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Quantifying the Impact of Artificial Intelligence (AI) Assisted Screening on Findings, Certainty of Evidence, and Resource Utilization in Rapid Reviews: A Study within a Review (SWAR)

Maureen Dobbins, RN, PhD

The National Collaborating Centre for Methods and Tools, McMaster University, Hamilton, ON, Canada

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Health Sciences | McMaster University

Disclosures

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Background & Aims

Background: NCCMT's Rapid Evidence Service

- Conducts rapid reviews on **priority topics**
- Applies an **internationally accepted methodology**
- Engages with **public partners**
- Has completed over **100 rapid reviews** and updates

Aims: Study Within a Review (SWAR)

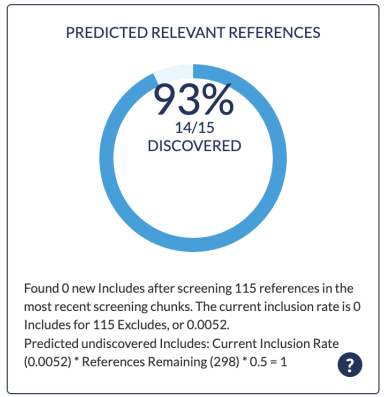
1. Does use of different **AI screening features** result in any **missed studies** compared to manual screening, and if so, does this **change our overall findings** (e.g., certainty of evidence, magnitude or direction of effect)?
2. How does AI compare to manual screening on **time to complete** a review?

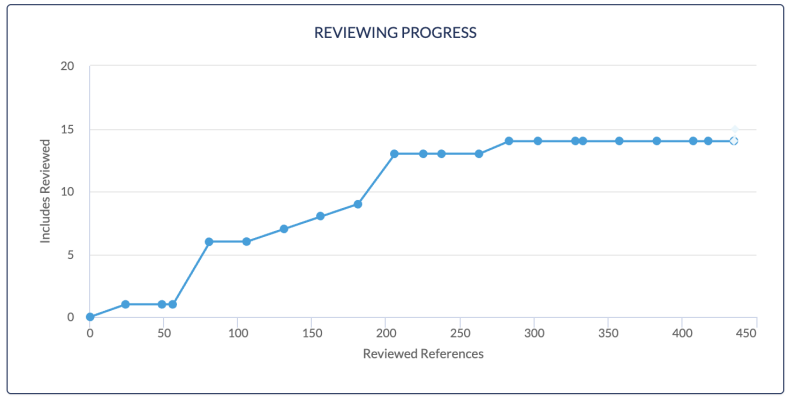
Rapid Review Projects
1 used for proof of concept • Exercise in adults with cancer and bone metastases
7 completed • Invasive meningococcal disease; School engagement; Wildfires – air filtration; Wildfires – masks; Wildfires – public health messaging; Gender-based violence; Inclusion of pregnant and lactating people in clinical trials

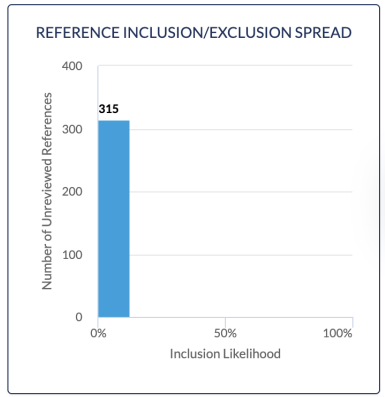
Methods

- Project clones at likelihood thresholds: 60%, 70%, 80%, 85%, 90%, 95%
- AI screen the remaining studies
- Compared the results of full manual screening
  - Studies incorrectly excluded by AI
  - Impact of omitting these “missed” studies on review’s key findings was assessed
- Time spent screening, overall and at each threshold was calculated

Re-Rank - Title and Abstract Screening







Re-Rank References Now | Check for Errors

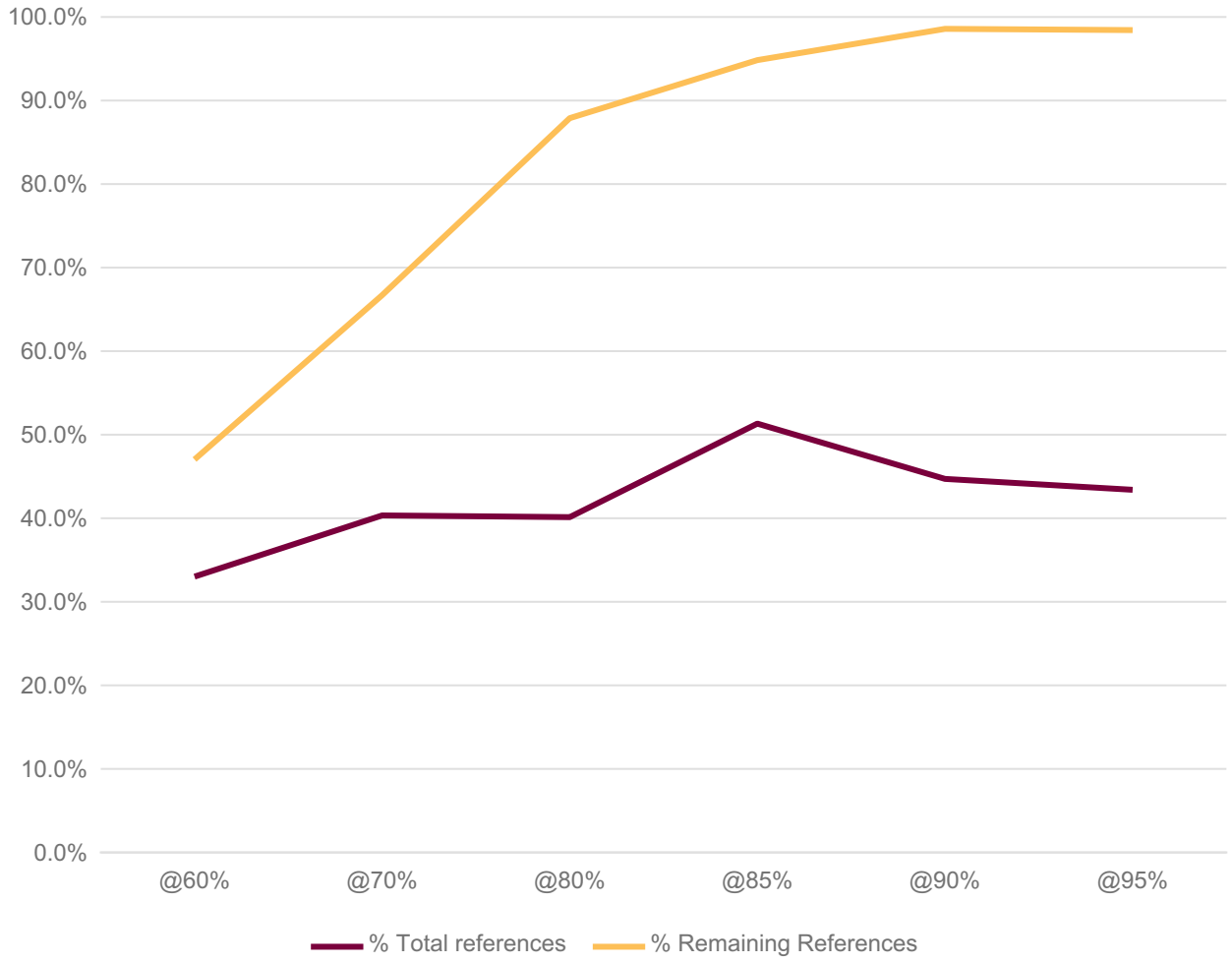
Results: Projects and AI Screening

- The number of studies to be screened ranged from 733 to 11,752 across projects
    - AI excluded 6% to 73% of the total number of studies



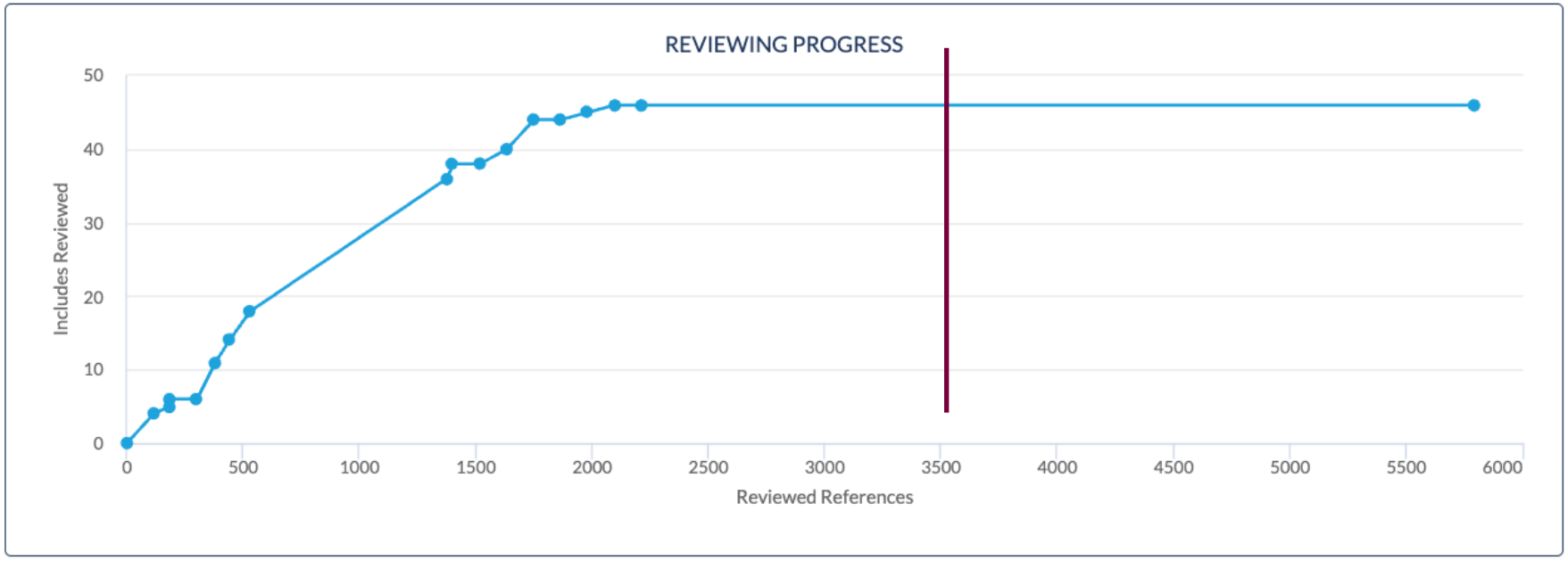
Results: Projects and AI Screening

- After manual screening, *remaining* number of studies to screen ranged from 377 – 8,509 across likelihood thresholds
    - AI excluded 8 to 100% of remaining studies to be screened, with values consistently closer to 100% as thresholds increased



Results: Projects and AI Screening

- For example, AI excluded all remaining studies (3,508) to screen @ 85% threshold in one project (with a total of 5,795 to screen, overall)



nccmt.ca/pdfs/res/wildfire-messaging

Results: Missed Studies & Impact on Finding

☑ AI screening did not result in any missed studies in 6 (of 7) projects

☒ In one project, AI screening did result in missed studies

- 2 at 80% threshold
- 1 at 85, 90, 95% thresholds

nccmt.ca/pdfs/res/school-engagement

Results: Missed Studies & Impact on Finding

- Whidden et al. 2020
  - 1 of 3 single studies of inclusivity-focused interventions
  - Moderate quality, positive findings

Interventions that focused on **inclusivity** for LGBT+ students or on promotion of universal human rights, regardless of identity, consistently found a positive effect on outcomes related to school engagement.	Syntheses Single studies	0 3	⊕⊕◯◯ LOW[2]

- Van Ryzin et al. 2020
  - 1 of 9 single studies of student leadership interventions
  - High quality, positive findings

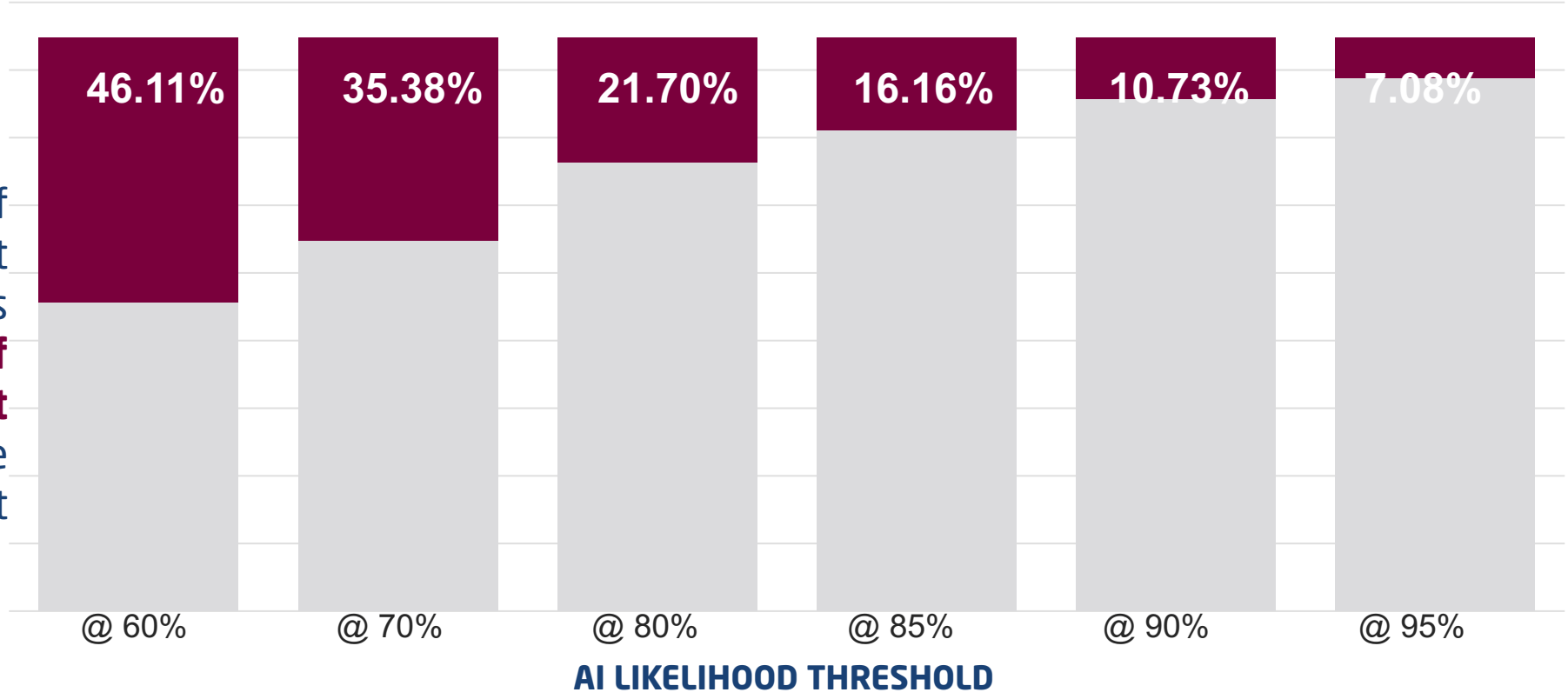
Interventions involving students in **leadership roles**, either in academic/recreational contexts or within **restorative justice programs**, had consistently positive findings for school engagement outcomes.	Syntheses Single studies	1 9	⊕⊕◯◯ LOW[2]

nccmt.ca/pdfs/res/school-engagement

Results: Time Spent Screening

- Total time spent screening manually ranged from 8.48 – 68.31 hours
- Time "saved" as a percentage of total ranged from 7.08 – 50.06%

An example of **time "saved",** at each threshold, as **a percentage of total time spent screening** for one project



Conclusions

Key Takeaways

- AI may be a promising support tool for improving screening efficiency
- AI screening **can be used** to exclude substantial proportions of studies at title and abstract level
- 85% may be the 'sweet spot'
- For 6 out of 7 analyzed projects, AI screening **did not miss** any included studies (60 – 95%)
- AI screening may "save" up to 50% of time on title and abstract screening

Next Steps

- Additional study is needed to understand how AI can be most appropriately integrated into rapid review methods

Thank You

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