ChatGPT and Medical Research: A Meta-Synthesis of Opportunities and Challenges

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Introduction: The utility of ChatGPT in research is ambiguous, serving as both a boon and bane and presenting challenges and opportunities. Accordingly, this study aimed to delineate the merits and demerits of ChatGPT within the realm of research.

Methods: A meta-synthesis methodology involving a seven-step process was adopted to pursue the research objectives. Data were collected from comprehensive studies across specialized research databases, such as Science Direct, Springer, Eric, Emerald, Sage Journals, Wiley Online Library, PubMed, and Google Scholar, within the time frame spanning from 2022 to 2023. A total of 57 articles were meticulously chosen for analysis through judgmental sampling. Subsequently, key concepts were distilled from these articles and categorized using the thematic analysis approach while considering Karl Llewellyn's octagonal model from 1963.

Results: The outcomes underwent scrutiny employing the thematic analysis strategy devised by Wolcott. The results about the capabilities and constraints of ChatGPT encompass eight dimensions, including formulating the research problem, reviewing relevant literature, selecting an appropriate research design, defining the population and choosing the sample, collecting data, analyzing data, interpreting data, and discussing and drawing conclusions. The credibility of these dimensions was substantiated through adherence to the criteria established by Lincoln and Guba.

Conclusion: ChatGPT manifests myriad potentialities and constraints within the research purview based on the results. In light of the expeditious progression of artificial intelligence across multifarious domains, integrating this technological paradigm in research becomes an inexorable imperative, and excluding its use in research is untenable. Thus, policymakers and higher education strategists should devise policies that harness ChatGPT's potential in research endeavors, engendering many opportunities.

Keywords: Artificial intelligence, Natural language processing, Research activities, Research and development, Technology transfer

Introduction

ChatGPT, or Chat Generative Pre-Trained Transformer, is OpenAI's Natural Language Processing (NLP) model that uses deep learning techniques to function as a natural language dialogic agent, providing information similar to customer service or chatbots. ChatGPT, trained on a comprehensive online dataset spanning multiple text genres such as news, essays, research papers, and social media postings in numerous subjects and languages, intends to assist users (1) successfully. ChatGPT automatically generates text in various genres, including essays, poetry, music lyrics, and academic articles. A radiologist-in-training has been the corresponding author of whole publications in highly esteemed journals (2). AI, particularly large language models such as ChatGPT, helps medical researchers analyze data more efficiently, develop treatments, and improve patient outcomes. Advances in natural language processing and deep learning improve various medical applications, including language translation and text generation (3). The impact of generative artificial intelligence (AI) on medical publication procedures is currently uncertain (4).

ChatGPT presents research opportunities and challenges as its abstracts can get 100% originality scores, creating significant issues about authorship and publishing ethics (5). Challenges in identifying crucial information and distinguishing reliable sources due to biases can hinder chatbots' effectiveness in research. Some scientists oppose their use, fearing duplication without human-like scientific insights (6). Another harmful use of ChatGPT is when researchers generate content similar to particular parts or sections of previously published publications (7). ChatGPT often offers a wide range of responses when presented with the same question multiple times. Compelling justifications for correct and false answers follow these responses (8). This phenomenon poses a greater risk because reviewers cannot cover all cited references in a peer review process. Several researchers have suggested that creating false texts with inaccurate content is one of the critical limitations of ChatGPT (9).

Reports have mentioned several prospects for leveraging GPT chat. ChatGPT, for example, may be used to write scientific publications, which may be given research prompts or themes and create content depending on its issue comprehension (10). ChatGPT can produce more complex and subtle answers to questions. Moreover, AI and ML play a crucial role in various other applications of ChatGPT, including medical diagnosis, medication research, and data analysis (11). ChatGPT can aid medical researchers and scientists by facilitating tasks such as composing literature research, condensing data, proposing frameworks, providing references and titles, and even generating an early draft of a scientific publication (12). Gao et al. (13) assessed the ability of ChatGPT to generate scholarly abstracts. Researchers chose 50 publications from major medical journals and asked ChatGPT to generate abstracts. While all were deemed satisfactory, just 8% used proper journal layout. Reviewers correctly identified 68% of ChatGPT abstracts due to having imprecise and formulaic wording. A machine learning-based detector exhibited comparable outcomes in determining the abstracts generated by ChatGPT with the potential to generate articles that could be perceived as plagiarized.

This study seeks to clarify ChatGPT's benefits and limitations for research amid AI's increasing influence in academia. The findings can help medical university authorities navigate technological breakthroughs such as ChatGPT.

Methods

This qualitative approach study applied Sandelowski and Barroso's seven-stage meta-synthesis methodology (14) to incorporate data from multiple investigations methodically. The strategy, represented in Figure 1, seeks to reveal fresh insights and concerns while encouraging a complete perspective. The applied meta-synthesis synthesized quantitative and qualitative research data, addressing the benefits and drawbacks of using ChatGPT in medical research. Content analysis was used to assess three types of research studies: quantitative, qualitative, and mixed, each having its own set of research questions, data, and analysis methods.

The following research questions were developed in the first stage: 1) What are the most significant ChatGPT potentials for medical research? 2) What are the most significant ChatGPT limitations for medical research? In the second step, specialized keywords were searched using the following formula to perform a systematic review:

TOPIC: ("ChatGPT Opportunities in Academic Research") OR: ("ChatGPT Opportunities in Scientific Research") OR: ("ChatGPT Potentials in Academic Research") OR: ("ChatGPT Potentials in Scientific Research").

TOPIC: ("ChatGPT Challenges in Academic Research") OR: ("ChatGPT Challenges in Scientific Research") OR: ("ChatGPT Potentials in Academic Research"); OR: ("ChatGPT Potentials in Scientific Research").
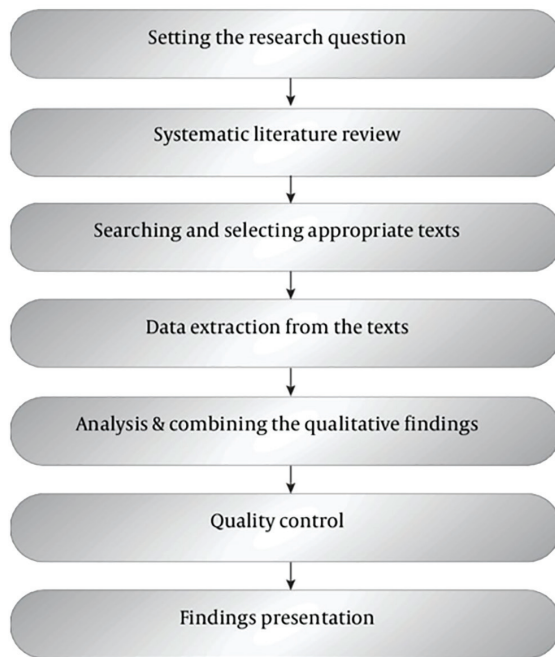
Figure 1: Meta-synthesis steps in the research

Figure 2: Conceptual model of the research

Keywords were searched across databases and search engines (Science Direct, Springer, ERIC, Emerald, Sage Journals, Wiley Online Library, PubMed, and Google Scholar) from 2022 to 2023. Sources were selected using judgmental sampling and expert opinion, aligning with the study framework—a meta-synthesis approach known as Berry picking strategies was applied, deliberately choosing articles that fit the criteria (15). A total of 103 articles were collected. Subsequently, the obtained articles were filtered using a ten-question CASP (Critical Appraisal Skills Program) form. This 10-item questionnaire supports researchers in determining the accuracy, validity, and importance of studies, as well as the relationship between methodology and study outcomes. Thus, the researchers assigned a quantitative score to each question and developed a method for calculating the articles' ratings. Articles having a score of less than 30 were removed based on the scoring supplied by this tool. The distribution of scores was as follows: 15 studies received an excellent score [40-50], 30 studies received a perfect score [31-40], 12 studies received a good score [21-30], 30 studies received a fair score [11-20], and 16 studies were excluded from the analysis process. Following the screening, 57 papers were chosen for the final analysis. The fourth stage involved extracting information from the text of the articles. Due to word limits, just the writers' names of these papers are listed, and a bibliographic summary Table 1 has been omitted. Here are the references that were chosen as preferred sources for analysis.
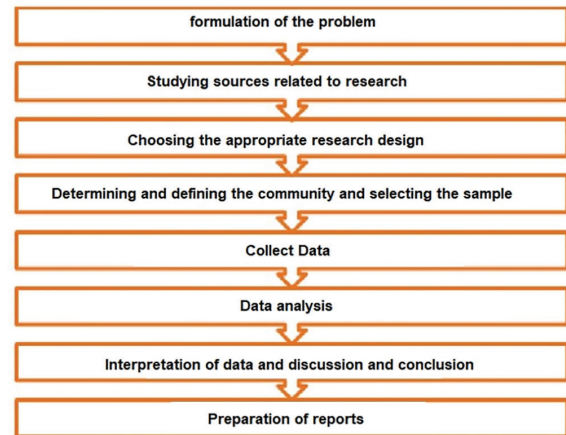
(1, 2, 4, 5, 10, 12, 16-66).

The fifth stage involved breaking down, analyzing, and synthesizing the findings at the paragraph level. Significant concepts were extracted from each article, integrated, and then classed based on similarities and differences using iterative processes. The sixth stage included quality control, qualitative validity criteria, and validation with four assessment criteria from Lincoln and Guba (67).

Finally, in the seventh stage, the idea identification and synthesis results were acquired, which are extensively discussed in the result section.

The Thematic Analysis approach Wolcott (68) was employed for data analysis based on three stages. The first stage involved data description. This research thoroughly extracted the studies obtained in the systematic review phase for their bibliographic characteristics, as outlined in Table 1. In the second stage, data from a systematic review were analyzed by organizing, structuring, and categorizing studies thematically. Key concepts were enumerated and documented, then categorized within an eight-dimensional model— the third stage involved interpreting findings, leading to a final categorized presentation and detailed explanation.

The octagonal model created by Karl Llewellyn (69) was utilized for data analysis. As a result, the investigation could be performed inside a specified scientific framework. The eight steps of this concept are depicted in Figure 2.

This study followed ethical considerations by citing the sources of the scientific integrity concept.

Results

Based on Karl Llewellyn's (69) octagonal model, the most significant potentials and limitations of ChatGPT for medical research are presented in Table 1.

Table 1: The most important potentials and limitations of Chat GPT in medical research

The stages of research according to Karl Llewellyn	Potentials (+)	References	Limitations (-)	References
Formulating the Research Problem	Opportunities of formulating the problem Increasing Creativity, Developing proposed titles depending on the problem, Facilitating the generation of ideas and brainstorming, Idea generation in the problem statement, The formation of a research mindset about the problem, Promoting diversification of research ideas, Assisting in the identification of unique interests and experiences in the production of ideas, Assisting in the identification of restrictions prior to the start of study, Making complicated medical terms easier to grasp in problem design, Encouraging the exchange of ideas in problem design	1: 17:18:19:22:48:25:29:30:34 :35:32:24:65:19:21:23:27:35:5 2:10:50	Challenges of formulating the problem Stifling the development of new ideas, Lack of human independence as a researcher, Generating incorrect ideas, Creating non-scientific concepts, Idea generation without engaging in the thinking process, Plagiarism of others' ideas	20:46:51:62:26:32:43:39:6 6:28:31:64:38:16:18:21:50: 62:46:51:
	Opportunities of analyzing the problem Providing further information on the research problem, Developing new insights into the problem, Enhancing the analysis of gaps in previous research, Facilitating the spread of ideas, presenting opinions on the significance and necessity, Assisting with the preparation of draft articles by explaining the problem further	17:10:29:32:24:65:1:29:50:25: 29:30:45:	Challenges of analyzing the problem Perplexity among researchers, Possibility of insufficient information in a specific case, Inability to recognize small variations in scientific literature, Creating untrustworthy thoughts, Inadequate author accountability (failure to disclose conflicts of interest, final approval of the published version, etc.), Inability to create ideas that require human involvement due to a lack of human involvement in research, Erosion of researchers' specialized research skills	51:39:64:18:12:54:60:61:55:2
	Opportunities of problem solving Inspiring new solutions to the problem, Assisting in selecting appropriate research questions in order to solve the problem, Making research hypotheses to solve the problem, Providing suggestions for securing research funding, facilitating the research discovery process, Assisting researchers in locating relevant sources to the problem	17:18:19:22:46:50:25:29:32:24: 53:61:19:30:45:	Challenges of problem solving Article creation that lacks clinical rationale, Wrong hypothesis formulation, Noncompliance with research ethics requirements, Inability to understand fine aspects of each specialized field, Risk of researchers using it for unintended purposes instead of solving the problem, Presentation of hypotheses without scientific basis, Inability to connect complicated thoughts in order to innovate in the solution, Obstacles to Research Innovation, Deviation from the basic purpose of discovering the truth	45:12:52:54:37:65:66:17:18: 35:28:29:12:

	Opportunities		Challenges	
Reviewing Relevant Literature	Opportunities of targeted identification of relevant articles	17:47:50:52:57:59:60:23:25:27:44:36:63:66:1:33:27:5:59:10:	Challenges of targeted identification of relevant articles	17:18:19:21:45:62:33:35:39:28:31:64:12:
	Systematic review of the research literature, Bringing together insights from prior research, Creating a list of additional resources, Providing a list of relevant subtopics to the primary article subject, Finding more specific scientific terms, Familiarity with new research in this field		Inability to address the research gap as a result of not having access to the original articles, generating superficial and synthetic content, Bias in response algorithms (gender bias, racial prejudice, etc.), Difficulty recognizing content from untrustworthy sources, Inadequate comprehension of specialist terminology and words, Lack of transparency about the origins of terminologies	
	Opportunities of literature-based research modeling	48:63:66:1:17:10:49	Challenges of literature-based research modeling	46:50:65:28:64:1:21:22:16::35:45:
	Assisting in the development of new conceptual models, Ability to compare sources for modeling, Assisting in the organization of research literature utilizing current sources for modeling		Producing irrelevant and inappropriate texts in modeling, Incorrectness of responses from an empirical perspective; Providing incomplete answers: Unvaried answers	
	Opportunities of literature review organization and structure	1:17: 53:18:21:22:10:47:48:50:5 2:562:43:66:64: 23:27:33:65:36:63:64:25:34:	Challenges of literature review organization and structure	16:18:20:50:52:25:33:43:37: 65:28:31:64:66:1:17:21:22:4 5:46:12:57:60:62:
	Quick comprehension of key material from other articles, aiding in the assessment of previous studies, highlighting significant points from other studies, Aiding in the discovery of factors that cause illness, Assisting in the comprehension of complicated topics and specialized terminology, Assisting researchers with creative writing, Improving Time Management Capabilities, Assisting with the creation of a mental map, Encouraging researchers to conduct more experimental research, Assisting in the refinement of new compositions, Assisting in the identification of essential research subject points, Aiding researchers in better comprehending current information on a certain topic, Improving Search Skills, Assisting in the discovery of crucial results in prior research, Reducing researchers' workload in literature writing, Assisting with the search for previously used citations		The dangers of relying only on the conclusions of a literature review, Producing fake literature, Creating writing that is comparable to the content of other sources, Incorrect references to articles that do not exist, Lack of critical analysis in summarizing, Copying and pasting information, Literary theft in research citations, Answering questions without mentioning the source, Concerns about the sources used by ChatGPT, Preference for responding to difficult questions with simple concepts, Performing insufficient translations, Copyright infringement	

Theme	Opportunities	Ref	Challenges	Ref
Selecting an Appropriate Research Design	**Opportunities of research design** Providing broader conceptual and operational definitions, Design concepts for experiments, Methodological suggestions, Assisting researchers in detecting new research method models, Providing specific experimental methods, Creating the experiment framework, Creating a framework for methodology implementation, Assisting with variable determination, Assisting in the selection of experimental methods, Optimization of research cost-effectiveness by design selection, Providing innovative ideas for research design	1:17:22:47:48:49:50:57:25:2 7:33: 41:32: 43:29:52:12:	**Challenges of research design** Inability to understand the needs of the intended research audience in research design, Superficial understanding of methodological issues, Methodological bias, Incomplete understanding of the biological mechanisms of the human body in design selection, Methodological errors in research	46:52:35:43
	Opportunities of developing a research design Experiment design optimization, Assisting with protocol development, Assisting in the development of appropriate treatment plans, Assisting with intervention identification, Assisting with the development of clinical situations	47:12:29:30:41:44:41:22:27:3 3:49:57	**Challenges of developing a research design** Difficulty in integrating with current design models, Error in choosing the correct intervention, Incorrect protocol design	1:47
Defining the Population and Choosing the Sample	**Opportunities of statistical population selection** Helping to choose the right statistical population for the research	35	**Challenges of statistical population selection** Representativeness of the sample in the society	34
	Opportunities of choosing the sample Aiding in the estimation of sample size, Keeping track of the sampling procedure, Putting the sampling procedure in order, Contributing to the automation of the process of requesting samples from individuals	46:22:34:41:1:10	**Challenges of choosing the sample** Inadequate grasp of technical sample estimate difficulties, Possibility of errors in sample estimation	1:34:45
Collecting Data	**Opportunities of collecting data** The ability to create vast amounts of data, providing extra information sources, keeping data updated, helping with data collecting, Assistance with data extraction, Simulation of data; Help summarizing data	1:22:45:10:47:12:50:59:27:33:	**Challenges of collecting data** Fabrication of data, Inability to locate valid data, Difficulty identifying and eliminating incorrect and fake information, there is limited access to new data, Providing an abundance of irrelevant and illogical information	12:51:43:37:39:23:1:22:50:57
	Opportunities of organizing new data Assisting with the organization of data-gathering notes, Continuously providing input throughout the process, Assisting with the creation of clinical notes, Assisting with data management, Assisting with note-taking while collecting data, Helping with clinical note-taking, Assisting in the automation of data from experiments	1:47:48:40:12	**Challenges of organizing new data** Intentional dissemination of false information, Damaging the credibility of authors due to incorrect data, Concerns concerning the preservation of privacy in research data, Putting data security at risk, Lack of transparency in data presentation, Lack of exact text assessment tools for ChatGPT produced text, Possibility of obtaining information from biased databases, Conducting research with unidentified and fake data, Putting data confidentiality at risk, Concerns surrounding the dissemination of research data	1: 17:20:21:22:57:54:60:62: 25:43:6528:26:51:54:

Stage	Opportunities	References	Challenges	References
Analyzing Data	Opportunities of data analysis preparation — Assisting with evaluation of data, Assisting in the selection of appropriate software for data analysis, Making suggestions for data analysis methodologies and tools, Providing insights on huge dataset trends and patterns, Assisting with data preparation and organizing in preparation for analysis, Making flexible analysis guidelines available	1:22:10:47:48:59:33:34:42:65:	Challenges of data analysis preparation — Limiting researchers to a broad viewpoint rather than analyzing data quality, Missing out on the opportunity to learn (for example, depending on ChatGPT rather than studying coding)	50:61
	Opportunities of analyzing and visualizing data — Making infographics, charts, and other visual components, Providing statistical analytic insights, Improving Data Analysis, Providing further coding explanation, Guiding the data analysis process over time, Helping with data integration, Increasing the efficiency of data analysis, Assisting with coding, Increasing the coherence of findings, Streamlining the coding process, Code conversion from one programming language to another, Creating prospects for computation acceleration, Assisting with big data analysis, Giving instances of various analytical methods, Assisting with the summarization of statistical results, Assisting with picture analysis, Assisting in the development of data analysis abilities among researchers	1:64:47:12:54:34:65:18:21:42 :10:49	Challenges of analyzing and visualizing data — The ability to manipulate results, Inability to evaluate statistical information, The possibility of overlooking certain results, Providing policymakers with deceptive results, Bias in study findings, Impact on the validity and reliability of research, Providing outdated responses, Incomplete or non-critical responses, Lack of alignment of some responses with the nature of certain research fields, Difficulty in evaluating response quality, Responses can be easily bypassed, Blind trust in ChatGPT's responses	1:2:61:62:26:34:65:66:21:22 :50:25:38:45:47:49:51:54:
Interpreting Data and Discussion	Opportunities of interpreting data — Assisting in the description of chemical formulae and molecular structures, Assisting in the prevention of misunderstandings in interpreting the findings, Assisting in the strengthening of debate arguments, Assisting researchers in promoting their findings	1:48:12:49:32:17:	Challenges of interpreting data — Bias in scientific interpretations, Significant concern for personal and social health as a interpretations of inaccurate information, Providing misleading judgements, Providing contradicting interpretations, Elimination of human diversity in data interpretation	16:18:47:54:55:2:64:29:10:56
	Opportunities of writing a discussion about findings — Developing further research recommendations, Assisting in the identification of strengths and shortcomings with previous studies, Adding further medical details to the comments section, Contributing to the development of future research directions	12:44:54:56:27	Challenges of writing a discussion about findings — Inadequate responsibility for the replies offered in clinical choices, Inadequate presentation of crucial results, Problems with research reproducibility, Differences between human and AI-generated writing, Inability to reason ethically	12:49:37:43:25:26:45:12

Drawing Conclusions	Opportunities of drawing conclusions		Challenges of drawing conclusions	
	Assisting with the drafting of the conclusion, Enhancing the Management of references, Providing ideas for the structure of the article	17:12: :33:41:47:53	Biased assessment and deceptive conclusions, The presence of logical errors in responses, Development of pseudoscience, Uncertainty about researchers' contributions to the research, Undermining the process of meaningful research, Weakening the cohesion of research, False and counterfeit reports	22:32:29:33:35:56
	Opportunities of executive and research advice		Challenges of executive and research advice	
	Considering new research paths based on the findings, Identifying potential research solutions	19:54:56:34:48	Providing solutions that are conflicting, Hindering scientific progress with the wrong solutions, Leading to errors in patient treatment	16:44
	Opportunities of publishing the article		Challenges of publishing the article	
	Providing assistance to researchers during the publishing process, Shortening the publication time, Contributing to the article's readability, Word count reduction to match journal formats, Assisting with journal-specific formatting, Writing an abstract within the word limit, Making the article editing process easier, Providing more appropriate vocabulary synonyms, Giving personal input on the writing styles of writers, Providing assistance in many languages, Increasing the output of non-English-speaking researchers, Assisting in the search for relevant journals, Increasing the productivity of researchers, Assisting in the modification of an article's style and tone, Increasing the readability of the article, Producing detailed reports, Allowing for greater flexibility in the final report's writing, Providing writing assistance to non-native English-speaking researchers, Developing appropriate reactions to questions, Providing customized responds, Providing real-time response, Assisting with pre-submission time-based evaluation of articles; increasing translation accuracy; Reducing the cost of research	17:18:21:22:46:47:48:12: 49:50:52:53:56:57:62:25: 29:33:44:32:43:37:39:24:65:58: 36:31:64:27:40:46:10:55:5:	Access to AI services in research differs between the affluent and the poor, The danger of publishing inaccurate information in scientific journals, Significant increase in low-quality scientific publications, Undermining confidence in university research, The commodification of science, The growth of science through uniform publications, Squandering research funding, Lack of legal enforcement regarding chatbot responses, Production of fake articles, Providing identical non-diverse replies, Insufficient number of software identified by ChatGPT for detection	66:1:20:21:22:46:49:51:54:5 5:56:57:2:3:61:23:29: 30:33:35:38:42:41:39:65:

Indeed, the extracted core concepts were categorized into preset groups based on their similarities and differences to create a systematic framework per the octagonal model.

Discussion

ChatGPT has the potential to play a critical role throughout the whole research spectrum included in the octagonal model. This AI can help researchers identify essential discoveries, treatment options, and emerging patterns by swiftly scanning massive amounts of medical literature and clinical data. Research reports, summaries, and even compelling research papers can be written with their ability to produce coherent and contextually relevant content.

In the research context, the initial phase involves framing the research problem. Researchers can utilize ChatGPT to generate research ideas and concepts by entering a topic and receiving suggestions for questions, ideas, and keywords (34). Furthermore, research is enhanced using content generation, coding assistance, concept reduction, and composition of essays (70). When helpful prompts are used, ChatGPT shows the potential to support systematic literature reviews, the second research aspect (54). This program can facilitate scientific advancement by assisting with study design, analysis, writing, and editing research articles (5). When developing a research problem, depending exclusively on ChatGPT's algorithm without critical thinking, creativity, and invention may result in undesired results. ChatGPT, as an AI tool, is limited in its ability to interact actively and propose novel approaches due to its algorithm and a lack of expert training.

ChatGPT provides clarity and error detection, significantly improving scientific writing quality, which allows researchers to concentrate on experiments by fixing errors, enhancing syntax, suggesting complex vocabulary, and providing improvement strategies. In addition, ChatGPT helps summarize previous research and develop insights and suggestions for particular issues. Non-native English speakers can use ChatGPT to communicate coherently with evidence by overcoming language barriers (24, 48, 52). Developing software-based editing tools has brought us several capabilities for improving clarity and correcting language, from simple spelling checks to sophisticated services such as Grammarly and Scribbr. However, these technologies rely on predetermined standards to evaluate writing (29).

The next area of application in medical research is reviewing relevant literature. ChatGPT demonstrates its capacity to assist in systematic literature reviews, representing the secondary facet of research using helpful prompts. Researchers can use ChatGPT to discover relevant topics and integrate information from various sources. While automating the stage of generating literature reviews saves time and effort, it is essential to note that ChatGPT may not be able to thoroughly analyze article quality or ensure the inclusion of acceptable sources systematically due to the absence of crucial methodologies such as search strategies, citation analysis, and rigorous selection criteria. This limitation could lead to errors and incomplete coverage in the generated literature reviews.

The benefits of ChatGPT for selecting an acceptable study design, identifying the population, and selecting the sample are as follows. Using ChatGPT and other language models allows researchers to focus on developing creative, experimental designs, fostering advancements in various domains. Even though advanced language models speed up research, enhance creativity, and foster innovation, they lack expertise in developing new experimental methods. Developing such methodologies demands human creativity, critical thinking, and problem-solving skills beyond the capabilities of ChatGPT or other AI tools in their current forms.

ChatGPT helps analyze data and serves as a recommender system, assisting users in discovering suitable research subjects, which is especially useful in interdisciplinary domains, where ChatGPT's features ease database searches and various terminology (71). Data processing, drug development, finding possible drug targets, and creating code are facilitated in scientific research (25). ChatGPT simplifies data visualization and statistical analysis and provides predictive insights by analyzing historical data to forecast future trends. However, relying entirely on ChatGPT for up-to-date information is not recommended. Versions that are newer will update more slowly than versions in the real world. Therefore, users cannot access the most recent information and resources. AI language models, such as ChatGPT, may have biases and biases in data collection can exacerbate inequalities and reflect human biases. Therefore, generated data may support and endorse the prevailing perspectives, such as gender and racial inequalities, impacting medical research reproduction and distorting the field's system. The digital divide and internet access, mainly affecting users in developed countries, are also discussed, causing discrepancies in access and age among participants. This circumstance exacerbates the gap between medical researchers

in developed and underdeveloped countries.

Another debatable point is the lack of transparency in processes. Neural network models, commonly regarded as opaque systems with ambiguous processes, provide difficulties in decision-making due to a restricted level of comprehension. This lack of transparency in medical research data can impact outcomes. Inadequate datasets may cause ChatGPT to contain unknown content, raising plagiarism concerns. Additionally, ineffective AI text detection can damage the scientific community's reputation (72). Compared to traditional search engines, an over-reliance on ChatGPT, which offers singular solutions without various viewpoints, may stifle original thought. The use of ChatGPT-generated content in academic work may not have a significant impact on originality. Additionally, the guidelines for academic journals do not clearly state when ChatGPT-generated content is acceptable, further complicating the definition of "originality" (50).

During the second stage of research, interpretation, discussion of data, and conclusion, researchers often struggle to choose the most appropriate journal to publish their study. This necessitates a detailed assessment of the "aims and scope" of various publications, which can be time-consuming and arduous. Nonetheless, ChatGPT can effectively recommend appropriate journals to diverse publishing organizations, provide precise recommendations, and potentially save researchers' time (33). Specific issues need to be addressed when using ChatGPT for data analysis. The model might not be able to identify biases or outliers, which could lead to flawed scientific conclusions.

Furthermore, the model cannot access contextual knowledge, which could complicate presenting persuasive research results. Additionally, the model might produce illogical or irrelevant responses. No transparent sources raise concerns about the accuracy of the information, which may impact funding, research directions, and policy decisions with significant social implications (54).

Conclusion

ChatGPT and similar tools should be embraced and understood for their potential and limitations in research. This information serves as a precautionary measure against upcoming issues and provides us with an insightful understanding of the numerous uses of these instruments. This study aimed to provide a more comprehensive understanding of the potentials and limitations of using ChatGPT in research by extracting relevant information from a carefully selected corpus of scholarly articles.

ChatGPT, as a language model, facilitates article selection, research methodologies, feedback, and idea summaries, saving researchers a tremendous amount of time. However, there are some shortcomings such as the inability to obtain complete and reliable data, which leads to unreliable study results. Moreover, ingrained prejudices and the potential for producing offensive information highlight the need for careful usage. Additionally, an over-reliance on ChatGPT may hinder the originality and inventiveness of research. Awareness of these factors enables researchers to utilize ChatGPT carefully, and thereby advance scientific understanding.

This research has specific limitations. Firstly, it exclusively examined studies published in English, excluding articles published in other languages. Additionally, the study concentrated on articles, neglecting books and research projects in this subject area, collectively known as "gray literature" in review studies.

Authors' Contribution

Each author participated in the conversation, reviewed, and endorsed the manuscript. They are also committed to taking responsibility for all aspects of the research, ensuring that inquiries regarding the accuracy or integrity of any section of the work are thoroughly addressed and resolved.

Conflict of Interest

The authors declare no conflicts of interest.

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J Adv Med Educ Prof. July 2024; Vol 12 No 3

145

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