# GenAI assisted screening compared to manual screening: the MechaScreener Trial

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# Outline

1. INTRODUCTION
2. DEVELOPMENT OF TERA MECHASCREENER
3. STUDY OBJECTIVES
4. METHODS
5. MECHASCREENER PREVIEW
6. RESULTS
7. DISCUSSION

# Introduction

## TIME

Title and abstract screening takes approximately **one minute per record**, meaning around 60 records can be screened per hour (Clark 2021).

If a review search identifies 1,200 records, slightly below the average of 1,750, screening would require approximately 40 hours, or 20 hours per person, for each of the two screeners.

## AUTOMATION TOOLS

Tools such as *EPPI-Reviewer*, *DistillerSR* and *PICO Portal* use priority-screening algorithms to help identify records most likely to be eligible. Experimental work using **large language models (LLMs)** for screening has also begun, but to date these approaches have not demonstrated sufficient accuracy for routine use in systematic reviews (Clark 2025).



# Development of TERA MechaScreener

The **Systematic Review Accelerator (SRA)** was launched in 2017 by researchers and developers at Bond University's *Institute for Evidence-Based Healthcare*. The SRA included a screening tool called **Screenatron**.

In 2025, the SRA was upgraded to a new platform: **the Evidence Review Accelerator (TERA).**

In late 2024, development of **MechaScreener** began, using and **LLM with zero-shot prompting**.

With zero-shot prompting, there is no need to provide examples of records that should be included or excluded. Users simply provide the eligibility criteria and upload the records to be screened.

Internal testing showed that MechaScreener correctly **identified 100% of relevant studies** and **excluded 61% of irrelevant studies** (Forbes et al., 2024).

Following these promising results, MechaScreener was evaluated in real-world settings by researchers independent of the development team.

# Study objectives

**PRIMARY OBJECTIVE:**

To assess whether using MechaScreener reduces the screening rate for title and abstract screening compared with human screening alone using Screenatron.

**Screening rate = screening time ÷ number of records screened**

**SECONDARY OBJECTIVES:**

The secondary objectives are assessing whether using the MechaScreener is:

1. **Superior** to human screening in the number of studies needed to be screened to identify one relevant study (**number needed to read/NNR**).
2. **Not worse** than human screening in the proportion of relevant studies it includes (**recall/sensitivity**).
3. **Not worse** than human screening in the proportion of irrelevant studies it excludes (**specificity**).

# Methods

## Selecting systematic reviews

PubMed was searched using this search string:
**("Cochrane Database Syst Rev"[Journal]) AND (2024:2024[pdat])**

The search identified **354 reviews** and Google random number generator was used to randomly select reviews for assessment.

Reviews were eligible if they:

- evaluated an intervention
- included only RCTs
- searched at least three databases
- reported search strategies for all databases
- included a complete PRISMA flow diagram
- provided an identifiable list of included studies
- identified 800–2,200 records after deduplication, according to the PRISMA flow diagram

# Methods

## Databases used to collate the records for screening

To ensure consistency across reviews, records were retrieved only from:

- PubMed/MEDLINE
- Cochrane CENTRAL
- Embase

Records from these databases were collated, deduplicated and screened.

Records from other databases searched in the original reviews were not included in this study.

# Methods

## Sample size

Based on a previous study (Ng et al, 2014), it was estimated that **10 participants** were required.

Each participant screened four sets of records:

- **Intervention:** two sets of records using MechaScreener + Screenatron
- **Control:** two sets of records using Screenatron alone

This resulted in **40 sets**, totaling **60,040 records**.

## Recruitment

Participants from **Bond University** volunteered to participate through discussions with the lead author.

Participants from **Flinders University** volunteered during workshops run by the lead author.

Participants were offered **authorship** on the study manuscript in return for completing their screening tasks in a timely fashion.

# Methods

## Assignment of interventions

Participants were randomly assigned **1:1: to the two groups** using computer-generated block randomization.

An author who was not involved in the trial independently randomised reviews to participants to maintain allocation concealment.

Data analysts and outcome assessors were blinded to the screening method used by each participant for each review.

## Instructions to participants

Participants were allowed to access the help guides for the MechaScreener and Screenatron, and read the methods section of each review, paying close attention to the eligibility criteria.

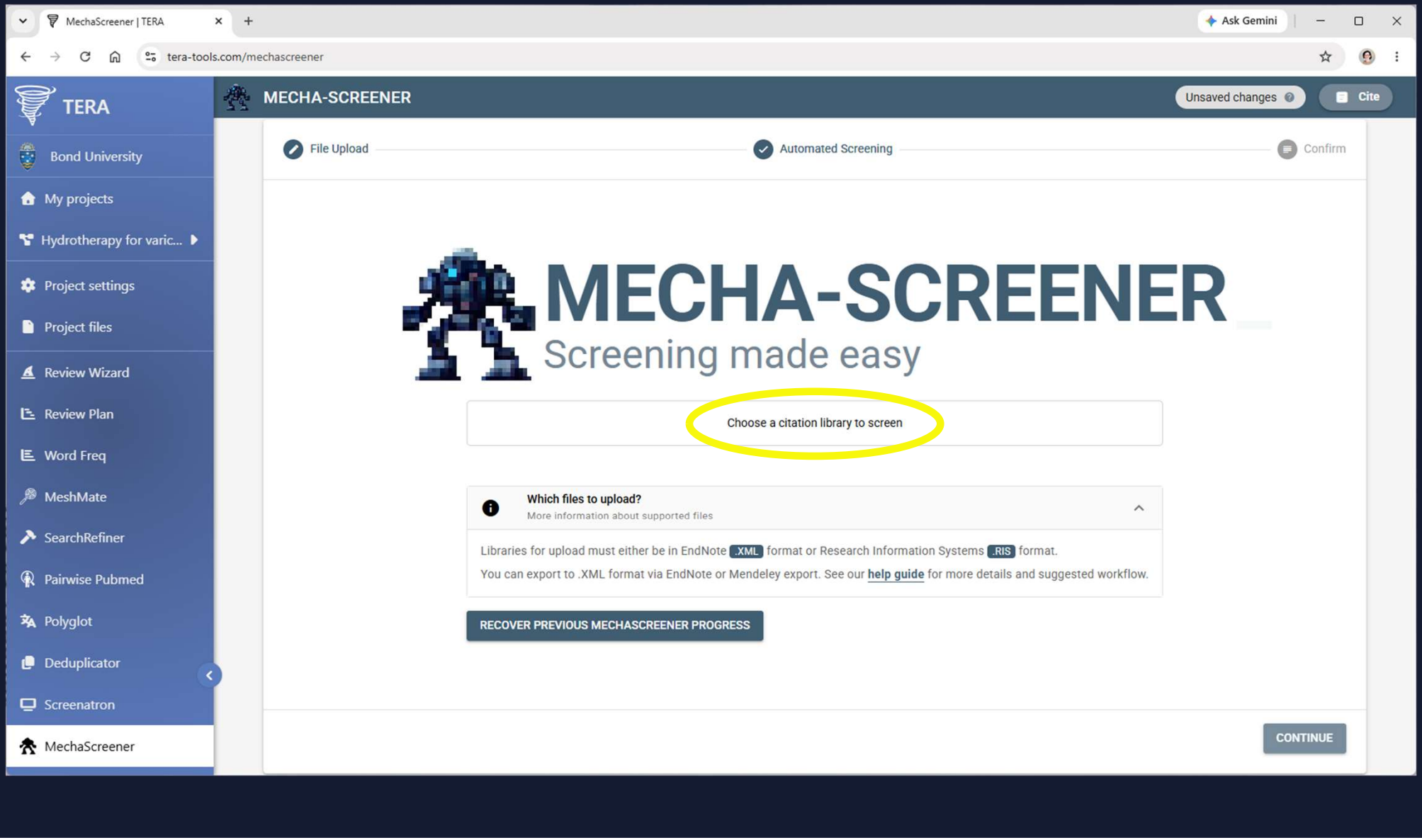
# Methods

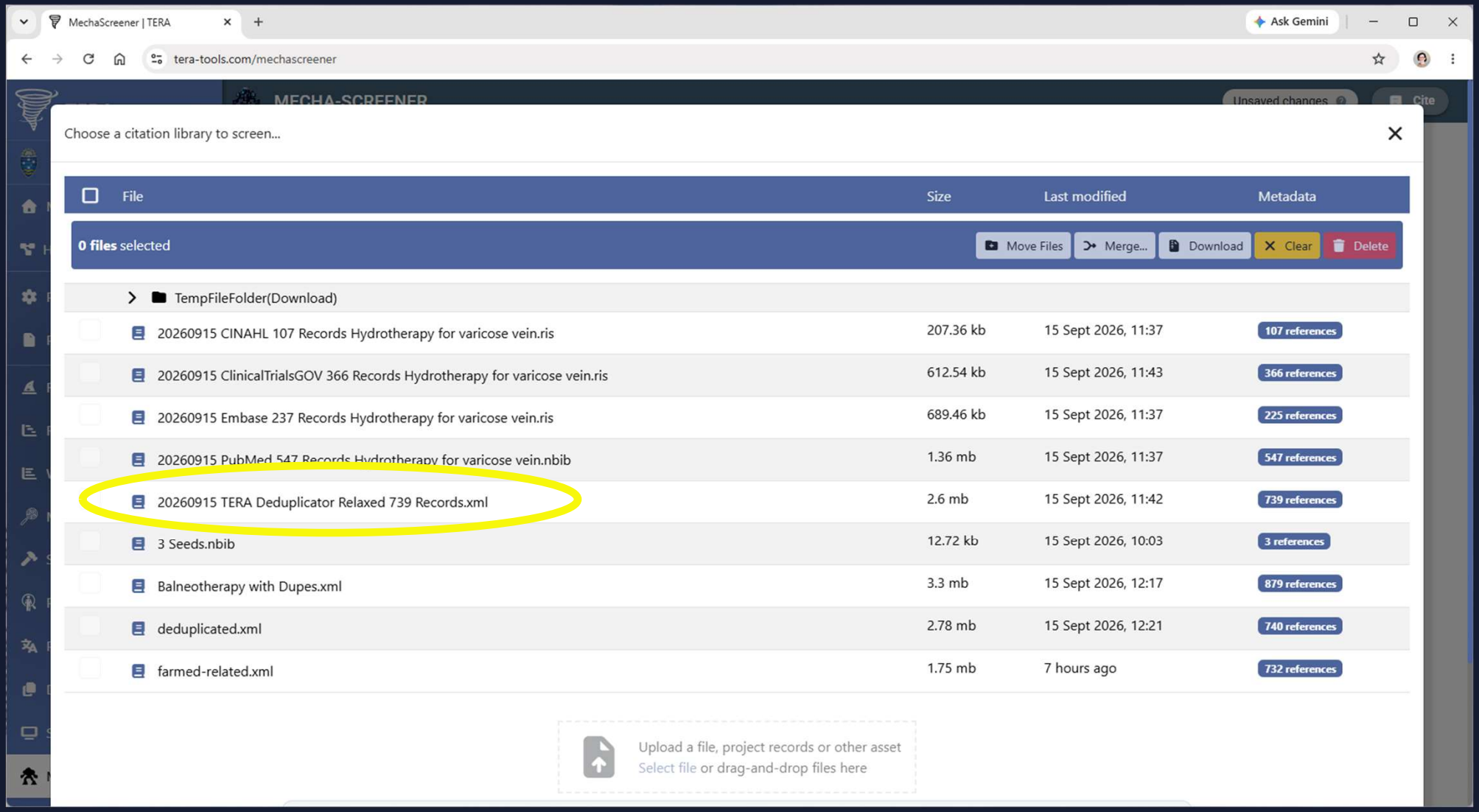
## Screening with MechaScreener+Screenatron (intervention)

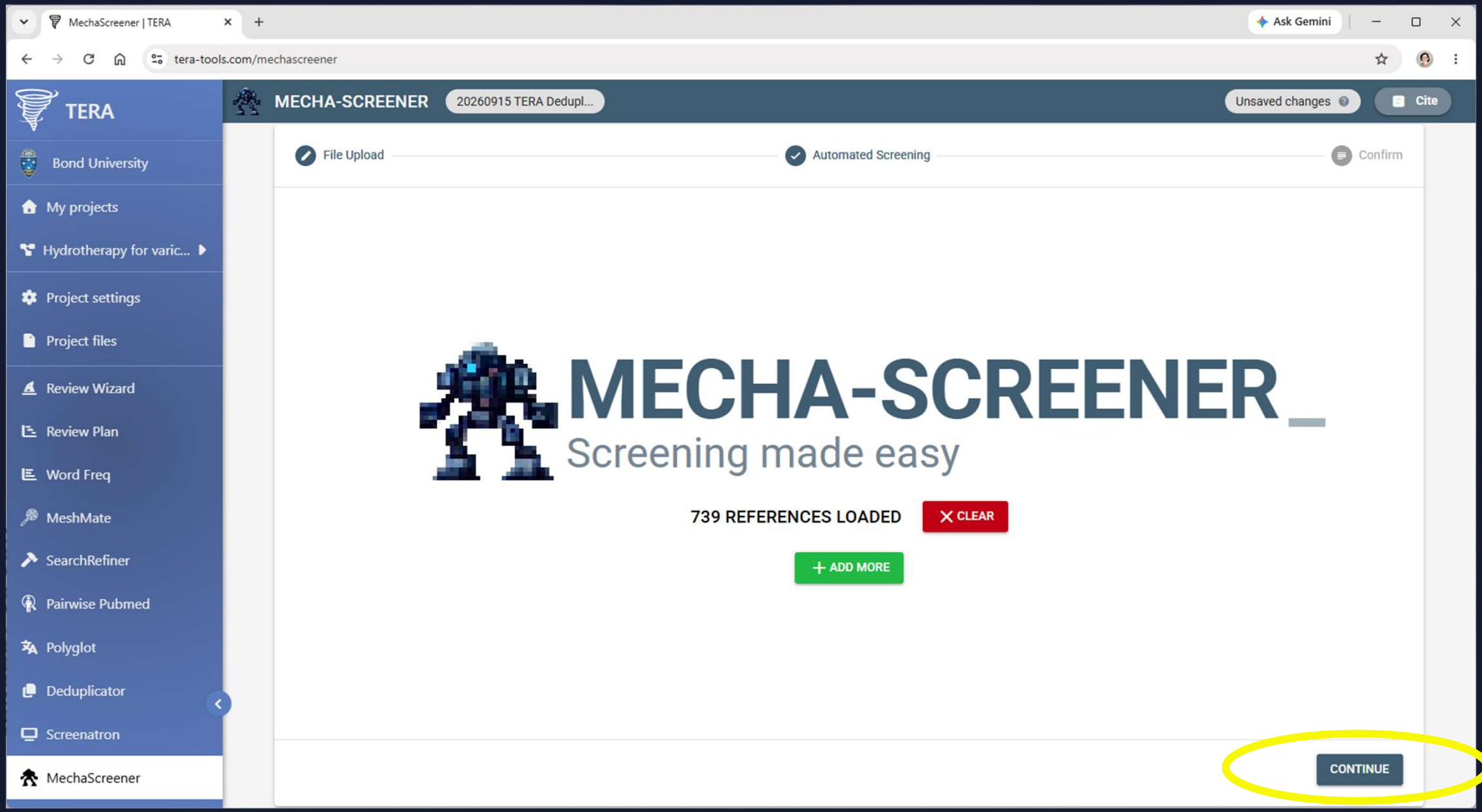
1. Start timing.
2. Upload the records provided to MechaScreener.
3. Enter the review's eligibility criteria into MechaScreener.
4. Once processing is complete, export the "To screen" records.
5. Upload the records to Screenatron.
6. Screen the records based on the title and abstract of the record.
7. Once screening is complete, stop timing.

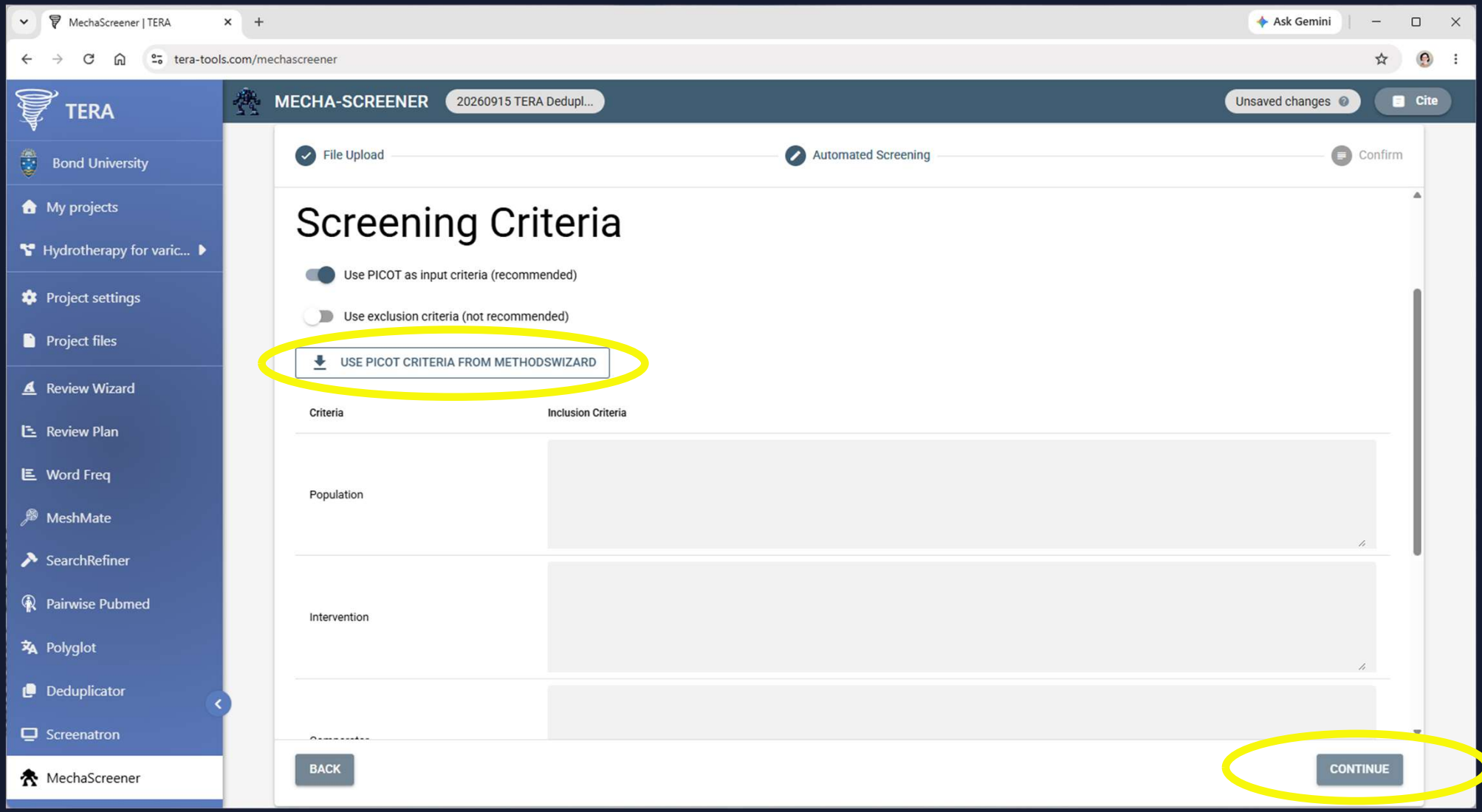
## Screening with Screenatron only (control)

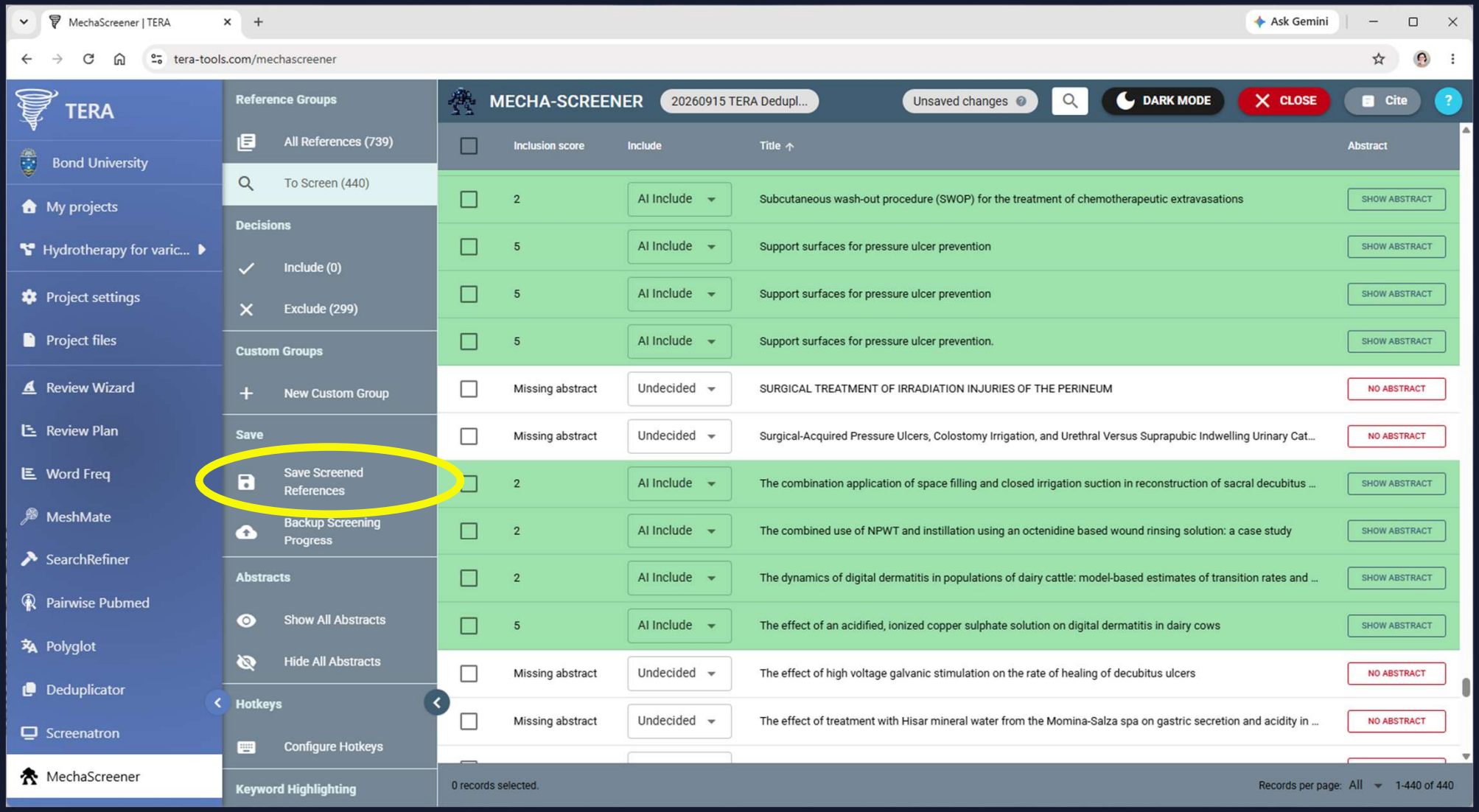
1. Start timing.
2. Upload the records provided to Screenatron.
3. Screen the records based on the title and abstract of the record.
4. Once screening is complete, stop timing.

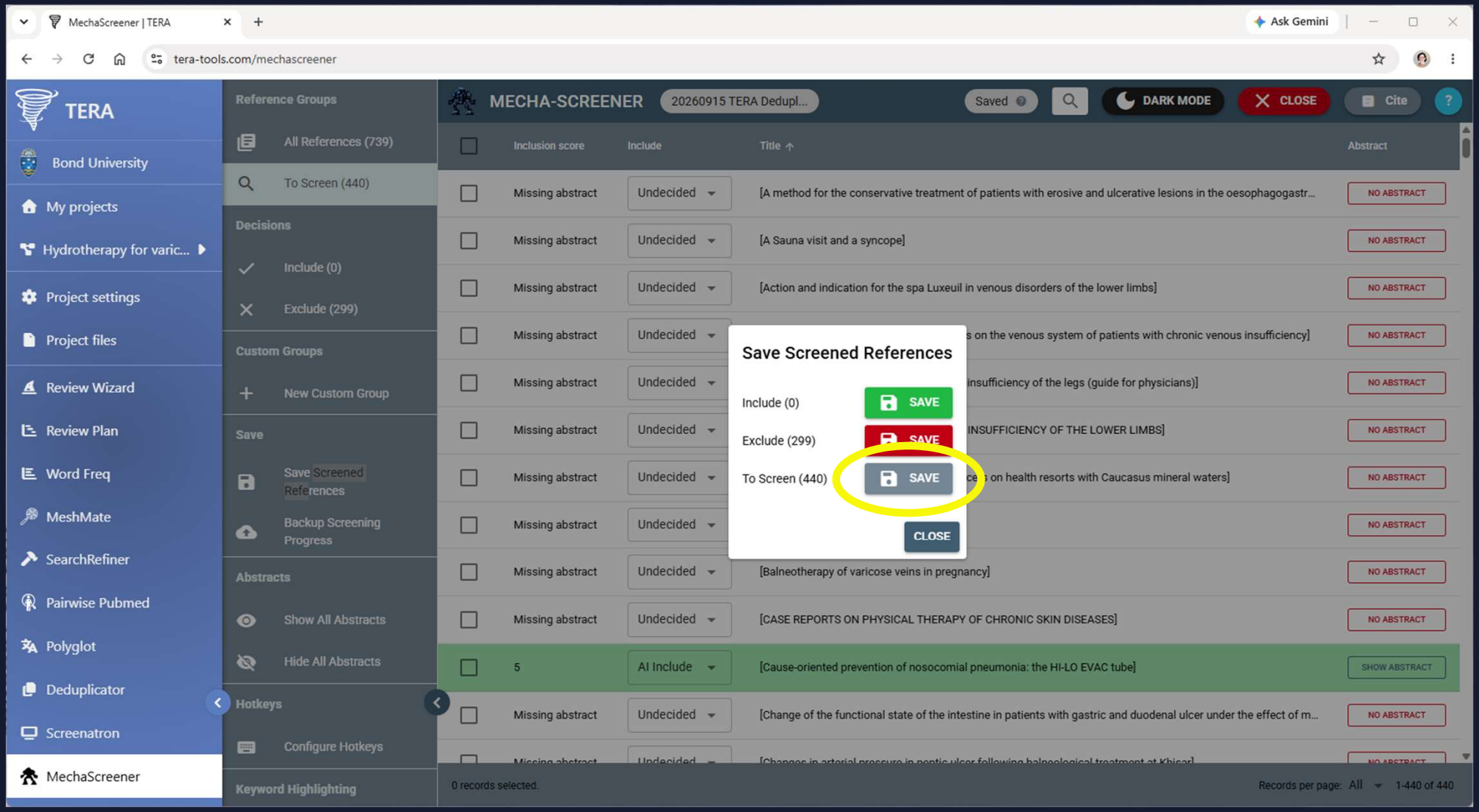

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My projects
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Project settings
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You can export to .XML format via EndNote or Mendeley export. See our help guide for more details and suggested workflow.
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107 references
20260915 ClinicalTrialsGOV 366 Records Hydrotherapy for varicose vein.ris
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Use exclusion criteria (not recommended)
USE PICOT CRITERIA FROM METHODSWIZARD
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Project settings
Project files
Review Wizard
Review Plan
Word Freq
MeshMate
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Reference Groups
All References (739)
To Screen (440)
Decisions
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5 AI Include Support surfaces for pressure ulcer prevention SHOW ABSTRACT
5 AI Include Support surfaces for pressure ulcer prevention SHOW ABSTRACT
5 AI Include Support surfaces for pressure ulcer prevention. SHOW ABSTRACT
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Missing abstract Undecided Surgical-Acquired Pressure Ulcers, Colostomy Irrigation, and Urethral Versus Suprapubic Indwelling Urinary Cat... NO ABSTRACT
2 AI Include The combination application of space filling and closed irrigation suction in reconstruction of sacral decubitus ... SHOW ABSTRACT
2 AI Include The combined use of NPWT and instillation using an octenidine based wound rinsing solution: a case study SHOW ABSTRACT
2 AI Include The dynamics of digital dermatitis in populations of dairy cattle: model-based estimates of transition rates and ... SHOW ABSTRACT
5 AI Include The effect of an acidified, ionized copper sulphate solution on digital dermatitis in dairy cows SHOW ABSTRACT
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Project settings
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Review Wizard
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To Screen (440)
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[Balneotherapy of varicose veins in pregnancy]
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# Characteristics of participants

| Role | Subject area | No. of SRs screened |
|---|---|---|
| Research fellow | Health | More than 10 reviews |
| Assistant professor | Health | More than 10 reviews |
| Assistant professor | Psychology | More than 10 reviews |
| Assistant professor | Business | 6 to 10 reviews |
| Lecturer/researcher | Health | 6 to 10 reviews |
| Senior research assistant | Health | 6 to 10 reviews |
| Statistician | Health | 1 to 5 reviews |
| Research assistant | Psychology | 1 to 5 reviews |
| Research fellow | Psychology | 1 to 5 reviews |
| Librarian | Health | 0 reviews |

# Results

## -32%

**Screening rate**

MechaScreener is associated with a **32% reduction in screening rate** from a mean rate of 0.159 minutes per article screened for control to 0.101 minutes per article screened.

## -57%

**Number needed to read**

MechaScreener is associated with a **57% reduction in NNR** from a mean rate of 116 articles read per included article for control to 43 articles read per included article.

## 100%

**Recall**

Across all reviews and participants, MechaScreener **retained all relevant records**, resulting in **100% recall**.

# Discussion

No relevant studies were incorrectly excluded. However, this trial included **only systematic reviews of RCTs**, so further evaluation in reviews with other study designs is needed.

For the MechaScreener intervention, **participants designed their own inclusion criteria**, which may have affected MechaScreener's performance. Further studies could investigate the quality of prompts against the tool's performance.

MechaScreener could be incorporated into the workflow **prior to manual title and abstract screening**. As an additional safeguard, one reviewer might check the excluded records.



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# Thank you

**ANY QUESTIONS?**

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