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## ACADEMIC WRITING IN THE DIGITAL AGE: A SYSTEMATIC INSIGHTS INTO TOOL- BASED PROFICIENCY IMPROVEMENTS

### Abstrak

Integrasi alat digital yang semakin berkembang dalam pendidikan telah berdampak besar pada keterampilan menulis akademik siswa yang kemudian menyoroti perlunya untuk melakukan peninjauan komprehensif terhadap efeknya. Meskipun studi-studi sebelumnya telah mengeksplorasi manfaat umum dari sumber daya digital, hanya sedikit yang secara sistematis mengevaluasi pengaruhnya terhadap keterampilan menulis dalam konteks akademik. Tinjauan literatur ini mengatasi kesenjangan tersebut, dengan mensintesis penelitian dari tahun 2019 hingga 2024 untuk menilai bagaimana alat digital, seperti pemeriksa tata bahasa, pengelola kutipan, detektor plagiarisme, dan platform kolaboratif, mengembangkan keterampilan menulis, keterlibatan akademik, dan hasil belajar siswa. Tinjauan ini menggunakan analisis sistematis untuk studi empiris dan penelitian kualitatif, dengan fokus pada bagaimana alat-alat ini mempengaruhi kejelasan, kepatuhan terhadap standar, dan argumentasi yang terstruktur dalam penulisan akademik siswa. Temuan menunjukkan bahwa alat digital secara signifikan meningkatkan keterampilan menulis teknis siswa dari berbagai latar belakang. Selain itu, asisten menulis berbasis AI muncul sebagai aset vital untuk mengurangi kesalahan tata bahasa dan memperkaya kosakata. Namun, tinjauan ini mengidentifikasi potensi kelemahan, termasuk ketergantungan siswa pada bantuan digital yang dapat menghambat perkembangan keterampilan analitis dan kreativitas. Tinjauan ini merekomendasikan pendekatan seimbang yang menggabungkan pengembangan keterampilan dasar dengan penggunaan teknologi digital yang bertanggung jawab. Oleh karena itu, lembaga pendidikan berperan penting dalam menyediakan pelatihan literasi digital dan pedoman etika untuk mendukung pemikiran kritis dan integritas akademik. Temuan ini juga menawarkan wawasan bagi pendidik, pembuat kebijakan, dan peneliti untuk mendorong literasi digital dan keterampilan menulis dalam lanskap pendidikan modern.

**Kata Kunci:** Alat Digital, Menulis Akademik, Literasi Digital, Asisten Menulis Berbasis AI

### Abstract

The growing integration of digital tools in education has substantially impacted students' academic writing, highlighting a need for a comprehensive examination of their effects. While previous studies have explored the general benefits of digital resources, few have systematically evaluated their influence on writing proficiency within an academic context. This literature review addresses that gap, synthesizing research from 2019 to 2024 to assess how digital tools, such as grammar checkers, citation managers, plagiarism detectors, and collaborative platforms developed students' writing skills, academic engagement, and learning outcomes. This review employs systematic analysis for empirical studies and qualitative research, focusing on how these tools impact clarity, adherence to standards, and structured argumentation in student writing. The findings reveal that digital tools significantly enhance technical writing skills for students from diverse backgrounds. Additionally, AI-based writing assistants emerged as powerful assets for

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reducing grammatical errors and enriching vocabulary. However, the review identifies potential downsides, including students' dependency on digital aids, which may hinder the development of analytical skills and creativity. This review recommends a balanced approach that combines foundational skill development with responsible use of digital technology. The conclusion emphasizes the essential role of educational institutions in providing digital literacy training and ethical guidelines to support critical thinking and academic integrity. These findings offer educators, policymakers, and researchers insights to foster digital literacy and writing skills within the modern educational landscape.

**Keywords:** Digital Tools, Academic Writing, Digital Literacy, AI-Based Writing Assistants

## INTRODUCTION

Digital tools have fundamentally reshaped the educational landscape by offering innovative methods that transform teaching and learning, especially in academic writing. As these tools have gained in popularity, students have become more capable of communicating complex ideas, adhering to academic conventions, and enhancing the overall quality of their writing. Studies from 2019 to 2024 emphasize the significant role digital tools play in improving students' language skills, organizing their ideas effectively, and providing instant feedback, which are all crucial elements in academic writing (Wu & Murti, 2024; Wang, 2024). Specifically, tools such as advanced grammar checkers, citation managers, plagiarism detection software, and collaborative platforms offer tailored support that enables students to refine their language and structure arguments coherently and logically.

Beyond these immediate benefits, digital tools also facilitate learning outside of traditional classroom settings, granting students continuous access to resources, feedback, and guidance at every stage of the writing process (Rahim & Aini, 2024; Paris et al, 2024; Darmanto et al, 2023). This accessibility is particularly valuable as it allows students to continuously engage with their writing, thereby progressively developing their skills. Research shows that students who use digital tools for writing produce work that is more structured and grammatically accurate than those who rely solely on traditional methods (Wang & Bonk, 2024; Guo & Li, 2024). This integration of digital technology into education plays a critical role in supporting students' writing skills, making it essential to understand the broader impact of these tools on fundamental academic skills.

Academic writing remains a vital component of higher education, as it cultivates skills such as critical thinking, analytical reasoning, and structured argumentation (Purser et al., 2020; Perkins et al., 2024). The integration of technology in this field provides an opportunity to make quality writing support more accessible, particularly for students from diverse backgrounds who may require additional assistance in developing academic communication skills. Studies on digital literacy from 2020 to 2024 highlight how digital tools can democratize learning by enabling students from various educational and social contexts to access resources that bolster their academic writing abilities (Burns et al., 2023; Gustilo et al., 2024; Lin, 2024). By identifying the most effective digital tools and best practices, this study contributes to the broader goal of enhancing digital literacy and preparing students for the demands of an increasingly digital society. As educational practices evolve, the need to adapt teaching methods and resources to harness the capabilities of modern digital tools becomes more urgent.

This systematic literature review (SLR) aims specifically to analyze the influence of digital tools on academic writing by consolidating and evaluating findings from relevant studies conducted between 2019 and 2024. Through a rigorous review process, the study identifies current trends, research gaps, and areas of impact in this field. This SLR is significant as it provides a comprehensive analysis of digital tools in academic writing, offering educators, policymakers, and researchers evidence-based insights into the most effective methods and technologies available. By systematically assessing the research landscape, this SLR contributes to a deeper understanding of how digital tools can be used to support students' writing development in a rapidly advancing digital era, ultimately informing future practices and research directions in educational technology.

**METHOD**

This study applied a systematic literature review method utilizing Scopus, Google Scholar, PubMed, and Web of Science to gather studies on the impact of digital tools on academic writing skills. Using keywords such as “digital tools in academic writing” and “influence on writing skills,” the search focused on articles in English or Indonesian published within the last 10 years. Inclusion criteria covered studies relevant to the topic and peer-reviewed, while popular studies without peer review or those not directly related were excluded. The selection process was visualized through a PRISMA diagram, encompassing identification through final selection, with each article filtered for duplication and relevance (Haddaway et al (2022)). Bibliometric analysis was conducted to map research trends based on citations, researcher collaborations, and key terms, providing comprehensive insights into the latest focus and developments in this research area (Smith & Lee, 2020; Hernandez et al., 2023).

**FINDINGS AND DISCUSSION**

**Findings**

**Bibliometric Analysis on Co-Authorship Connection**

Figure 1 shows the bibliometric of co-authorship in research, illustrating the collaboration between authors to combine knowledge, share workload, and enhance the trustworthiness of the work. Co-authorship expands professional networks and provides skill development opportunities, resulting in more comprehensive work.

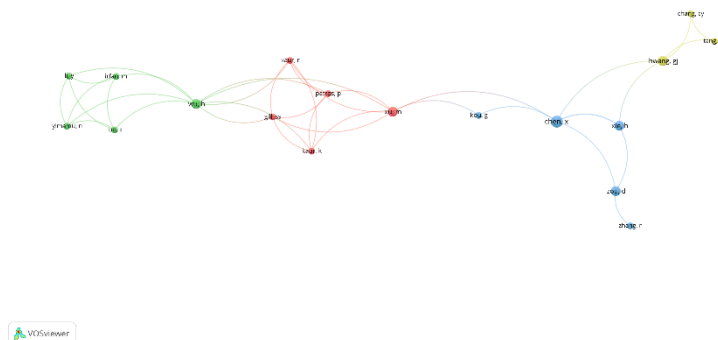


Figure 1: Connection among Co-Authorships

The picture displays a bibliometric co-authorship network, illustrating collaborative relationships between authors based on joint publications. Each node in the image represents an author, with the size of the node indicating the level of involvement or influence of that author within the collaboration network. The color of the nodes signifies clusters or collaborative communities, indicating that authors within the same color tend to collaborate more frequently with each other than with authors of different colors. Through the use of color, this image reveals that the collaboration network is divided into several main groups or clusters, each with its own dynamics and internal collaboration patterns.

The image shows several interconnected main clusters. For example, the green cluster is centered around the author "wu h," who has many collaborations with authors such as "irfan m," "liu," and "yimam u n." The red cluster focuses on the author "xu m," who works closely with "kaur r," "patros p," and "gill ss," forming a solid collaborative group around this author. Meanwhile, the blue cluster is centered on "chen x," who is connected to several other researchers, including "kou g" and "xie h," while the yellow cluster is a smaller group led by "hwang gj," who collaborating with colleagues such as "chang cy" and "tang ky." Some authors, such as "xu m," have cross-cluster connections, acting as "bridges" that link various collaboration groups. This visualization provides a clear understanding of the structure of



relevant and high-quality studies are analyzed in the review. The results are shown in the following figure.

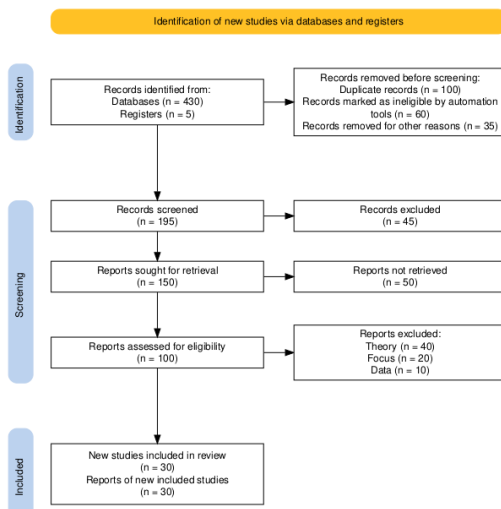


Figure 3: Diagram of PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)

From the 30 selected articles, an additional selection process identified 10 articles for in-depth analysis. This selection was based on more specific criteria, such as data quality, direct relevance to the research questions, the most cited articles, and significant contributions to understanding the topic. The focus on data quality ensured that only studies with robust methodologies, reliable data sources, and rigorous analysis were included. The selected articles demonstrated high credibility and contained relevant, accurate information, essential for generating reliable insights. Additionally, aligning these articles with the research questions enabled a more focused examination of core themes, ensuring that each chosen piece contributed directly to the research objectives. This selectivity in filtering the articles enhances the coherence and depth of the literature review.

Conducting an in-depth analysis of these 10 articles allows researchers to obtain more detailed and applicable insights from the available findings. By concentrating on studies with substantial contributions, the analysis delves into nuanced discussions, innovative findings, and influential theories that advance understanding in the field. This selective approach also prevents the dilution of insights when too many sources of varying relevance are considered. Thus, the final review becomes more substantial, providing a strong foundation for the conclusions drawn and ensuring high validity in the research conducted. The analysis results of these 10 selected articles are displayed in the following table.

Table 1: Articles based on PRISMA Analysis

No	Writer/s	Title	Cited By	Publisher
1	Dergaa, I., Chamari, K., Zmijewski, P., & Saad, H. B. (2023)	From human writing to artificial intelligence generated text: examining the prospects and potential threats of ChatGPT in academic writing	421	Biology of sport
2	Strobl, C., Ailhaud, E., Benetos, K., Devitt, A., Kruse, O., Proske, A., & Rapp, C (2019)	Digital support for academic writing: A review of technologies and pedagogies	288	Computers & Education
3	Nazari, N., Shabbir, M. S., & Setiawan, R. (2021)	Application of Artificial Intelligence powered digital writing assistant in higher education: randomized	284	Heliyon

		controlled trial		
4	Williams, C., & Beam, S. (2019)	Technology and writing: Review of research	257	Computers & Education
5	Gayed, J. M., Carlon, M. K. J., Oriola, A. M., & Cross, J. S. (2022)	Exploring an AI-based writing Assistant's impact on English language learners	230	Computers and Education: Artificial Intelligence
6	Hafner, C. A., & Ho, W. Y. J. (2020)	Assessing digital multimodal composing in second language writing: Towards a process-based model.	181	Journal of Second Language Writing
7	Camacho, A., Alves, R. A., & Boscolo, P. (2021)	Writing motivation in school: A systematic review of empirical research in the early twenty-first century	168	Educational Psychology Review
8	Guerin, C., Aitchison, C., & Carter, S. (2020)	Digital and distributed: learning and teaching doctoral writing through social media.	48	Teaching in Higher Education
9	Paltridge, B. (2020)	Writing for academic journals in the digital era	37	RELC Journal
10	Kim, Y., Kang, S., Nam, Y., & Skalicky, S. (2022)	Peer interaction, writing proficiency, and the quality of collaborative digital multimodal composing task: Comparing guided and unguided planning	20	System

### Discussion

#### Risk of digital-ChatGPT writing on creativity and naturalness of writing

Using ChatGPT for writing offers several benefits, but certain risks may impact a person's writing abilities. The article by Dergaa et al (2023) discusses the potential impact of ChatGPT in the realm of academic writing, both in terms of the benefits and the threats it poses. This article, which has been cited 421 times, explains that ChatGPT offers various conveniences, such as speeding up the writing process, helping to organize ideas, and supporting researchers in effectively formulating arguments. This technology, particularly for novice or non-native writers, can improve language quality and writing structure. However, the writers also highlight risks that need to be watched, including the potential for plagiarism, reduced creativity due to dependence on technology, and occasionally questionable information accuracy. The authors caution that ChatGPT should be used ethically and with clear guidelines to avoid diminishing the intellectual value and originality of academic work. In conclusion, the authors recommend using ChatGPT as a tool that supports writing rather than as a replacement for the writing skills that an academic should possess.

#### Leveraging Technologies in Academic Writing

The research conducted by Strobl et al. (2019) discusses how digital technology can be utilized to assist students in developing academic writing skills. The various tools and platforms covered include automated assessment applications, collaborative writing aids, and AI-supported feedback systems. They not only examine specific software or tools but also emphasize the importance of appropriate pedagogical methods to optimize the use of these technologies. Strobl and colleagues highlight the challenges faced by learners and educators in leveraging this technology, including ethical issues, technical limitations, and the educator's role in providing proper guidance. In line with this study, the findings of the study by Nazari et al (2021) indicated that the use of the AI tool not only significantly improved the quality of academic writing but also helped students develop critical thinking and independent learning skills. This study contributes to understanding how AI technology can be effectively

implemented to support learning in higher education, providing insights into its potential to optimize modern education. The study concludes that while digital technology offers substantial potential to enhance academic writing, its impact will be more effective when combined with wise and contextually appropriate teaching strategies.

#### Digital Multimodal in Writing

The articles by Hafner & Ho (2020) and Kim et al. (2022) share a similar theme, focusing on digital multimodal composition in language learning contexts, though with different emphases and approaches. Hafner & Ho (2020) investigate the process of digital multimodal composition within second language learning, developing a process-based model to assess students' ability to create compositions that incorporate both text and visual, audio, and interactive elements. Their main focus is evaluating the process of creating multimodal works that integrate various types of digital media. In contrast, Kim et al. (2022) also examines digital multimodal composition tasks but concentrate on the influence of peer interaction and guided planning. They compare guided and unguided approaches in collaborative tasks and assess how peer interaction and writing proficiency impact the quality of collaborative digital multimodal compositions. While both articles explore multimodal digital learning to enhance students' writing skills and creativity, Hafner & Ho emphasize a process-based assessment model. In contrast, Kim et al. focus on the effects of peer interaction and planning methods on task quality.

#### Challenges and Innovation

The articles by Williams and Beam (2019), Gayed et al. (2022), Camacho et al. (2021), Guerin et al. (2020), and Paltridge (2020) highlight the role of technology in teaching, motivation, and academic writing across different educational levels, from school to doctoral studies. The first article by Williams and Beam (2019), titled "Technology and Writing: Review of Research," examines the impact of technology on writing instruction. Based on a literature review, technology has been shown to enrich students' writing experiences through features like automatic correction and online collaboration tools. However, it also presents challenges, particularly regarding students' potential dependence on technology. The study recommends that technology in writing instruction be implemented in a balanced way to encourage critical and creative thinking skills in students.

The next article by Gayed, Carlon, Oriola, and Cross (2022), "Exploring an AI-based Writing Assistant's Impact on English Language Learners," investigates how using an AI-based writing assistant can support English language learners. The study shows that AI-based writing assistants help learners improve sentence structure, reduce grammatical errors, and expand their vocabulary. However, researchers also found risks associated with over-reliance on this technology, which could hinder the development of learners' analytical skills. The recommendation from this research is to use AI writing assistants as a supplement in the writing learning process so that learners can still develop their language skills independently.

The third article by Camacho, Alves, and Boscolo (2021), titled "Writing Motivation in School: A Systematic Review of Empirical Research in the Early Twenty-First Century," presents a systematic review related to students' writing motivation in school settings. This research found that writing motivation is influenced by internal factors such as interest and self-confidence, as well as external factors like feedback from teachers and the classroom environment. Camacho and colleagues suggest teaching approaches that can encourage student autonomy and create a collaborative classroom environment to increase writing motivation. Research by Guerin, Aitchison, and Carter (2020) in "Digital and Distributed: Learning and Teaching Doctoral Writing through Social Media" discusses the benefits of social media in the doctoral-level academic writing learning process. This study identified that social media can support broad interaction and collaboration, though challenges such as time management exist. Finally, Paltridge's (2020) article, titled "Writing for Academic Journals in the Digital Era," discusses changes in writing for scholarly journals due to digitalization, such as new skills needed for navigating digital platforms and data management. The researcher recommends that academic writers use digital opportunities wisely, maintaining the quality of scholarly writing while adapting to changes in the digital era.

## CONCLUSION

The use of digital tools in academic writing given a significant effect on the development of students' writing skills across various educational levels. Tools such as automatic grammar checkers, reference managers, plagiarism detection software, and collaboration platforms help students create more structured writing that aligns with academic standards. This digitalization supports the technical development of writing skills, enhancing educational accessibility, and providing broader opportunities for students from diverse backgrounds to improve their writing abilities.

Additionally, AI technologies, such as AI-based digital writing assistants, can enhance the quality of students' writing by reducing grammatical errors and expanding vocabulary. Multimodal digital technologies also play a role in language learning by allowing students to incorporate visual and audio elements into their writing, ultimately fostering creativity. However, this research also identifies certain risks, such as the potential for overreliance on technology, which can impede the development of students' natural analytical skills and creativity. Therefore, clear guidance is needed to use digital tools in academic writing to support essential writing skills.

The research recommends a balanced use of digital tools, ensuring that these tools complement fundamental academic writing skills rather than replacing them. Digital literacy training is also essential, especially for students with limited access to technology. Educational institutions are required to provide digital literacy training so that students can effectively leverage digital tools to develop their academic writing skills. Contextual pedagogy integration is also recommended, where leveraging technology in academic writing is accompanied by appropriate guidance, such as in the use of AI-based writing assistants and the ethics of using digital tools. The use of multimodal writing methods that combine visual, audio, and interactive elements, particularly in language learning, can increase students' creativity.

## DAFTAR PUSTAKA

- Burns, T., Sinfield, S., & Abegglen, S. (2023). Postdigital Academic Writing. In *Encyclopedia of Postdigital Science and Education* (pp. 1-7). Cham: Springer Nature Switzerland.
- Camacho, A., Alves, R. A., & Boscolo, P. (2021). Writing motivation in school: A systematic review of empirical research in the early twenty-first century. *Educational Psychology Review*, 33(1), 213-247.
- Darmanto, D., Utari, F. Y., & Rahim, A. (2023). AN ANALYSIS OF TEACHER'S FEEDBACK ON STUDENTS' WRITING TASK. *Jurnal Ilmiah Global Education*, 4(1), 138-142.
- Dergaa, I., Chamari, K., Zmijewski, P., & Saad, H. B. (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.
- Gayed, J. M., Carlon, M. K. J., Oriola, A. M., & Cross, J. S. (2022). Exploring an AI-based writing Assistant's impact on English language learners. *Computers and Education: Artificial Intelligence*, 3, 100055.
- Graham, S. (2019). Changing how writing is taught. *Review of Research in Education*, 43(1), 277-303.
- Guo, K., & Li, D. (2024). Understanding EFL students' use of self-made AI chatbots as personalized writing assistance tools: A mixed methods study. *System*, 124, 103362.
- Gustilo, L., Ong, E., & Lapinid, M. R. (2024). Algorithmically-driven writing and academic integrity: exploring educators' practices, perceptions, and policies in AI era. *International Journal for Educational Integrity*, 20(1), 3.
- Haddaway, N. R., Page, M. J., Pritchard, C. C., & McGuinness, L. A. (2022). PRISMA2020: An R package and Shiny app for producing PRISMA 2020-compliant flow diagrams, with interactivity for optimised digital transparency and Open Synthesis. *Campbell Systematic Reviews*, 18, e1230. <https://doi.org/10.1002/cl2.1230>
- Hafner, C. A., & Ho, W. Y. J. (2020). Assessing digital multimodal composing in second language writing: Towards a process-based model. *Journal of Second Language Writing*, 47, 100710.



- Kim, Y., Kang, S., Nam, Y., & Skalicky, S. (2022). Peer interaction, writing proficiency, and the quality of collaborative digital multimodal composing task: Comparing guided and unguided planning. *System*, 106, 102722.
- Lin, Z. (2024). Techniques for supercharging academic writing with generative AI. *Nature Biomedical Engineering*, 1-6.
- Nazari, N., Shabbir, M. S., & Setiawan, R. (2021). Application of Artificial Intelligence powered digital writing assistant in higher education: randomized controlled trial. *Heliyon*, 7(5).
- Paris, A. S., Hadi, M. W., & Rosyidi, A. Z. (2024). Implementing Project-Based Learning Model (PjBL) to Develop Students' Writing Skills in Composing Academic Texts. *Jambura Journal of English Teaching and Literature*, 5(2), 102-113.
- Perkins, M., Roe, J., Postma, D., McGaughran, J., & Hickerson, D. (2024). Detection of GPT-4 generated text in higher education: Combining academic judgement and software to identify generative AI tool misuse. *Journal of Academic Ethics*, 22(1), 89-113.
- Purser, E., Dreyfus, S., & Jones, P. (2020). Big ideas & sharp focus: Researching and developing students' academic writing across the disciplines. *Journal of English for Academic Purposes*, 43, 100807.
- Rahim, A., & Aini, R. Q. (2024). PEMANFAATAN KOMIK BUTA DALAM MENINGKATKAN KEMAMPUAN MENULIS CERPEN SISWA KELAS X-1 SMAN 3 SUMBAWA TAHUN AJARAN 2023-2024. *Jurnal Kependidikan*, 9(1), 85-89.
- Strobl, C., Ailhaud, E., Benetos, K., Devitt, A., Kruse, O., Proske, A., & Rapp, C. (2019). Digital support for academic writing: A review of technologies and pedagogies. *Computers & Education*, 131, 33-48.
- Wang, C., Li, Z., & Bonk, C. (2024). Understanding Self-Directed Learning in AI-Assisted Writing: A Mixed Methods Study of Postsecondary Learners. *Computers and Education: Artificial Intelligence*, 100247.
- Wang, Y. (2024). Cognitive and sociocultural dynamics of self-regulated use of machine translation and generative AI tools in academic EFL writing. *System*, 126, 103505.
- Williams, C., & Beam, S. (2019). Technology and writing: Review of research. *Computers & Education*, 128, 227-242.
- Wu, T. T., Silitonga, L. M., & Murti, A. T. (2024). Enhancing English writing and higher-order thinking skills through computational thinking. *Computers & Education*, 213, 105012.
- Zhang, R., Zou, D., Cheng, G., & Xie, H. (2025). Flow in ChatGPT-based logic learning and its influences on logic and self-efficacy in English argumentative writing. *Computers in Human Behavior*, 162, 108457.