

Refined GPT Protocols Enhance the Efficiency and Reliability of AI-Assisted Review Writing in Biomedical Research: Applications to Alzheimer’s Disease, Fracture Healing, and COVID-19



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Abstract

Background

Artificial intelligence (AI) language models offer increasing promise in scientific writing, yet early applications revealed concerns regarding accuracy, referencing, and originality. A previous study (Version 1) established the feasibility of using ChatGPT but highlighted the need for substantial human oversight. In this follow-up (Version 2), we implemented refined GPT protocols to evaluate their ability to improve efficiency and reliability across three biomedical topics: Alzheimer’s disease and bone health, fracture healing, and COVID-19–related bone pathology.

Methods

Three medical students applied a structured GPT-assisted workflow incorporating optimised prompt engineering, curated literature integration, and systematic verification checkpoints. Each manuscript was assessed for time efficiency, accuracy of references, editorial workload, and plagiarism similarity indices, and results were compared with Version 1 outcomes.

Results

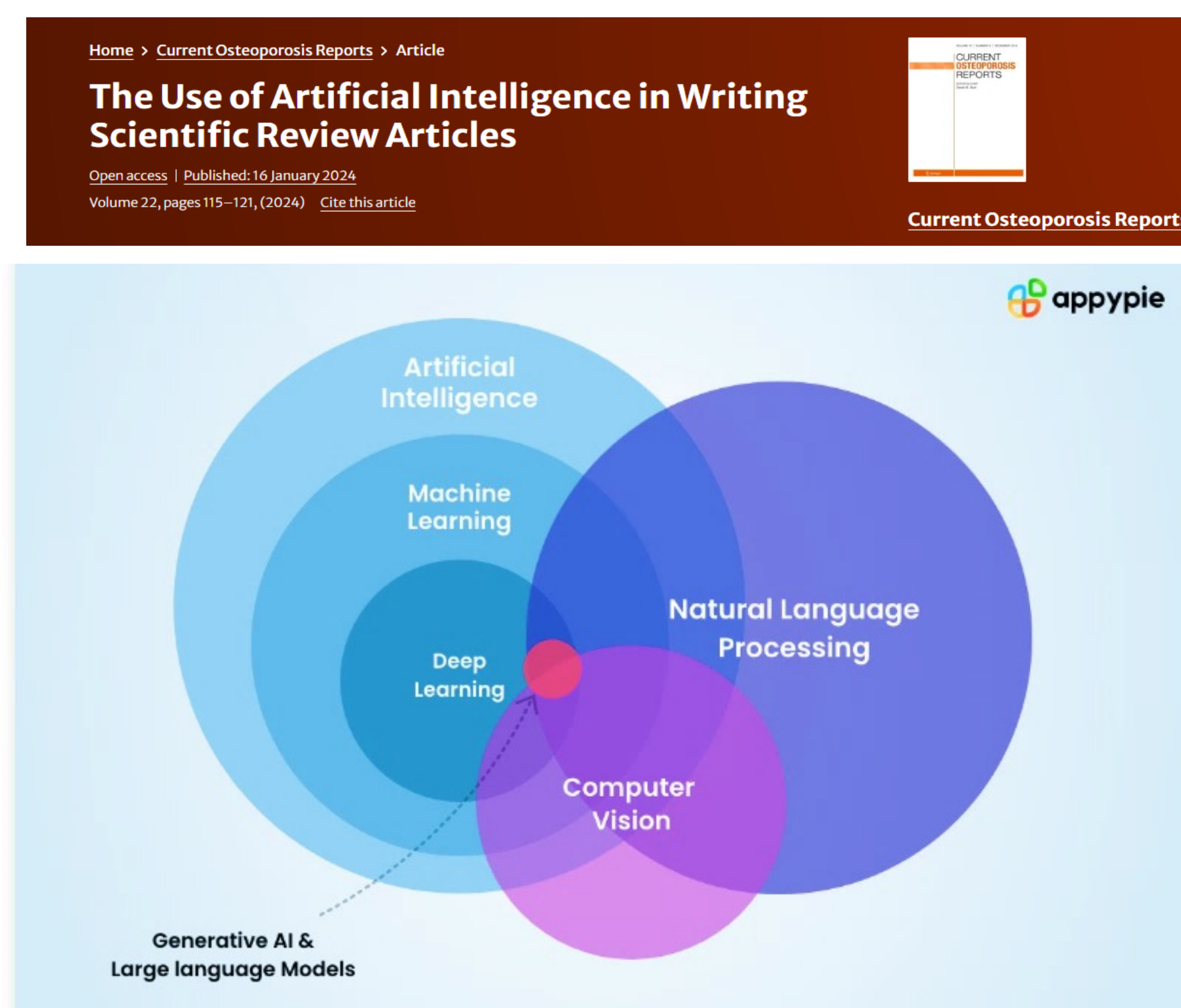
Preliminary findings indicate that the refined GPT protocols substantially reduce the overall time required for review article preparation, encompassing both the search and organisation of relevant literature as well as the drafting of manuscripts. In some cases, efficiencies have exceeded 60% compared with traditional approaches. Early drafts have demonstrated improved citation fidelity and required fewer extensive revisions than those generated in Version 1. Originality levels have remained within acceptable thresholds, although detailed plagiarism and efficiency analyses are still underway.

Conclusions

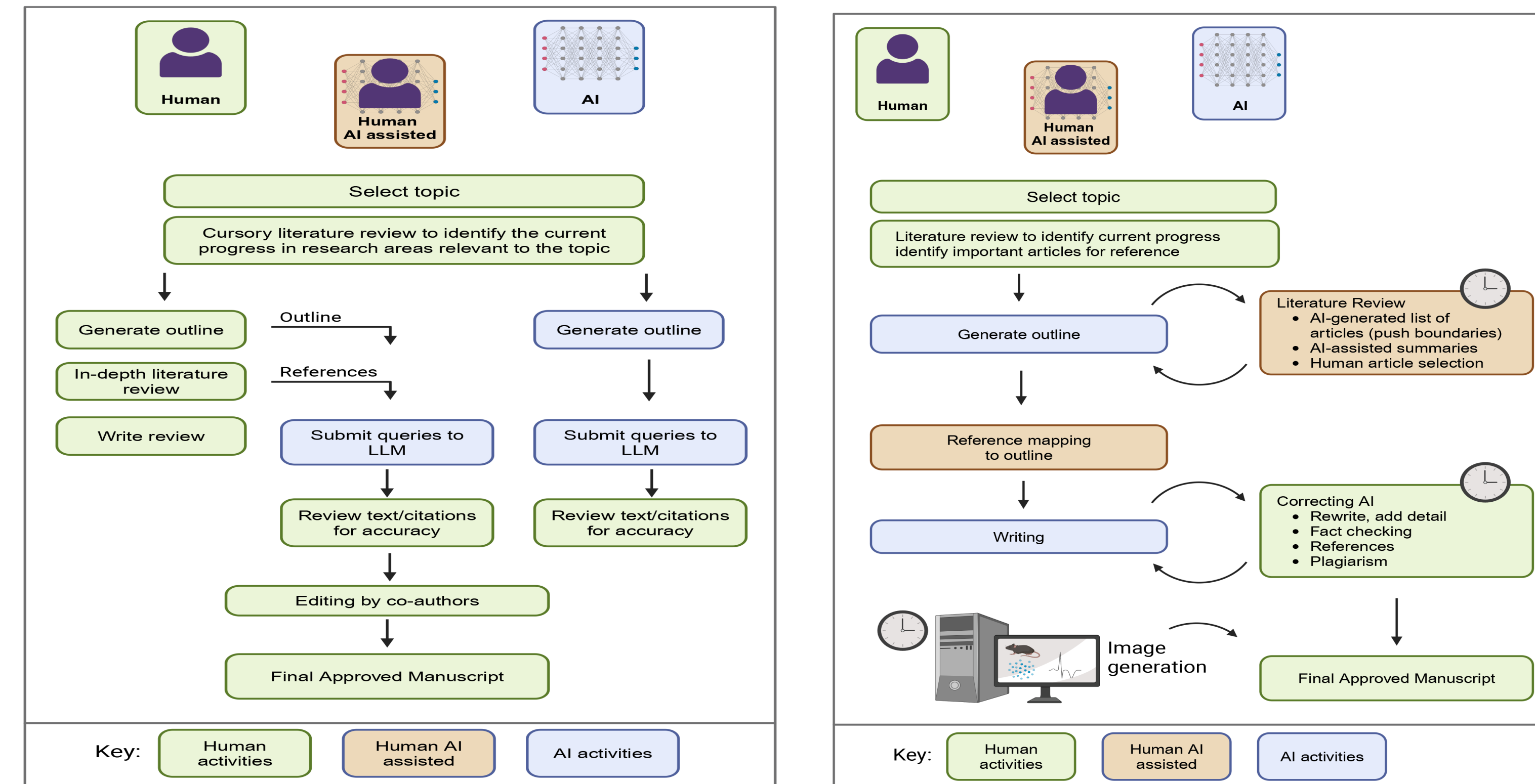
Version 2 demonstrates that structured GPT protocols can meaningfully advance the efficiency and reliability of AI-assisted scientific writing. While human expertise remains critical for contextual interpretation, these findings establish a practical framework through which AI may be integrated into biomedical scholarship to support timely, accurate, and rigorous review article generation.

Background

Artificial intelligence (AI) is a simulation program or algorithm that is structured in a way to simulate human thinking.



Methods



From: Use of AI Language Engine ChatGPT 4.0 to Write a Scientific Review Article Examining the Intersection of Alzheimer's Disease and Bone

Activity	Human	AI-only	AI-assisted
Preparation (h)	0	5.83	6.20
Literature review (h)	13.93	0	13.93
Outline (h)	0.33	0.25	0.33
Writing (h)	29.25	1.70	9.17
Fact checking AI (h)	0	8.35	7.08
Student edits (h)	16.38	7.42	16.75
Faculty edits (h)	16.50	10.83	10.68
Other (h)	1.64	1.25	0.75
Total time (h)	78.03	35.63	64.89

From: Using AI to Write a Review Article Examining the Role of the Nervous System on Skeletal Homeostasis and Fracture Healing

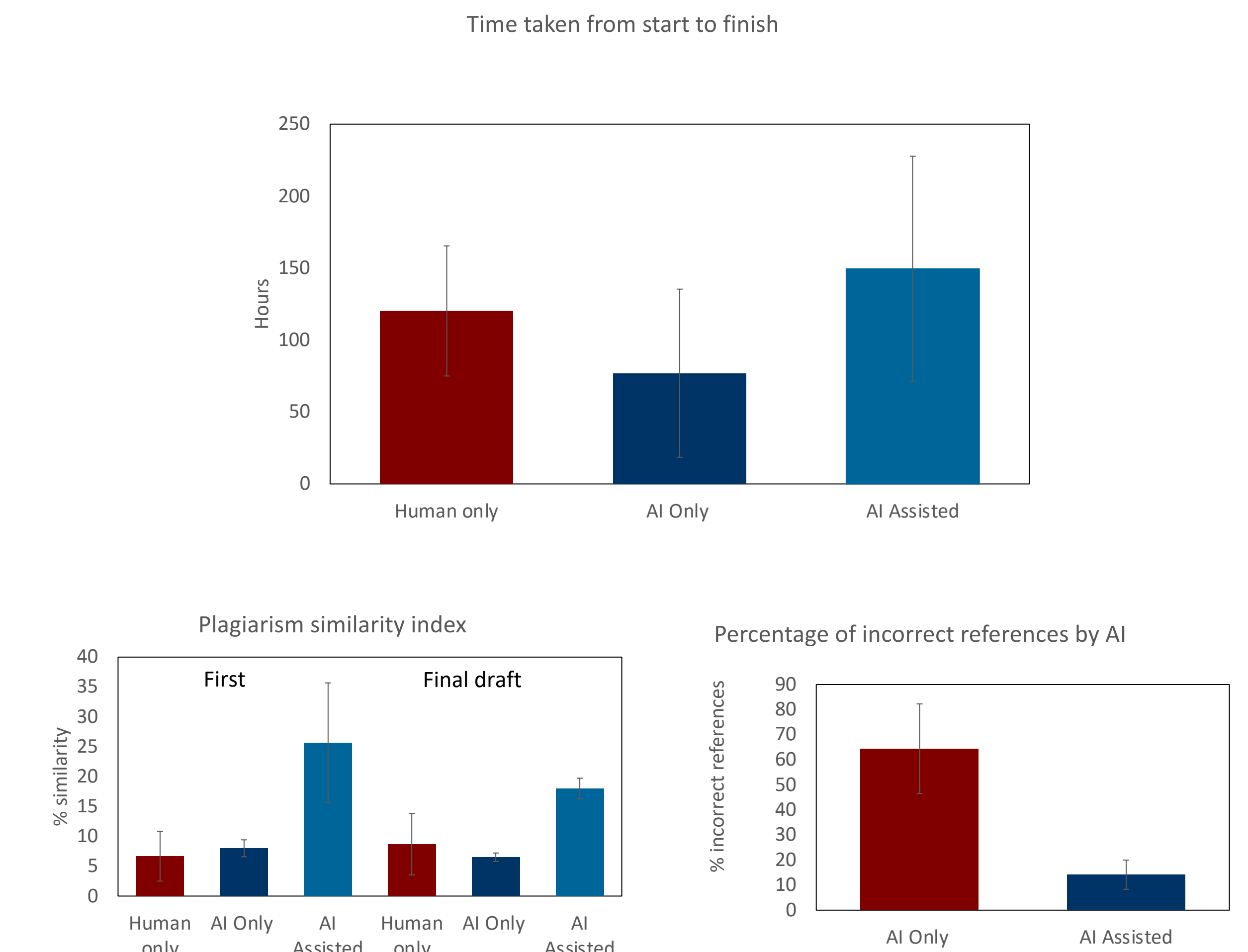
Activity	Human	AI-only	AI-assisted
Preparation (h)	0	5.32	8.33
Literature review (h)	42.63	0	42.63
Outline (h)	7.57	3.22	7.57
Writing (h)	32.09	10.81	32.94
AI fact checking (h)	0	27.12	7.43
Student edits (h)	65.90	52.03	40.66
Faculty edits (h)	18.50	14.12	22.23
Other (h)	1.25	5.62	2.84
Total time (h)	167.94	118.24	164.63

From: The Utility of AI in Writing a Scientific Review Article on the Impacts of COVID-19 on Musculoskeletal Health

Activity	Human	AI-assisted
Preparation (h)	0	13.00
Literature review (h)	45.10	45.10
Outline (h)	0.50	0.50
Writing (h)	12.90	19.25
AI fact-checking (h)	0	11.00
Student edits (h)	36.92	73.25
Faculty edits (h)	17.24	54.74
Other (h)	2.00	2.25
Total time (h)	114.66	219.09

ChatGPT Details	v1.0		v2.0	
	ChatGPT Plus Version	Version 4 (released March, 2023)	ChatGPT Plus Version	Version 4o (released May, 2024)
Experiment Timeline		April 2023 - August 2023		November 2024 - January 2025
Knowledge cutoff date		September 2021		October 2023
Cost		\$20/mo		\$20/mo
Limits		4,096 tokens (equivalent to 6 pages of single spaced text)		128,000 tokens (equivalent to 192 pages of single spaced text)
Time Tracking		Toggl		Google Sheets
Reference Tool		EndNote		EndNote
Plagiarism Tool		Turnitin		Turnitin
Graphical Abstract		BioRender		BioRender

Results



Key findings

AI-assisted vs human-only

- Similar or slightly longer total time once fact-checking and edits are included.
- Faster initial drafting, but this benefit is largely cancelled by extra verification.

AI-only workflow

- Fastest at producing a first draft.
- Majority of time shifts to fact-checking, plagiarism checks, and faculty edits.
- AI-only saved about 40.8 hours (**≈66% reduction**)

Where the time really goes

- In all workflows, most hours are spent on checking and editing, not writing.
- AI moves effort from drafting to quality control, rather than removing it.

Safety/quality implication

- Large time savings only appear when oversight is reduced – which risks undetected errors and misinformation.

Conclusions

- ChatGPT offers clear benefits: faster writing, useful idea generation, cohesive structure, and strong grammar support.
- Key risks remain hallucinations, plagiarism, and repetitive or overly flowery text.
- It cannot yet synthesise complex material into strong scientific conclusions.
- Future improvements may reduce errors, but responsible oversight is essential.
- Authors and reviewers must stay vigilant to prevent misinformation and maintain scientific integrity.

References

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