academic dishonesty using AI tools like ChatGPT. It proposes strategies universities can implement to ensure these tools' ethical & responsible use.	It's conclusion suggests that integrating AI into higher education offers advantages & disadvantages. However, universities can successfully tackle these concerns by adopting a proactive & ethical approach towards using these tools.
Dergaa et al. (2023)	Investigating potential advantages & disadvantages of ChatGPT & other NLP technologies in academic writing & research publications; highlighting moral issues associated with using these tools; & considering potential effects on veracity & credibility of academic work.	ChatGPT as a tool that can aid in writing process.	It raises concerns regarding authenticity & credibility of academic work when utilizing these tools. It emphasizes necessity of engaging in comprehensive discussions regarding their potential applications, associated threats, & limitations. It underscores importance of upholding ethical & academic principles, prioritizing human intelligence & critical thinking throughout research process. It emphasizes need for thorough deliberations & ethical considerations surrounding use of tools.	It discovered that ChatGPT and similar NLP technologies hold promise in improving academic writing and research efficiency. However, the study emphasizes the need for academics to approach their usage cautiously and maintain transparency. It underscores the significance of human intelligence and critical thinking in academic endeavors, emphasizing that these tools should complement and not replace these essential aspects of scholarly work.

Table 3 (Continued). Summary of main conclusions of the studies

Reference	Design & aim	Application & benefit	Risk, concerns, & limitation of ChatGPT	Suggested action & conclusions
Editorial (2023)	Write a brief editorial arguing against using ChatGPT for composing academic scientific publications that will be published.	ChatGPT: Writing tool or plagiarism without attribution	Participating in the iterative and collaborative process is crucial for producing scientific manuscripts of high quality.	While ChatGPT can serve as a valuable tool for generating ideas & initial drafts of text, relying solely on it for writing academic scientific manuscripts intended for publication is not advisable. Intricate & nuanced nature of scientific research demands expertise & involvement of human researchers. Human researchers play a vital role in ensuring scientific claims & findings' accuracy, validity, & reliability. They possess necessary domain knowledge, critical thinking abilities, & contextual understanding to evaluate & refine content generated by ChatGPT, ensuring that it meets rigorous standards of scientific scholarship. Thus, while ChatGPT can assist in writing process, it is essential to involve human researchers to uphold integrity & quality of scientific manuscripts.
Frye (2022)	Impact of ChatGPT on academic integrity.	ChatGPT as a tool that can aid in the writing process.	There is growing concern among educators that widespread use of AI text generators, such as ChatGPT, will pose significant challenges in distinguishing between texts generated by students & those generated by AI. This uncertainty raises important questions about academic integrity & ability to assess student work accurately.	The concerns surrounding the use of AI text generators may be unfounded. If students can effectively respond to questions using these tools, it could imply that the questions lack depth. Similarly, if an AI text generator can rival the quality of scholarship, it may suggest that the original thinking behind the scholarship is superficial.
Gao et al. (2023)	Tests ChatGPT's ability to provide compelling abstracts for medical research.	ChatGPT: Writing tool or plagiarism without attribution.	The ethical and acceptable use of large language models in scientific writing is an ongoing topic of discussion, and there is variability in the policies adopted by different journals and conferences. The boundaries and guidelines for using these models are still being explored and defined within the academic community.	According to reviewers, distinguishing between AI-generated & human-written abstracts was surprisingly challenging. But they noted that the suspected generated abstracts tended to be vaguer and more formulaic. It was observed that ChatGPT could produce scientifically believable abstracts, albeit with generated data. Depending on the guidelines set by publishers, AI output detectors could be used as an editorial tool to assist in upholding scientific standards.
Khalil and Er (2023)	This study tries to investigate how original ChatGPT's contents are.	Using ChatGPT without proper citation and attribution.	It highlights importance of institutions taking proactive steps to address potential plagiarism concerns and guides navigating the ongoing discussion regarding the influence of AI technology on education.	The findings demonstrate that ChatGPT can generate complex and sophisticated text outputs, evading detection from plagiarism-checking software. ChatGPT can generate content across various subjects with a high level of originality, mimicking the work of a human author.

Table 3 (Continued). Summary of main conclusions of the studies

Reference	Design & aim	Application & benefit	Risk, concerns, & limitation of ChatGPT	Suggested action & conclusions
Kumar et al. (2023)	The following random query topic was chosen to test ChatGPT's capacity for academic writing, and the response returned was recorded in a Word file.	ChatGPT: Writing tool or plagiarism without attribution.	Although ChatGPT has limitations, it holds significant potential as a resource for training & upskilling in academic writing. ChatGPT can augment human intelligence rather than supplant it when used appropriately & under academic mentors' advice. By leveraging its capabilities in generating text & providing language suggestions, ChatGPT can assist individuals in improving their writing skills, exploring different writing styles, & expanding their understanding of academic discourse. Key lies in integrating ChatGPT as a tool within a structured & supervised learning environment, where human expertise & critical thinking are paramount. This way, ChatGPT can be harnessed to enhance individuals' learning & writing experiences, contributing to their growth & development in field of their learning & writing experiences, contributing to their growth & development in academic writing.	Although ChatGPT has considerable limitations, it has excellent potential as a training and upskilling resource for academic writing. If appropriately used under academic mentoring, it can enhance biological intelligence rather than replace it.
Macdonald et al. (2023)	Show how ChatGPT could facilitate faster paper drafting for scholars.	ChatGPT as a tool that can aid in the writing process.	The study raised significant inquiries regarding authorship and the ethics of publication.	Scientists face a challenge where research papers can successfully evade plagiarism detection tools, displaying a 100% originality score. Consequently, it becomes increasingly difficult for researchers to determine whether an abstract is original work of their colleagues or if ChatGPT has generated it.
Mijwil et al. (2023)	It examines how artificial intelligence tools & approaches are used in academic research & what that could mean for academic integrity. It will pay attention to ChatGPT's methods for producing scientific research in setting of academic integrity.	ChatGPT: Writing tool or plagiarism without attribution	Detecting violations of academic writing poses a significant challenge due to the limited availability of technologies capable of identifying such infractions.	The article reveals that incorporating artificial intelligence applications in academic research can raise ethical concerns about academic integrity.

Table 3 (Continued). Summary of main conclusions of the studies

Reference	Design & aim	Application & benefit	Risk, concerns, & limitation of ChatGPT	Suggested action & conclusions
Okaibedi (2023)	An outline of the current debates surrounding ChatGPT, and academic integrity is given in this study.	Using ChatGPT without proper citation and attribution.	To effectively mitigate risks to academic integrity & maximize its preservation, it is necessary to involve institutional & multiple stakeholders in concerted efforts.	While technologies like ChatGPT can revolutionize academia, their usage can also threaten academic integrity. How ChatGPT and other generative AI systems are used can undermine academic integrity.
Perkins (2023)	Examines the ethical issues raised by students using ChatGPT and other AI applications that use large language models (LLMs) in formal exams.	ChatGPT: Writing tool or plagiarism without attribution.	Considering the potential threats to academic integrity discussed in the paper, we anticipate an integration of LLMs and other AI-supported digital tools into educational settings. Consequently, it becomes imperative for higher education institutions to carefully consider the implications of this integration in their future policy development.	Determination of whether students' use of AI tools constitutes plagiarism, or a breach of academic integrity is not solely since they are using such tools. Instead, it depends on whether students acknowledge & disclose their use of these tools. Whether a specific use of LLMs by students can be categorized as academic misconduct is determined by academic integrity policies of each higher education institution. Policies & guidelines set by each institution play a crucial role in defining what constitutes appropriate & ethical use of AI tools in academic work. Students must familiarize themselves with their institution's policies & adhere to them to maintain academic integrity.
Salvagno et al. (2023)	In this essay, artificial intelligence chatbots are discussed concerning scientific writing.	ChatGPT as a tool that can aid in the writing process.	Using these tools raises various ethical concerns, including potential for plagiarism, inaccuracies, & unequal accessibility between high- & low-income countries if software becomes paid. Consequently, there is a growing need for a consensus on how to regulate use of chatbots in scientific writing to address these issues effectively.	ChatGPT, including other similar tools, demonstrates its usefulness in scientific writing by aiding researchers and scientists in organizing material, generating initial drafts, and proofreading. However, ChatGPT should not substitute for human judgment. The output generated by ChatGPT should always undergo a thorough review by experts before being used in critical decision-making or real-world applications.
Tatzel and Mael (2023)	Artificial intelligence chatbots are discussed in relation to scientific writing.	ChatGPT as a tool that can aid in the writing process.	Institutions should not hastily prohibit the use of AI but instead strive to understand, adopt, and regulate its utilization. By doing so, they can regain control over academic dishonesty while enhancing their students' educational experiences.	AI's rapid advancement brings new opportunities for discoveries & allows students to showcase their creativity in novel ways. It is a powerful tool that, when used correctly, has the potential to enhance learning experiences. But it is essential to emphasize the need for reliable and proper use of artificial intelligence to ensure its positive impact on education and address any associated challenges effectively.
Tomlinson et al. (2023)	Presents a perspective on how academics could approach writing in conjunction with AI & provides methods for determining if such AI writing violates copyright	ChatGPT as a tool that can aid in the writing process.	By adhering to the recommended guidelines for standard practices, academics and researchers can employ AI-assisted writing tools responsibly and lawfully, thereby safeguarding the quality and credibility of their work.	Integration of AI into scholarly writing activities is deemed appropriate. To establish solid legal & scholarly foundations for this integration, we propose a framework that provides guidance & ensures ethical practices are upheld. This framework aims to promote responsible usage of AI in scholarly writing while considering

Table 3 (Continued). Summary of main conclusions of the studies

Reference	Design & aim	Application & benefit	Risk, concerns, & limitation of ChatGPT	Suggested action & conclusions
	or is protected by fair use safe harbor.			legal implications and maintaining academic integrity.
Wen and Wang (2023)	Showcase the influence of ChatGPT on academic clinical and translational medical research.	Using ChatGPT without proper citation and attribution.	The increasing utilization of ChatGPT has generated significant discussions within the scientific community, raising ethical concerns regarding the use of AI in generating scientific publications with potential implications for healthcare professionals, researchers, and policymakers.	Thoroughly assessing the potential effects of ChatGPT on academic clinical and translational medicine research is of utmost importance. Conducting a critical evaluation of ChatGPT's impact will provide valuable insights into its implications for academic clinical and translational medicine research.
Yan (2023)	The study aimed to assess how the text generation function of ChatGPT affected a one-week L2 writing practicum. It investigated how ChatGPT affected students' performance in L2 writing.	ChatGPT as a tool that can aid in the writing process.	Participants in the study voiced their apprehension about the risks to academic integrity and equitable education associated with the tool. The research underscored the need to redefine plagiarism in the modern era and establish regulations and educational guidance to govern its appropriate use. The study emphasized the significance of addressing these concerns and implementing frameworks to ensure the responsible use of the tool.	The study's findings highlighted the usefulness and potential application of the tool in L2 writing pedagogy. Moreover, the tool demonstrated an automated workflow that could enhance the efficiency of the writing process.

Figure 3 provides valuable insights into the distribution of articles across countries. The total number of articles per country in **Figure 3** exceeds 20, corresponding to the total number of selected articles. This observation suggests the involvement of authors affiliated with organizations having locations in multiple nations.

A notable observation is that most of the selected publications were either published or co-written by academics from American universities, indicating a significant American contribution to the research. European universities also exhibited a robust research output, accounting for the highest number of articles (nine articles) among all regions. In terms of regional contributions, Asian universities contributed three articles, while American universities contributed seven articles. Furthermore, universities from Africa and Australia each contributed 1 article, totaling five articles.

These findings emphasize the distribution of research articles among different regions, with prominent participation from American and European institutions. For a comprehensive understanding of countries and institutions involved in the research, referring to the original **Figure 3** and corresponding articles is suggested.

Impact of Artificial Intelligence on Promoting Academic Integrity

Figure 4 provides information on the number of articles related to the impact of AI in promoting academic integrity based on the articles included in this study. The total number of articles in **Figure 4** is 20, corresponding to the number of selected articles.

Among the selected articles, a significant majority (eight articles) highlight ChatGPT as a tool that can aid in the writing process, emphasizing its positive role. However, a smaller number of articles (seven articles) indicate concerns regarding ChatGPT being used as a writing tool or as a potential source of plagiarism without proper attribution. Additionally, a subset of articles (five articles) emphasizes the importance of using ChatGPT with appropriate citation and attribution (**Figure 4**).

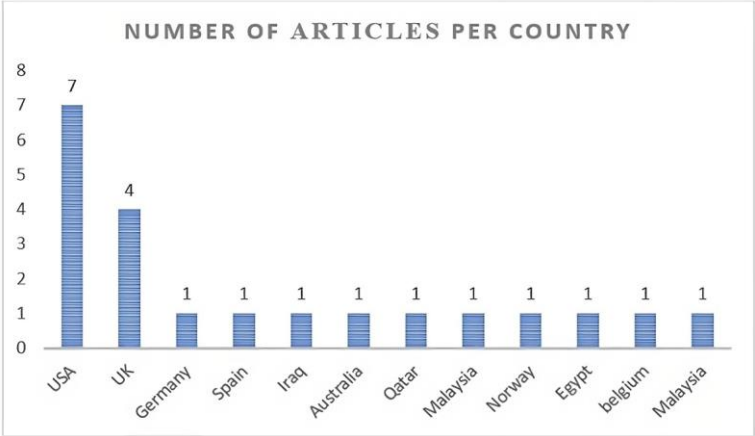

Figure 3. Number of articles per country (Source: Authors)

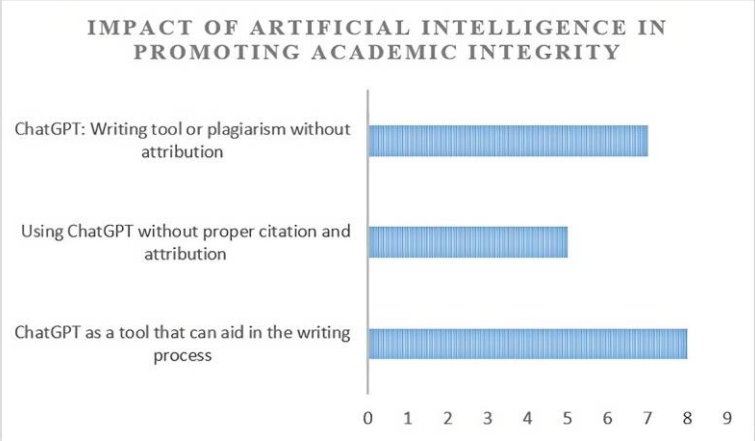

Figure 4. Impact of artificial intelligence in promoting academic integrity (Source: Authors)

DISCUSSION

This study's main objective is to conduct a comprehensive literature review on using ChatGPT in academic writing and its implications regarding plagiarism. The research investigation revealed three critical dimensions related to this topic. Firstly, ChatGPT is a tool that can enhance the writing process. Secondly, the use of ChatGPT without proper citation and attribution. Lastly, the potential concern of ChatGPT being used as a writing tool leads to plagiarism without appropriate attribution.

ChatGPT as a Tool That Can Aid in Writing Process

Among the selected articles, a significant majority (eight articles) highlight ChatGPT as a tool that can aid in the writing process, emphasizing its positive role. Among the selected articles, most of eight studies emphasize the beneficial role of ChatGPT as a tool for supporting the writing process. These findings highlight numerous benefits of using ChatGPT, such as increased productivity, improved language quality, and access to accurate information. The studies present ChatGPT's ability to assist authors by providing prompt and grammatically correct content. Consequently, these findings suggest that ChatGPT can be a valuable tool for academic writers, facilitating enhanced writing practices and outcomes (Vijayakumar, 2023).

Numerous research has shown that ChatGPT is a helpful tool that can help with the writing process. Studies have shown that ChatGPT is a helpful tool that can help with writing. These studies highlight the potential advantages of ChatGPT for increasing productivity, enhancing language quality, and delivering precise information. They underline how ChatGPT may help authors by producing grammatically correct content quickly. These research results imply utilizing using ChatGPT's features, writers can improve their writing processes and create content of a higher quality (Alkaissi & McFarlane, 2023; Dergaa et al., 2023; Frye, 2022; Macdonald et al., 2023; Salvagno et al., 2023; Tatzel & Mael, 2023; Tomlinson et al., 2023; Yan, 2023).

Using ChatGPT Without Appropriate Citation and Attribution

Among the selected subset of research articles, five publications emphasize the significance of using ChatGPT in conjunction with proper citation and attribution practices. These studies stress the importance of recognizing ChatGPT as a writing tool and giving appropriate credit to the AI-generated content. They highlight the necessity for authors to conscientiously cite the sources provided by ChatGPT and attribute the tool's contributions to their writing. By emphasizing the value of accurate citation and attribution, these articles promote the ethical and responsible utilization of ChatGPT in academic writing (Alser &Waisberg, 2023; Herbst-Debby et al., 2023; Khalil & Er, 2023; Okaibedi, 2023; Wen & Wang, 2023).

The articles highlight the risk of plagiarism that arises when authors fail to acknowledge the contribution of ChatGPT to their writing. They emphasize giving proper attribution to ChatGPT as an AI tool and recognizing its role in the writing process. By not citing ChatGPT as a source and relying solely on its generated content, there is a concern that authors may inadvertently pass off the AI-generated text as their own. This lack of proper citation and attribution undermines academic integrity and violates ethical writing practices.

The studies underscore the importance of authors being diligent and thorough in citing the sources generated by ChatGPT. They highlight the significance of incorporating AI-generated content following established academic conventions. It is crucial to adhere to these conventions to ensure proper credit is given and acknowledge ChatGPT for its valuable contribution to the writing process (Zheng et al., 2023).

By examining the concerns related to the improper use of ChatGPT without appropriate citation and attribution, these articles provide valuable insights into the ethical considerations that researchers and writers need to consider when incorporating AI tools into their academic work. They serve as a reminder of the utmost significance of practicing responsible and ethical writing to uphold academic integrity and adhere to the fundamental principles of scholarship.

ChatGPT: Writing Tool or Plagiarism Without Attribution

A smaller subset of articles, consisting of seven publications, raise concerns regarding using ChatGPT as a writing tool and its potential for facilitating plagiarism without proper attribution. These studies highlight the need for caution when using ChatGPT, as students or writers can misuse or abuse it or fail to provide appropriate attribution for the AI-generated content. The articles' authors express concerns about the ethical implications of relying solely on ChatGPT for writing tasks and stress the importance of maintaining academic integrity by ensuring proper citation and attribution practices. The findings of these studies caution against the potential misuse of ChatGPT and emphasize the responsibility of authors to use the tool ethically and responsibly (Anderson et al., 2023; Bom, 2023; Editorial, 2023; Gao et al., 2023; Kumar, 2023; Mijwil et al., 2023; Perkins, 2023).

The studies included in this research highlight the risk of plagiarism that arises when authors rely solely on ChatGPT's generated content without acknowledging its role in the writing process. They emphasize that using ChatGPT as a writing tool without proper attribution can lead to ethical issues and violations of academic integrity. The studies also underscore the importance of distinguishing between original content and AI-generated text. They stress the need for authors to correctly attribute ChatGPT's involvement by citing it as a source in their work. Failure to provide attribution can result in unintentional plagiarism, where the AI-generated content is presented as the author's own.

By raising concerns about using ChatGPT as a writing tool without proper attribution, these studies serve as a reminder of the ethical responsibilities of authors. They encourage writers to be mindful of giving credit to ChatGPT for its contributions and to follow established citation and attribution practices to avoid potential instances of following established citation and attribution practices to avoid plagiarism.

Limitations and Implications

Using ChatGPT, an advanced language model, in various domains, including academic writing, raises significant considerations and implications. This section discusses the limitations and potential consequences associated with using ChatGPT, highlighting the need for responsible and ethical usage.

One key concern is the potential for plagiarism and the need for proper citation and attribution when incorporating AI-generated content. The reliance on ChatGPT without acknowledging its role can lead to

ethical issues and violations of academic integrity. Authors must be cautious and diligent in distinguishing between their original work and AI-generated text to ensure appropriate credit is given. To avoid plagiarism, authors must always distinguish between the original work and AI-generated text and provide appropriate credit for AI contributions.

The authenticity and credibility of academic work may be questioned when using AI tools like ChatGPT. One of the primary concerns is the potential for inaccuracies in AI-generated content. While AI language models like ChatGPT have shown remarkable proficiency in generating human-like text, they are fallible and may occasionally produce erroneous or misleading information. To address this issue, researchers and academic institutions must conduct thorough discussions on the limitations of AI and its implications for academic writing. These discussions should involve AI experts, educators, researchers, and stakeholders to gain diverse perspectives and insights. Establishing guidelines and regulations to address potential inaccuracies and maintain stringent scientific standards is crucial. Adapting policies and procedures for evaluating scientific manuscripts can help uphold the integrity of research outputs.

The use of AI in academic writing poses challenges in detecting violations of academic integrity. Limited technologies are available for identifying infractions, making it essential to develop advanced detection methods to ensure the credibility of scholarly publications. Integrating ChatGPT and similar AI-supported tools into educational settings requires careful consideration. Institutions must understand, adopt, and regulate their utilization to regain control over academic dishonesty and enhance students' educational experiences. Policies should be developed to address AI integration's implications and guide its responsible use in learning environments. By actively developing advanced detection methods and adopting policies that address potential implications, academic institutions can safeguard scholarly publications' credibility while embracing the benefits of AI-supported tools in education and research. Some detection methods are automated plagiarism detection, AI pattern recognition, AI-driven contextual analysis, educational programs on academic integrity, and encouraging responsible AI development. Responsible AI integration and continuous monitoring will be vital to maintaining the trust and integrity of academic work.

The accessibility and availability of AI tools like ChatGPT may vary across regions and income levels. The digital divide and inadequate technological infrastructure pose significant barriers to AI tool accessibility, hindering students and by Utilizing AI-powered resources like ChatGPT. Advocacy efforts should focus on bridging this divide and promoting affordable AI services to ensure cost does not limit access. Addressing language and cultural representation is also essential, as AI models developed with limited data may exhibit biases for diverse users. User-friendly interfaces, inclusive AI education, public initiatives, data privacy, community outreach, research on AI for social good, and collective responsibility are crucial to promoting equity and inclusivity in AI tool access. Addressing these inequalities and ensuring equitable access to AI technologies is crucial to promote fairness and inclusivity in education.

While ChatGPT can assist individuals in improving their writing skills and exploring different writing styles, it should be integrated as a tool within a structured and supervised learning environment. Human expertise, critical thinking, and mentorship are vital in maximizing the benefits of ChatGPT and guiding its appropriate use. Learners can complement their writing abilities with AI suggestions while avoiding over-reliance. Supervision helps learners understand AI limitations, develop analytical skills, and use AI responsibly, fostering originality and confidence. Educators are crucial in providing feedback, promoting ethics, and encouraging learners to exercise their creativity alongside AI assistance.

As AI technologies advance, the academic community must engage in ongoing discussions and establish consensus on regulations and guidelines for using AI, including ChatGPT, in scientific writing. This proactive approach addresses ethical considerations, AI limitations, and responsible AI development to ensure accountable and ethical usage in research. Collaboration between disciplines and educational institutions will help navigate the evolving AI landscape while upholding research integrity and balancing AI assistance and human input. The goal is to anticipate and tackle emerging challenges associated with AI technologies, fostering a responsible and informed approach to AI integration in scientific writing.

While ChatGPT offers significant potential in academic writing, its limitations and implications must be carefully considered. Maintaining academic integrity, addressing ethical concerns, detecting violations,

promoting equity, and integrating AI tools responsibly are essential aspects of leveraging the benefits of ChatGPT while upholding the principles of scholarly writing and education.

Guidelines for Users of ChatGPT in Academic Writing

ChatGPT and other AI language models offer significant potential for academic writing, but their usage must be approached responsibly. The following guidelines may help authors and educators harness the benefits of AI while upholding the principles of scholarly writing, academic integrity, and ethical use of technology in education.

Guidelines for users of ChatGPT in academic writing:

- **Proofreading and editing:** Even though ChatGPT can assist in generating content, it is essential to proofread and edit the AI-generated text thoroughly. While the language model can provide a foundation, it may not always produce error-free or contextually accurate content. Authors should take responsibility for the final quality and coherence of their work.
- **Transparent use of AI assistance:** When submitting academic work involving ChatGPT, authors should transparently disclose the extent of AI assistance in the writing process. This disclosure can help readers and reviewers understand the AI tool's contribution and the author's original input.
- **Verifying information:** While ChatGPT can generate content based on the input provided, verifying the accuracy and credibility of the information obtained from AI-generated sources is crucial. Authors should cross-check AI-generated facts and data with reliable academic resources before including them.
- **Combining multiple AI inputs:** Avoid relying solely on a single AI tool for content generation. Instead, consider using multiple AI models or sources to validate and diversify the generated content. This approach can enhance the quality and reliability of the output.
- **Understanding AI limitations:** Be aware of the limitations of ChatGPT and other AI language models. Recognize that AI is not a substitute for human expertise, critical thinking, or domain-specific knowledge. Authors should contribute their insights and analysis to augment the AI-generated content.
- **Secure data handling:** If AI-generated content involves sensitive data, authors must handle it cautiously and ensure data privacy and security measures are in place. Compliance with relevant data protection regulations is essential.
- **Ethical considerations in training data:** When creating custom AI models or fine-tuning ChatGPT, be mindful of the data used for training. Ensure that the data is ethically sourced, does not perpetuate biases, and adheres to the principles of responsible AI development.
- **Responsible AI model sharing:** If authors train and share custom AI models based on ChatGPT, they should ensure that others use these models ethically and responsibly. Encourage users to be aware of the guidelines and limitations of the AI models they access.
- **Continuous learning and adaptation:** As AI technology evolves, keep informed about the latest advancements and best practices in AI use in academic writing. Stay adaptable and open to incorporating new guidelines to ensure AI tools' responsible and effective use.

CONCLUSIONS

The primary objective of this study was to conduct a literature review on using ChatGPT in academic writing and its implications regarding plagiarism. Our evaluation revealed that while ChatGPT falls short of producing academic writing that meets the required academic journal publication standards, it excels in providing fast information with excellent language proficiency, primarily free of grammatical errors. We employed ChatGPT as an aid in the writing process of this article, which was subsequently revised and edited to meet academic criteria.

As the academic community continues to explore the use of AI technologies in scholarly writing, it is essential to delve deeper into the nuances and challenges of incorporating tools like ChatGPT. While the language model offers convenience and proficiency in generating content, researchers must remain vigilant

about the potential pitfalls and implications that may arise. Maintaining academic integrity and avoiding plagiarism is paramount, and authors must be diligent in distinguishing between their original work and AI-generated text. Emphasizing the importance of responsible and ethical use of ChatGPT in academic writing is vital in academia.

Another significant challenge is the issue of bias. AI models like ChatGPT are trained on vast datasets, which may inadvertently contain biased information from various sources. Researchers should be cautious of perpetuating biases and stereotypes when using AI-generated content. An ongoing discussion within the academic community can help identify and address these biases, ensuring that AI tools contribute to inclusive and diverse research outputs. Another consideration is the impact of AI on the peer review process. As researchers increasingly rely on AI assistance in generating content, peer reviewers must adapt their evaluation processes to assess the integration of AI-generated text and its alignment with the overall context of the manuscript. Guidelines and best practices for reviewing AI-augmented research can be collaboratively developed through discussions, ensuring the integrity of the peer review process.

Educational institutions play a vital role in embracing and regulating the use of AI in academic settings. Collaboration between AI developers, researchers, educators, and policymakers is vital for shaping the future of AI in scholarly writing. By working together, stakeholders can comprehensively address the challenges and opportunities of AI integration. Through interdisciplinary collaborations, researchers from various domains can share insights and contribute to the collective understanding of AI's implications for academic writing. Furthermore, public-private partnerships can play a significant role in promoting equitable access to AI technologies. Governments, non-profit organizations, and AI developers can collaborate to offer subsidized or free AI tools to educational institutions and researchers in underserved regions. Initiatives focusing on bridging the digital divide and providing equal access to AI resources will contribute to leveling the playing field for all researchers.

By carefully considering the implications, implementing appropriate policies, and fostering mentorship and collaboration, institutions can empower students while safeguarding against academic dishonesty. Equity and accessibility issues must also be addressed to ensure that AI tools are accessible to all, regardless of geographical location or income level. By promoting inclusivity and equal opportunities, AI's potential benefits can be harnessed fairly and equitably.

Looking ahead, the future implications of AI language models in academic settings are both promising and challenging. As AI technology continues to advance, AI language models like ChatGPT have the potential to revolutionize how research is conducted and scholarly communication is facilitated.

On the positive side, AI language models can significantly enhance the efficiency of academic writing and research. Researchers can use AI to explore ideas, generate drafts, and gather information quickly. This expedites writing and allows researchers to focus on higher-order thinking tasks. Additionally, AI language models may democratize academic writing by making writing tools accessible to researchers with diverse linguistic backgrounds and skill levels. AI-generated translations and language support can break down language barriers, enabling global collaboration in research and promoting inclusivity in academia.

However, these advancements also come with challenges and potential risks. Using AI language models may raise concerns about intellectual property and copyright issues. Researchers must be cautious about using AI-generated content without proper attribution and consider the implications of AI-to-AI plagiarism. Furthermore, the influence of AI on academic authorship is a topic of ongoing discussion. As AI tools contribute to content creation, questions may arise about the role of human authors and how to define authorship in AI-augmented research. Addressing these issues requires a collective effort from the academic community to establish guidelines and best practices for acknowledging AI contributions.

Author contributions: All authors were involved in concept, design, collection of data, interpretation, writing, and critically revising the article. All authors approved the final version of the article.

Funding: The authors received no financial support for the research and/or authorship of this article.

Ethics declaration: Authors declared that ethical approval was not applicable since this is a review article that does not involve human subjects or animal experiments.

Declaration of interest: Authors declare no competing interest.

Data availability: Data generated or analyzed during this study are available from the authors on request.

REFERENCES

Alkaissi, H., & McFarlane, S. I. (2023). Artificial hallucinations in ChatGPT: Implications in scientific writing. *Cureus, 15*(2), e35179. https://doi.org/10.7759/cureus.35179

Alneyadi, S., & Wardat, Y. (2023). ChatGPT: Revolutionizing student achievement in the electronic magnetism unit for eleventh-grade students in Emirates schools. *Contemporary Educational Technology, 15*(4), ep448. https://doi.org/10.30935/cedtech/13417

Alser, M., & Waisberg, E. (2023). Concerns with the usage of ChatGPT in academia and medicine: A viewpoint. *American Journal of Medicine Open, 9*, 100036. https://doi.org/10.1016/j.ajmo.2023.100036

Anderson, N., Belavy, D. L., Perle, S. M., Hendricks, S., Hespanhol, L., Verhagen, E., & Memon, A. R. (2023). AI did not write this manuscript, or did it? Can we trick the AI text detector into generated texts? The potential future of ChatGPT and AI in sports & exercise medicine manuscript generation. *BMJ Open Sport & Exercise Medicine, 9*(1), e001568. https://doi.org/10.1136/bmjsem-2023-001568

Andrews, S., Bare, L., Bentley, P., Goedegebuure, L., Pugsley, C., & Rance, B. (2016). Contingent academic employment in Australian universities. *LH Martin Institute*. http://hdl.voced.edu.au/10707/404396

Bayne, S. (2018). Teacherbot: Interventions in automated teaching. *Apertura, 10*(2), 140-154. https://doi.org/10.32870/ap.v10n2.1342

Bender, E. M., Gebru, T., McMillan-Major, A., & Shmitchell, S. (2021). On the dangers of stochastic parrots: Can language models be too big? In *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency* (pp. 610-623). https://doi.org/10.1145/3442188.3445922

Bom, H. S. H. (2023). Exploring the opportunities and challenges of ChatGPT in academic writing: A roundtable discussion. *Nuclear Medicine and Molecular Imaging, 57*, 165-167. https://doi.org/10.1007/s13139-023-00809-2

Cao, Y., Li, S., Liu, Y., Yan, Z., Dai, Y., Yu, P. S., & Sun, L. (2023). A comprehensive survey of AI-generated content (AIGC): A history of generative AI from GAN to ChatGPT. *arXiv, 2303*, 04226. https://doi.org/10.48550/arXiv.2303.04226

Carrera-Rivera, A., Ochoa, W., Larrinaga, F., & Lasa, G. (2022). How-to conduct a systematic literature review: A quick guide for computer science research. *MethodsX, 9*, 101895. https://doi.org/10.1016/j.mex.2022.101895

Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *IEEE Access, 8*, 75264-75278. https://doi.org/10.1109/ACCESS.2020.2988510.

Chen, X., Wang, Y., Nakanishi, M., Gao, X., Jung, T.-P., & Gao, S. (2015). High-speed spelling with a noninvasive brain-computer interface. *Proceedings of the National Academy of Sciences*, *112*(44), E6058-E6067. https://doi.org/10.1073/pnas.1508080112

Cotton, D. R., Cotton, P. A., & Shipway, J. R. (2023). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. *Innovations in Education and Teaching International*. https://doi.org/10.1080/14703297.2023.2190148

David, E. (2023). Pausing AI might be a good idea, but companies won't do it. *Business Insider*. https://www.businessinsider.com/openai-elon-musk-pause-development-letter-never-happen-2023-4

De Lange, C. (2015). Welcome to the bionic dawn. *New Scientist, 227*(3032), 24-25. https://doi.org/10.1016/s0262-4079(15)30881-2

Dergaa, I., Chamari, K., Zmijewski, P., & Ben Saad, H. (2023). From human writing to artificial intelligence generated text: examining the prospects and potential threats of ChatGPT in academic writing. *Biology of Sport, 40*(2), 615-622. https://doi.org/10.5114/biolsport.2023.125623

Editorial. (2023). Why ChatGPT should not be used to write academic scientific manuscripts for publication. *Annals of Family Medicine*, 2958. https://doi.org/10.1370/afm.2982

Frye, B. L. (2022). Should using an AI text generator to produce academic writing be plagiarism? *Fordham Intellectual Property, Media & Entertainment Law Journal, 947*.

Gao, C. A., Howard, F. M., Markov, N. S., Dyer, E. C., Ramesh, S., Luo, Y., & Pearson, A. T. (2023). Comparing scientific abstracts generated by ChatGPT to real abstracts with detectors and blinded human reviewers. *npj Digital Medicine, 6*, 75. https://doi.org/10.1038/s41746-023-00819-6

Gavilán, J. C. O., Díaz, D. Z., Huallpa, J. J., Cabala, J. L. B., Aguila, O. E. P., Puma, E. G. M., Vasquez-Pauca, M. J., Mansilla, E. B. R., Laura, P. A. S., & Hoces, W. B. (2022). Technological social responsibility in university professors. *Eurasian Journal of Educational Research, 100*(100), 104-118.

Gough, D., Oliver, S., & Thomas, J. (2017). *An introduction to systematic reviews*. SAGE.

Herbst-Debby, A., Kaplan, A., Endeweld, M., & Achouche, N. (2023). Adolescent employment, family income and parental divorce. *Research in Social Stratification and Mobility, 84*, 100772. https://doi.org/10.1016/j.rssm.2023.100772

Holland, M. (2023). Responsible AI helps reduce ethical, legal risks. *techtarget.com*. https://www.techtarget.com/searchcio/news/366536672/Responsible-AI-helps-reduce-ethical-legal-risks

Johnson, A. (2023). ChatGPT in schools: Here's where it's banned–And how it could potentially help students. *Forbes*. https://www.forbes.com/sites/ariannajohnson/2023/01/18/chatgpt-in-schools-heres-where-its-banned-and-how-it-could-potentially-help-students/?sh=443643686e2c

Khalil, M., & Er, E. (2023). Will ChatGPT get you caught? Rethinking of plagiarism detection. *ArXiv, 2302*, 04335. https://doi.org/10.35542/osf.io/fnh48

Kim, J. (2018). Are the professions (disciplines?) of educational developer and learning designer merging? Or not? *Inside Higher Ed*. https://www.insidehighered.com/digital-learning/blogs/technology-and-learning/are-professions-disciplines-educational-eveloper

Kübler, A., Holz, E. M., Sellers, E. W., & Vaughan, T. M. (2015). Toward independent home use of brain-computer interfaces: A decision algorithm for selection of potential end-users. *Archives of Physical Medicine and Rehabilitation, 96*(3), S27-S32. https://doi.org/10.1016/j.apmr.2014.03.036

Kumar, A. (2023). Analysis of ChatGPT tool to assess the potential of its utility for academic writing in biomedical domain. *Biology, Engineering, Medicine and Science Reports, 9*(1), 24-30. https://doi.org/10.5530/bems.9.1.5

Macdonald, C., Adeloye, D., Sheikh, A., & Rudan, I. (2023). Can ChatGPT draft a research article? An example of population-level vaccine effectiveness analysis. *Journal of Global Health, 13*. https://doi.org/10.7189/jogh.13.01003

Mansilla, E. B. R., Castillo-Acobo, R. Y., Puma, E. G. M., Maquera, Y. M., Gonzales, J. L. A., & Vasquez-Pauca, M. M. J. (2022). Stress in university teachers in the framework of the post-pandemic face-to-face. *Journal of Namibian Studies, 33*(S1), 71-85.

McCarthy, J. (2007). From here to human-level AI. *Artificial Intelligence, 171*(18), 1174-1182. https://doi.org/10.1016/j.artint.2007.10.009

McKinsey & Company. (2023). *What is generative AI?* https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-generative-ai#/

Mijwil, M. M., Hiran, K. K., Doshi, R., Dadhich, M., Al-Mistarehi, A.-H., & Bala, I. (2023). ChatGPT and the future of academic integrity in the artificial intelligence era: A new frontier. *Al-Salam Journal for Engineering and Technology, 2*(2), 116-127. https://doi.org/10.55145/ajest.2023.02.02.015

Moher, D. (2019). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Annals of Internal Medicine, 151*(4), 264. https://doi.org/10.7326/0003-4819-151-4-200908180-00135

Nath, S., Marie, A., Ellershaw, S., Korot, E., & Keane, P. A. (2022). New meaning for NLP: The trials and tribulations of natural language processing with GPT-3 in ophthalmology. *British Journal of Ophthalmology, 106*(7), 889-892. https://doi.org/10.1136/bjophthalmol-2022-321141

Nicholas, D., Watkinson, A., Jamali, H. R., Herman, E., Tenopir, C., Volentine, R., Allard, S., & Levine, K. (2015). Peer review: Still king in the digital age. *Learned Publishing, 28*(1), 15-21. https://doi.org/10.1087/20150104

Niemimaa, M., & Zimmer, M. P. (2022). Are we discovering or making concepts? Performativity in concept defining. In *Proceedings of the Pacific Asia Conference on Information Systems* (pp. 1-9).

Okaibedi, D. (2023). ChatGPT and the rise of generative AI: Threat to academic integrity? *Journal of Responsible Technology, 13*, 100060. https://doi.org/10.1016/j.jrt.2023.100060

Perkins, M. (2023). Academic Integrity considerations of AI large language models in the post-pandemic era: ChatGPT and beyond. *Journal of University Teaching & Learning Practice, 20*(2). https://doi.org/10.53761/1.20.02.07

Qasem, F. (2023). ChatGPT in scientific and academic research: future fears and reassurances. *Library Hi Tech News, 40*(3), 30-32. https://doi.org/10.1108/lhtn-03-2023-0043

Rahman, M., Terano, H. J. R., Rahman, N., Salamzadeh, A., & Rahaman, S. (2023). ChatGPT and academic research: A review and recommendations based on practical examples. *Journal of Education, Management and Development Studies, 3*(1), 1-12. https://doi.org/10.52631/jemds.v3i1.175

Salvagno, M., Taccone, F. S., & Gerli, A. G. (2023). Can artificial intelligence help for scientific writing? *Critical Care, 27*(1), 1-5. https://doi.org/10.1186/s13054-023-04380-2

Tatzel, A., & Mael, D. (2023). *"Write a paper on AI plagiarism": An analysis on ChatGPT and its impact on academic dishonesty in higher education.* https://www.lasell.edu/documents/Writing%20Program/2023%20Winners/TatzelA%20100%20Level%20Winnter%202023.pdf.

Tomlinson, B., Torrance, A. W., & Black, R. W. (2023). ChatGPT and works scholarly: Best practices and legal pitfalls in writing with AI. *arXiv, 2305*, 03722. https://doi.org/10.48550/arxiv.2305.03722

Vijayakumar, S. (2023). 13 best AI essay writing tools to get A grades in 2023. *Business 2 Community*. https://www.business2community.com/ai/best-ai-essay-writer

Wardat, Y., Tashtoush, M. A., AlAli, R., & Jarrah, A. M. (2023). ChatGPT: A revolutionary tool for teaching and learning mathematics. *Eurasia Journal of Mathematics, Science and Technology Education, 19*(7), em2286. https://doi.org/10.29333/ejmste/13272

Wen, J., & Wang, W. (2023). The future of ChatGPT in academic research and publishing: A commentary for clinical and translational medicine. *Clinical and Translational Medicine, 13*(3), e1207. https://doi.org/10.1002/ctm2.1207

Xu, Y., Liu, X., Cao, X., Huang, C., Liu, E., Qian, S., Liu, X., Wu, Y., Dong, F., Qiu, C.-W., Qiu, J., Hua, K., Su, W., Wu, J., Xu, H., Han, Y., Fu, C., Yin, Z., Liu, M., … Zhang, J. (2021). Artificial intelligence: A powerful paradigm for scientific research. *The Innovation, 2*, 100179. https://doi.org/10.1016/j.xinn.2021.100179

Yan, D. (2023). Impact of ChatGPT on learners in a L2 writing practicum: An exploratory investigation. *Education and Information Technologies*. https://doi.org/10.1007/s10639-023-11742-4

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education-where are the educators? *International Journal of Educational Technology in Higher Education, 1*, 16-39. https://doi.org/10.1186/s41239-019-0171-0

Zheng, H., & Zhan, H. (2023). ChatGPT in scientific writing: A cautionary tale. *The American Journal of Medicine, 136*(8), 725-726. https://doi.org/10.1016/j.amjmed.2023.02.011