Optimizing Systematic Review Processes with AI

Case Study: Combining music and reminiscence therapy interventions for wellbeing of elderly populations

Team Members

1. Mario Palomino Viero
2. Sandaru Welikala
3. Rachel Mendonsa
4. Komalpreet

Content

The Case Study

Our case study is based on the research paper "Combining Music and Reminiscence Therapy Interventions for Well-being in Elderly Populations: A Systematic Review." This study explores how integrating music therapy with reminiscence therapy can improve emotional, cognitive, and social well-being in older adults.

By applying our AI-driven systematic review process, we efficiently analyzed a vast body of research, identifying key findings with greater speed and accuracy. This approach not only streamlined the literature review but also demonstrated how AI can support evidence-based interventions in healthcare and psychology.

Our case study highlights the power of AI in accelerating research while preserving human expertise—ensuring that meaningful insights contribute to enhancing the quality of life for elderly populations.

Objective

- Accelerate Research Analysis – Use AI-driven systematic reviews to speed up the selection and evaluation of scientific literature.
- Enhance Decision-Making – Improve accuracy and objectivity in identifying relevant studies for evidence-based healthcare interventions.
- Support Human Expertise – Assist researchers by automating tedious screening tasks, allowing them to focus on deeper analysis and critical thinking.
- Ensure Ethical & Transparent Research – Maintain human oversight in decision-making to uphold quality, fairness, and reproducibility.
- Demonstrate Real-World Impact – Apply AI to a case study on music and reminiscence therapy for elderly well-being, showcasing its effectiveness in healthcare research.

Methodology

RAG-Based Literature Review Architecture

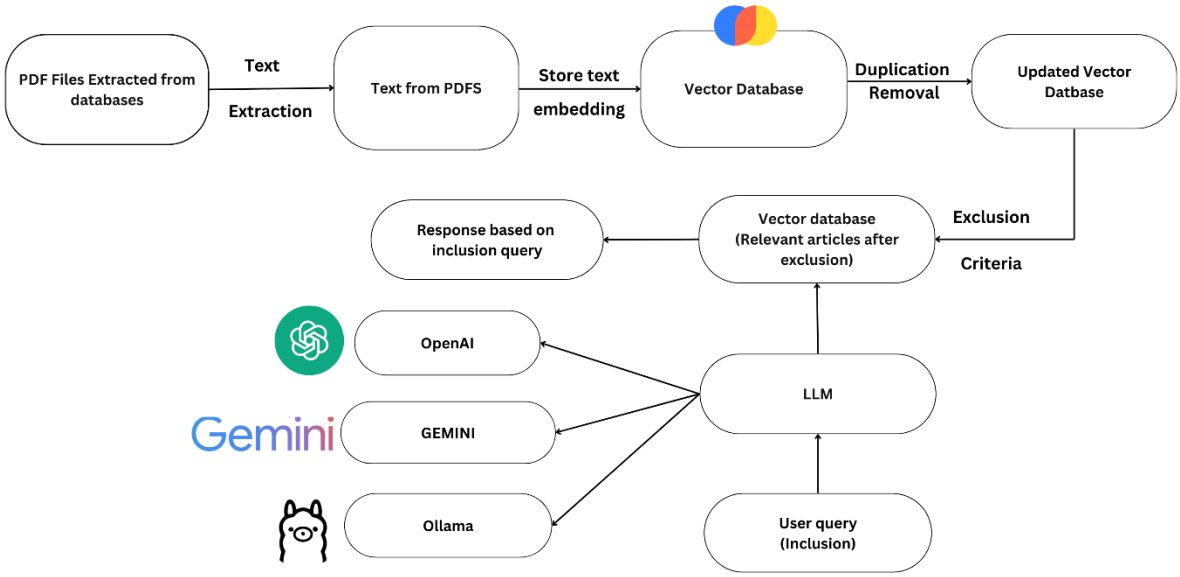

Fig 1: RAG-Based Architecture Diagram

1. PDF Extraction
   - Collected 808 research papers from academic databases.
   - Extracted text from PDFs using PyPDF2 for further processing.

2. Storing and Preprocessing
   - Stored extracted text in ChromaDB, a vector database for efficient retrieval.
   - Removed duplicate articles, reducing the dataset to 778 papers.

3. Exclusion Filtering
   - Applied keyword-based filtering in the database to remove irrelevant studies.
   - Excluded articles related to:
     - Medical Conditions: HIV, cancer, Parkinson's, disability, suicide.
     - Target Group Mismatch: Studies focused on young people.
     - Study Type Mismatch: Literature reviews instead of original research.
   - After applying these criteria, the dataset was reduced to 89 papers.

4. AI-Powered Inclusion Filtering
   - Used AI models (Gemini, OpenAI, and Ollama) to refine the selection process.
   - Each model analyzed articles based on their focus on both music therapy and reminiscence therapy.
   - Selection breakdown:

- Ollama: Identified 2 relevant articles.
- Gemini: Selected 5 key studies.
- OpenAI: Identified 5 more relevant articles.

5. Accuracy of AI Models
   - Manual Screening was performed to verify the accuracy of the AI models.
   - This screening ensured the quality of the results, leading to the following accuracy levels:
     - OpenAI: 88% accuracy in selecting relevant papers.
     - Gemini: 87% accuracy in filtering studies.
     - Ollama: 80% accuracy in identifying key research.

6. Retrieval-Augmented Generation (RAG) Implementation
   - Integrated RAG to streamline the literature review process.
   - Instead of relying solely on pre-trained LLMs, RAG dynamically retrieves relevant information from the curated database before generating responses.
   - This process ensures source-backed, contextually accurate insights with an overall accuracy of 85%.

7. Outcome
   - The combination of vector-based exclusion, LLM-powered inclusion, and RAG-driven retrieval transformed weeks of manual work into hours.
   - This approach made research faster, smarter, and more efficient, allowing researchers to focus on high-impact analysis rather than manual filtering.

Process

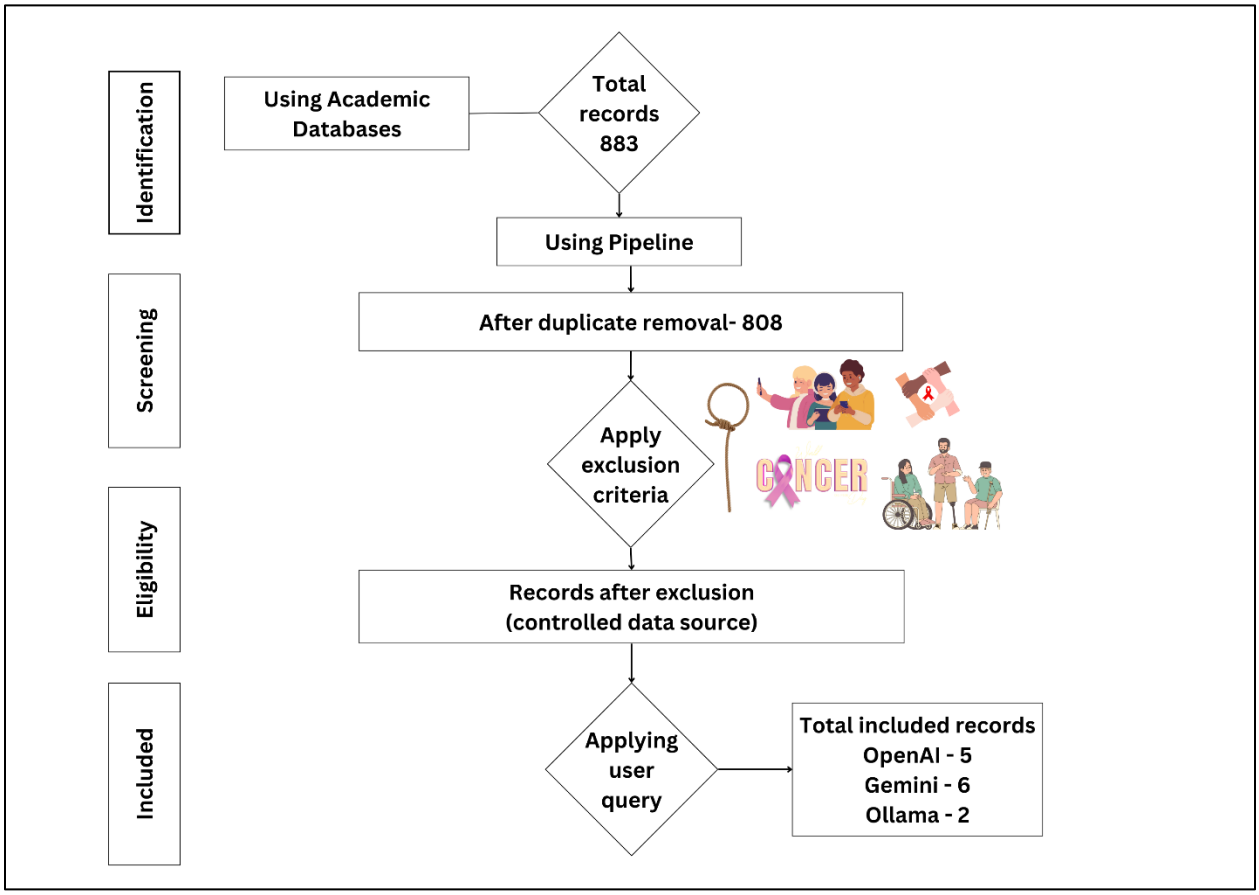

Fig 2: Process Diagram

There are four steps in the process we applied to train the model for retrieving systematic reviews of the shared articles:

1. **Identification**: We used a search strategy and applied the query in four academic databases - [redacted] This process yielded 883 full-text articles related to the keywords from the query.
2. **Screening**: This process consists of two steps. First, we removed duplicates, as multiple databases were used. After removing duplicates, we were left with 808 articles. In the second step, we applied the exclusion criteria mentioned in the paper, which included HIV, cancer, Parkinson's disease, disability, suicide, literature reviews, young people, individuals under 65, and systematic reviews. A significant percentage of articles were related to HIV, so we decided to include HIV in the exclusion criteria, even though it was not originally mentioned in the paper.
3. **Eligibility**: After applying the exclusion criteria, we retained the remaining articles to train the model. These articles were all deemed eligible for providing relevant systematic reviews based on any query posed to the model.

4. **Inclusion**: At this stage, we trained three LLMs—OpenAI, Ollama, and Gemini. For the demo, we tested the models using the same user query. The results were as follows:

    - OpenAI returned 5 articles
    - Ollama returned 2
    - Gemini returned 6.

The user query can be any question a researcher wants to ask related to the case study they are working on.

Data Description – Query Strategy

The original paper for the case study suggested a query, but for each academic database, the query varied depending on the filters and search logic of that database.

The original query from the paper:

music OR arts AND aged care OR elderly OR seniors OR ageing OR older people AND reminiscence therapy OR therapy AND intervention AND wellbeing OR health

Each keyword from the paper was evaluated using a sequential search strategy. Some academic databases used abbreviations to specify whether the search would be conducted in the abstract (AB) or full text (TX).

The following sections outline the search strategy applied to the four academic databases used.

[redacted]

In the search strategy, additional keywords were incorporated, and the principal filters were identified. Some keywords that initially filtered many papers were modified to search within the full text instead of just the abstract, as in the case of "reminiscence therapy."

Once the final query was defined, yielding 816 papers, the download process began. The same database automatically removed duplicate results, reducing the total number of papers to 664. This indicates that the actual number of unique papers was lower than the initial search results suggested.

#	Date	Query	Results
S1	Feb / 08 / 2025	AB music	1,209,792
S2	Feb / 08 / 2025	AB arts	1,833,973
S3	Feb / 08 / 2025	AB aged care	244,143
S4	Feb / 08 / 2025	AB elderly	564,013
S5	Feb / 08 / 2025	AB seniors	557,101
S6	Feb / 08 / 2025	AB ageing	499,251
S7	Feb / 08 / 2025	AB older people	245,405
S8	Feb / 08 / 2025	AB reminiscence therapy	1,364
S9	Feb / 08 / 2025	TX reminiscence therapy	25,141
S10	Feb / 08 / 2025	AB therapy	4,361,436
S11	Feb / 08 / 2025	AB intervention	3,348,977
S12	Feb / 08 / 2025	AB wellbeing	980,882
S13	Feb / 08 / 2025	AB health	8,013,391
S14	Feb / 08 / 2025	AB music OR AB arts	2,993,674
S15	Feb / 08 / 2025	AB aged care OR AB elderly	826,802
S16	Feb / 08 / 2025	AB aged care OR AB elderly OR AB seniors	1,373,480
S17	Feb / 08 / 2025	AB aged care OR AB elderly OR AB seniors OR AB ageing	1,819,639

S18	Feb / 08 / 2025	AB aged care OR AB elderly OR AB seniors OR AB ageing OR AB older people	1,956,009
S19	Feb / 08 / 2025	AB reminiscence therapy OR AB therapy	4,361,436
S20	Feb / 08 / 2025	AB wellbeing OR AB health	8,545,237
S21	Feb / 08 / 2025	AB music AND AB aged care	537
S22	Feb / 08 / 2025	AB music AND (AB aged care OR AB elderly)	1,538
S23	Feb / 08 / 2025	AB music AND (AB aged care OR AB elderly OR AB seniors)	7,695
S24	Feb / 08 / 2025	AB music AND (AB aged care OR AB elderly OR AB seniors OR AB ageing)	8,629
S25	Feb / 08 / 2025	AB music AND (AB aged care OR AB elderly OR AB seniors OR AB ageing) AND TX reminiscence therapy	162
S26	Feb / 08 / 2025	AB music AND (AB aged care OR AB elderly OR AB seniors OR AB ageing) AND (TX reminiscence therapy OR TX therapy)	1,313
S27	Feb / 08 / 2025	AB music AND (AB aged care OR AB elderly OR AB seniors OR AB ageing) AND (TX reminiscence therapy OR TX therapy) AND AB intervention	635
S28	Feb / 08 / 2025	AB music AND (AB aged care OR AB elderly OR AB seniors OR AB ageing) AND (TX reminiscence therapy OR TX therapy) AND TX intervention	808
S29	Feb / 08 / 2025	(AB music OR AB arts) AND (AB aged care OR AB elderly OR AB seniors OR AB ageing) AND (AB reminiscence therapy OR AB therapy) AND AB intervention	1,090
S30	Feb / 08 / 2025	(AB music OR AB arts) AND (AB aged care OR AB elderly OR AB seniors OR AB ageing) AND (AB reminiscence therapy OR AB therapy) AND TX intervention	1,563
S31	Feb / 08 / 2025	(AB music OR AB arts) AND (AB aged care OR AB elderly OR AB seniors OR AB ageing) AND (AB reminiscence therapy OR AB therapy) AND AB intervention AND AB wellbeing	119
S32	Feb / 08 / 2025	(AB music OR AB arts) AND (AB aged care OR AB elderly OR AB seniors OR AB ageing) AND (AB reminiscence therapy OR AB therapy) AND TX intervention AND AB wellbeing	158
S33	Feb / 08 / 2025	(AB music OR AB arts) AND (AB aged care OR AB elderly OR AB seniors OR AB ageing) AND (AB reminiscence therapy OR AB therapy) AND AB intervention AND (AB wellbeing OR AB health)	576
S34	Feb / 08 / 2025	(AB music OR AB arts) AND (AB aged care OR AB elderly OR AB seniors OR AB ageing) AND (AB reminiscence therapy OR AB therapy) AND TX intervention AND (AB wellbeing OR AB health)	780
S35	Feb / 08 / 2025	(AB music OR AB arts) AND (AB aged care OR AB elderly OR AB seniors OR AB ageing) AND (TX reminiscence therapy OR TX therapy) AND TX intervention AND (AB wellbeing OR AB health)	1,195
S35	Feb / 08 / 2025	(AB music OR AB arts) AND (AB aged care OR AB elderly OR AB seniors OR AB ageing) AND (TX reminiscence therapy OR TX therapy) AND TX intervention AND (AB wellbeing OR AB health)	960

S36	Feb / 08 / 2025	(AB music OR AB arts) AND (AB aged care OR AB elderly OR AB seniors OR AB ageing) AND (TX reminiscence therapy OR TX therapy) AND TX intervention AND (AB wellbeing OR AB health)	892
S37	Feb / 08 / 2025	(AB music OR AB arts) AND (AB aged care OR AB elderly OR AB seniors OR AB ageing) AND (TX reminiscence therapy OR TX therapy) AND TX intervention AND (AB wellbeing OR AB health) NOT systematic review	816

Table 1: Query strategy result: [redacted]

An important percentage of articles were related to HIV, therefore the final query had a NOT HIV cases.

The final query used in "(AB (music OR arts) AND AB (aged care OR elderly OR seniors OR ageing) AND TX (reminiscence therapy OR therapy) AND TX intervention AND AB (wellbeing OR health)) NOT systematic review NOT HIV"

[redacted]

In [redacted], query strategy refers to how you construct searches to retrieve relevant literature efficiently. [redacted] uses Boolean operators, MeSH (Medical Subject Headings) terms, and filters to refine searches.

1. Boolean operators: AND, OR, NOT
2. MeSH terms: controlled vocabulary used to standardize biomedical topics.
3. Keywords and Field Tags: [TI] for title, [AB] for abstract
4. Filters & Advanced Search: Filters like publication date, article type, species, and language refine results

Using a combination of Boolean operators (AND, OR), keywords, and field tags ([Title/Abstract]), along with filters for article type (Full text) and language (English), we created the final [redacted] query for our case study. The following table demonstrates how we built the query step by step and the results obtained.

#	Date	Query	Result
S1	14-02-2025	music[Title/Abstract]	21859
S2	14-02-2025	arts[Title/Abstract]	9900
S3	14-02-2025	aged care[Title/Abstract]	4021
S4	14-02-2025	elderly[Title/Abstract]	265335
S5	14-02-2025	seniors[Title/Abstract]	8350
S6	14-02-2025	ageing[Title/Abstract]	56155
S7	14-02-2025	older people[Title/Abstract]	42027
S8	14-02-2025	reminiscence therapy[Title/Abstract]	350
S9	14-02-2025	reminiscence therapy	865
S10	14-02-2025	therapy[Title/Abstract]	2026731

S11	14-02-2025	intervention[Title/Abstract]	856438
S12	14-02-2025	wellbeing[Title/Abstract]	156741
S13	14-02-2025	health[Title/Abstract]	2584327
S14	14-02-2025	music[Title/Abstract] OR arts[Title/Abstract]	31092
S15	14-02-2025	aged care[Title/Abstract] OR elderly[Title/Abstract]	268945
S16	14-02-2025	aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract]	275432
S17	14-02-2025	aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract]	324295
S18	14-02-2025	aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older people[Title/Abstract]	354602
S19	14-02-2025	reminiscence therapy[Title/Abstract] OR therapy[Title/Abstract]	2026731
S20	14-02-2025	wellbeing[Title/Abstract] OR health[Title/Abstract]	2647034
S21	14-02-2025	music[Title/Abstract] AND aged care[Title/Abstract]	47
S22	14-02-2025	(music[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract])	360
S23	14-02-2025	(music[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract])	384
S24	14-02-2025	(music[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract])	441
S25	14-02-2025	(music[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older people[Title/Abstract])	550
S26	14-02-2025	(music[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older people[Title/Abstract]) AND (reminiscence therapy[Title/Abstract])	25
S27	14-02-2025	(music[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older people[Title/Abstract]) AND (reminiscence therapy)	39
S28	14-02-2025	(music[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older people[Title/Abstract]) AND (reminiscence therapy OR therapy)	382
S29	14-02-2025	(music[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older people[Title/Abstract]) AND (reminiscence therapy OR therapy) AND (intervention[Title/Abstract])	161
S30	14-02-2025	(music[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older people[Title/Abstract]) AND (reminiscence therapy OR therapy) AND (intervention)	321
S31	14-02-2025	(music[Title/Abstract] OR arts[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older	106

		people[Title/Abstract]) AND (reminiscence therapy[Title/Abstract] OR therapy[Title/Abstract]) AND (intervention[Title/Abstract])	
S32	14-02-2025	(music[Title/Abstract] OR arts[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older people[Title/Abstract]) AND (reminiscence therapy[Title/Abstract] OR therapy[Title/Abstract]) AND (intervention)	203
S33	14-02-2025	(music[Title/Abstract] OR arts[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older people[Title/Abstract]) AND (reminiscence therapy[Title/Abstract] OR therapy[Title/Abstract]) AND (intervention[Title/Abstract]) AND (wellbeing[Title/Abstract])	22
S34	14-02-2025	(music[Title/Abstract] OR arts[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older people[Title/Abstract]) AND (reminiscence therapy[Title/Abstract] OR therapy[Title/Abstract]) AND (intervention) AND (wellbeing[Title/Abstract])	38
S35	14-02-2025	(music[Title/Abstract] OR arts[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older people[Title/Abstract]) AND (reminiscence therapy[Title/Abstract] OR therapy[Title/Abstract]) AND (intervention[Title/Abstract]) AND (wellbeing[Title/Abstract] OR health[Title/Abstract])	41
S36	14-02-2025	(music[Title/Abstract] OR arts[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older people[Title/Abstract]) AND (reminiscence therapy[Title/Abstract] OR therapy[Title/Abstract]) AND (intervention) AND (wellbeing[Title/Abstract] OR health[Title/Abstract])	79
S37	14-02-2025	(music[Title/Abstract] OR arts[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older people[Title/Abstract]) AND (reminiscence therapy OR therapy) AND (intervention) AND (wellbeing[Title/Abstract] OR health[Title/Abstract])	135
S38	14-02-2025	(music[Title/Abstract] OR arts[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older people[Title/Abstract]) AND (reminiscence therapy OR therapy) AND (intervention) AND (wellbeing OR health)	237

Table 2: Query strategy result: [redacted]

According to the results of the [redacted] query: (music[Title/Abstract] OR arts[Title/Abstract]) AND (aged care[Title/Abstract] OR elderly[Title/Abstract] OR seniors[Title/Abstract] OR ageing[Title/Abstract] OR older people[Title/Abstract]) AND (reminiscence therapy OR therapy) AND (intervention) AND (wellbeing[Title/Abstract] OR health[Title/Abstract]), a total of 135 full-text English articles were retrieved.

[redacted]

In [redacted], a query strategy refers to the structured approach used to search for relevant academic articles, dissertations, reports, and other resources.

[redacted] Search Page Components

The [redacted] search page consists of the following key elements:

- Search Bar – Enter keywords or phrases for retrieval.
- Field Selection – A drop-down menu to specify search areas such as title, abstract, or author.
- Boolean Operators – Use AND, OR, and NOT to refine searches.
- Filters – Options to narrow results by:
    - Date Range
    - Full Text/PDF Availability
    - Source Type (e.g., journals, newspapers, books)
    - Language

Using Boolean operators, keywords (such as "abstract" and "full text"), and filters (Language: English, Full-text articles), we applied different query combinations to refine our search. The table below presents the variations tested to determine the most effective query for retrieving relevant research papers.

#	Date	Query	Count
S1	17-02-2024	abstract(music)	112,115
S2	17-02-2024	abstract(arts)	392,629
S3	17-02-2024	abstract(aged care)	29,551
S4	17-02-2024	abstract(elderly)	69,587
S5	17-02-2024	abstract(seniors)	279,300
S6	17-02-2024	abstract(ageing)	116,161
S7	17-02-2024	abstract(older people)	45,996
S8	17-02-2024	abstract(reminiscence therapy)	127
S9	17-02-2024	fulltext(reminiscence therapy)	7,535
S10	17-02-2024	abstract(therapy)	392,472
S11	17-02-2024	abstract(intervention)	413,722
S12	17-02-2024	abstract(wellbeing)	25,486

S13	17-02-2024	abstract(health)	1,338,578
S14	17-02-2024	abstract(music) OR abstract(arts)	494,886
S15	17-02-2024	abstract(aged care) OR abstract(elderly)	96,659
S16	17-02-2024	abstract(aged care) OR abstract(elderly) OR abstract(seniors)	372,763
S17	17-02-2024	abstract(aged care) OR abstract(elderly) OR abstract(seniors) OR abstract(ageing)	475,248
S18	17-02-2024	abstract(aged care) OR abstract(elderly) OR abstract(seniors) OR abstract(ageing) OR abstract(older people)	507,076
S19	17-02-2024	abstract(reminiscence therapy) OR abstract(therapy)	392,472
S20	17-02-2024	abstract(wellbeing) OR abstract(health)	1,350,312
S21	17-02-2024	abstract(music) AND abstract(aged care)	141,614
S22	17-02-2024	abstract(music) AND abstract(aged care OR elderly)	84
S23	17-02-2024	abstract(music) AND abstract(aged care OR elderly OR seniors)	1,561
S24	17-02-2024	abstract music AND abstract(aged care OR elderly OR seniors OR ageing)	1,681
S25	17-02-2024	abstract(music) AND abstract(aged care OR elderly OR seniors OR ageing) AND fulltext(reminiscence therapy)	46
S26	17-02-2024	abstract(music) AND abstract(aged care OR elderly OR seniors OR ageing) AND fulltext(reminiscence therapy OR therapy)	325
S27	17-02-2024	abstract(music) AND abstract(aged OR seniors OR elderly OR ageing) AND fulltext(reminiscence therapy OR therapy) AND abstract(intervention)	119
S28	17-02-2024	abstract(music) AND abstract(aged OR seniors OR elderly OR ageing) AND abstract(reminiscence therapy OR therapy) AND abstract(intervention)	64
S29	17-02-2024	abstract(music OR arts) AND abstract(aged care OR elderly OR seniors OR ageing) AND abstract(reminiscence therapy OR therapy) AND fulltext(intervention)	650
S30	17-02-2024	abstract(music OR arts) AND abstract(aged care OR elderly OR seniors OR ageing) AND abstract(reminiscence therapy OR therapy) AND abstract(intervention) AND abstract(wellbeing)	8
S31	17-02-2024	abstract(music OR arts) AND abstract(aged OR seniors OR elderly OR ageing) AND abstract(reminiscence therapy OR therapy) AND fulltext(intervention) AND abstract(wellbeing)	16
S32	17-02-2024	abstract(music OR arts) AND abstract(aged OR seniors OR elderly OR ageing) AND abstract(reminiscence therapy OR therapy) AND abstract(intervention) AND abstract(wellbeing OR health)	156
S33	17-02-2024	abstract(music OR arts) AND abstract(aged OR seniors OR elderly OR ageing) AND abstract(reminiscence therapy OR therapy) AND fulltext(intervention) AND abstract(wellbeing OR health)	310
S34	24-02-2024	abstract(music OR arts) AND abstract(aged OR seniors OR elderly OR ageing) AND fulltext(reminiscence therapy OR therapy) AND fulltext(intervention) AND abstract(wellbeing OR health)	568

S35	17-02-2024	abstract(music OR arts) AND abstract(aged OR seniors OR elderly OR ageing) AND fulltext(reminiscence therapy OR therapy) AND fulltext(intervention) AND abstract(wellbeing OR health) NOT abstract(cancer OR parkinson's OR disability OR suicide)	500
S36	17-02-2024	abstract(music OR arts) AND abstract(aged OR seniors OR elderly OR ageing) AND fulltext(reminiscence therapy OR therapy) AND fulltext(intervention) AND abstract(wellbeing OR health) NOT abstract(cancer OR parkinson's OR disability OR suicide) NOT abstract(under 65 OR young)	511
S37	17-02-2024	abstract(music OR arts) AND abstract(aged OR seniors OR elderly OR ageing) AND fulltext(reminiscence therapy OR therapy) AND fulltext(intervention) AND abstract(wellbeing OR health) NOT abstract(cancer OR parkinson's OR disability OR suicide) NOT abstract(under 65 OR young) NOT fulltext(systematic review)	501
S38	17-02-2024	abstract(music OR arts) AND abstract(aged OR seniors OR elderly OR ageing) AND abstract(reminiscence therapy OR therapy) AND fulltext(intervention) AND abstract(wellbeing OR health) NOT abstract(cancer OR parkinson's OR disability OR suicide) NOT abstract(under 65 OR young) NOT fulltext(systematic review)	279
S39	17-02-2024	abstract(music OR arts) AND abstract(aged OR seniors OR elderly OR ageing) AND abstract(reminiscence therapy OR therapy) AND abstract(intervention) AND abstract(wellbeing OR health) NOT abstract(cancer OR parkinson's OR disability OR suicide) NOT abstract(under 65 OR young) NOT fulltext(systematic review)	152
S40	24-02-2024	abstract(music OR arts) AND abstract(aged OR seniors OR elderly OR ageing) AND fulltext(reminiscence therapy OR therapy) AND fulltext(intervention) AND abstract(wellbeing OR health) NOT abstract(HIV)	248

Table 3: Query strategy result: [redacted]

An important percentage of articles were related to HIV in [redacted]; therefore, the final query had a NOT abstract(HIV).

The final search query from [redacted] database that gave us 248 articles is:
“abstract(music OR arts) AND abstract(aged OR seniors OR elderly OR ageing) AND fulltext(reminiscence therapy OR therapy) AND fulltext(intervention) AND abstract(wellbeing OR health) NOT abstract(HIV)”.

[redacted]

To identify relevant academic literature on the impact of music or arts-based reminiscence therapy interventions on the health and well-being of elderly individuals, a structured query was used in [redacted] The search was designed to retrieve full-text PDF research papers published between 1996 and 2016, ensuring access to studies conducted within this time frame.

("Music" OR "Arts") AND ("Reminiscence therapy") AND ("Aged care" OR "Elderly" OR "Seniors" OR "Ageing" OR "Older people") AND ("Intervention") AND ("Wellbeing" OR "Health")

Explanation of Search Terms and Operators

1. Key Concepts and Synonyms
   a. ("Music" OR "Arts"): Ensures inclusion of studies involving either music or arts as a therapeutic intervention.
   b. ("Reminiscence therapy"): Focuses on studies specifically discussing reminiscence therapy as a primary approach.
   c. ("Aged care" OR "Elderly" OR "Seniors" OR "Ageing" OR "Older people"): Covers different terms used for older adults in academic research.
   d. ("Intervention"): Ensures the search retrieves studies that evaluate reminiscence therapy as an applied treatment rather than theoretical discussions.
   e. ("Wellbeing" OR "Health"): Includes studies that examine the impact of reminiscence therapy on physical or mental health outcomes.

2. Filters Applied
   a. filetype:pdf: Restricts results to full-text PDF documents, increasing the likelihood of retrieving complete research papers.
   b. Publication Date Range (1996–2016): Ensures that only studies published within this 20-year period are included, avoiding outdated or excessively recent studies that may not align with the scope of review.

Results and Relevance

This query successfully retrieves 273 research articles that explore reminiscence therapy using music or arts as an intervention for elderly individuals, focusing on health and well-being. By filtering results between 1996 and 2016, the search ensures a balance between historical context and contemporary relevance while avoiding overly recent studies that may not yet be widely cited or reviewed.

The Prompt

OpenAI

The prompt in the OpenAI model was used in the inclusion criteria, specifically in the step where the researcher's questions are captured.

Note: Ther research question is captured as CONTEXT.

```
messages = [
    {
        "role": "system",
        "content": f"""
        You are an intelligent assistant tasked with retrieving and ranking documents based on their relevance to a given question.
        ###
        Instructions:
        - Analyze the provided context and extract relevant details.
        - The source to answer the questions is only what is provided in results = collection.query.
        - Do not use external information to answer the questions.
        - Return results in a structured table sorted by relevance.
        - The table should have three columns: "File Name/ID", "Title", and "Reason for Relevance".
        - The "File Name/ID" column should contain the filename or ID of the document from ids.
        - The "Title" column should be the title of the relevant document.
        - The "Reason for Relevance" should be a concise explanation of why the document is relevant.
        ###
        Context:
        {context}
        """
    },
    {"role": "user", "content": question},
]
```

Fig 3: OpenAI prompt

The role was set up as a system, defining parameters as internal for the OpenAI model.

The content specifies **what** information is needed, **how** it should be processed, and **from where** the output should be retrieved. Below is a breakdown of the prompt analysis:

Prompt:
"You are an intelligent assistant tasked with retrieving and ranking documents based on their relevance to a given question."

This statement defines the objective of the output: retrieving and ranking documents based on their relevance to a given question.

Instructions:

- Analyze the provided context and extract relevant details.
  This step determines “where” relevant details should be extracted based on the given question.
- The source to answer the questions is only what is provided in results = collection.query.
- Do not use external information to answer the questions.
  This restriction ensures that responses are based solely on collection.query, which is the database of stored PDFs. It reinforces that the system should only use the given input.

- Return results in a structured table sorted by relevance.
- The table should have three columns: "File Name/ID", "Title", and "Reason for Relevance".
- The "File Name/ID" column should contain the filename or ID of the document from ids.
- The "Title" column should contain the title of the relevant document.
- The "Reason for Relevance" should be a concise explanation of why the document is relevant.

These instructions define “how” the output should be structured - **a table sorted by relevance**. The system extracts specific fields from the database and presents them in a structured order to ensure clarity and usability for the user.

Context: {context}

In this case, the **context** refers to the corpus, or the input data, from which the answers will be generated.

{"role": "user", "content": question}

Finally, after defining the framework, the research question is formulated and passed to the model in the variable "question". The model then generates an output based on the given question, using only the filtered database.

Ollama – Llama3

The prompt in the Ollama model is the same as in OpenAI, so we can refer to the above analysis for the prompt explanation.

The only difference is that the user's question is stored in a field named **"query"** instead of "question".

{"role": "user", "content": query}

```
response = ollama.chat(model="llama3", messages = [
        {
            "role": "system",
            "content": f"""
            You are an intelligent assistant tasked with retrieving and ranking documents based on their relevance to a given question.
            ###
            Instructions:
            - Analyze the provided context and extract relevant details.
            - The source to anser the questions is only what is is provided in results = collection.query)
            - Do not use external informaiton to anser the qurstions.
            - Return results in a structured table sorted by relevance.
            - The reason should be a concise explanation of why the document is relevant
            - The table should have three columns: "File Name/ID", "Document Section", and "Reason for Relevance".
            - The "File Name/ID" column should contain the filename or ID of the document from ids.
            - The "Document Section" should be the relevant section.
            - The reason should be a concise explanation of why the document is relevant
            ###
            Context:
            {context}
            """
        },
        {"role": "user", "content": query},
    ])
```

Fig 4: Llama3 prompt

Gemini

The prompt in the Gemini model was used in the inclusion criteria, specifically in the step where the researcher's questions are captured.

Note: Ther research question is captured as Question.

Prompt:
"You are an intelligent assistant tasked with retrieving and ranking documents based on their relevance to a given question."

This prompt is designed for an intelligent assistant to retrieve and rank documents based on their relevance to a user-provided question. The assistant is instructed to analyze a given context, extract relevant details, and present the results in a structured table, prioritizing documents that directly answer the question.

```
prompt = f"""
You are an intelligent assistant tasked with retrieving and ranking documents based on their relevance to a given question.
###
Instructions:
- Analyze the provided context and extract relevant details.
- The source to answer the questions is only what is provided in the Context below.
- Do not use external information to answer the questions.
- Return results in a structured table sorted by relevance.
- The table should have three columns: "File Name/ID", "Title", and "Reason for Relevance".
- The "File Name/ID" column should contain the filename or ID of the document from the IDs provided.
-  The "Title" should be the title of the document.
- The reason should be a concise explanation of why the document is relevant.
###
Context:
{context}

IDs: {ids}

Question: {question}

Answer in a table format:
"""
```

Fig 5: Gemini prompt

Key Components and Instructions:

- Role Definition:

The assistant is specified as "an intelligent assistant tasked with retrieving and ranking documents." This establishes the purpose of the system.

- Data Source Restriction:

The phrase "The source to answer the questions is only what is provided in the Context below" is crucial. It ensures the assistant does not rely on external databases or internet searches, maintaining the integrity of the provided context.

- Structured Output

The instruction to "Return results in a structured table sorted by relevance" ensures a clear and organized output. The table's structure is defined with three columns:

    - "File Name/ID": Identifies the source document.
    - "Title": specifies the title of the document that is relevant.
    - "Reason for Relevance": Provides a concise explanation of why that document section is relevant to answering the question.

- Input Variables:
    - context: This variable holds the text from the documents that the assistant will analyze.
    - ids: This variable contains the filenames or IDs of the documents.
    - question: This variable contains the user's query.

Purpose and Functionality:

The prompt aims to create a system that can effectively:

1. Understand the question: The assistant must accurately interpret the user's query.

2. Analyze the context: The assistant must parse and understand the provided text.

3. Identify relevant sections: The assistant must pinpoint the sections of the documents that directly answer the question.

4. Rank by relevance: The assistant must prioritize the most relevant documents and sections.

5. Present results clearly: The assistant must output the information in a structured table, with clear explanations.

In essence, this prompt outlines a document retrieval and ranking system designed for precise, context-specific information retrieval.

Results

The results after applying LLMs to select relevant papers demonstrate how accurately the retrieved articles align with the research question: 'Combining music and reminiscence therapy interventions for well-being in elderly populations?' Below are the articles identified by each LLM model according to the research query.

OpenAI	• "The Effect of a Music Therapy Intergenerational Program on Children and Older Adults' Intergenerational Interactions, Cross-Age Attitudes, and Older Adults' Psychosocial Well-Being" authored by Melita Belgrave • "Effect of music as a therapeutic resource in a support group for the elderly" authored by Joycimara da Silva Sales de Medeiros and Luciane Paula Batista Araújo • "The Creative Arts in Dementia Care: Practical Person-Centred Approaches and Ideas" is authored by Jill Hayes and Sarah Povey. • "Art Therapy Impact on Aging Adults' Quality of Life: Leisure and Learning" authored by Eileen Misluk and Haley Rush • "Effects of Movement Music Therapy with the Naruko Clapper on Psychological, Physical and Physiological Indices among Elderly Females: A Randomized Controlled Trial" authored by Nobuko Shimizu, Tomohiro Umemura, Takayoshi Hirai, Taro Tamura, Kazuhiro Sato and Yukinori Kusaka
Ollama	• "The Effect of a Music Therapy Intergenerational Program on Children and Older Adults' Intergenerational Interactions, Cross-Age Attitudes, and Older Adults' Psychosocial Well-Being" authored by Melita Belgrave • "Effect of music as a therapeutic resource in a support group for the elderly" authored by Joycimara da Silva Sales de Medeiros and Luciane Paula Batista Araújo
Gemini	• "Follow the Musical Road": Selecting Appropriate Music Experiences for People with Dementia Living in the Community • Theme and variations on quietness: Relaxation-focused music and imagery in aged care • INTRODUCTION TO THE SPECIAL VOLUME ON PSYCHOGEROMUSICOLOGY PSYCHOLOGY OF MUSIC AND AGING COMES OF AGE: PSYCHOGEROMUSICOLOGY • Exercise with Music: An Innovative Approach to Increase Cognition and Reduce Depression in Institutionalized Elderly • Effect of music as a therapeutic resource in a support group for the elderly

	• "Music Makes My Old Heart Beat": A Randomised Controlled Study on the Benefits of the Use of Music in Comprehensive Care for Institutionalised Older Adults

According to the different results provided by the LLMs, OpenAI recommended 5 articles, Llama 2 articles, and Gemini 6 articles for the research question. In terms of the results provided by the different LLMs, for the OpenAI model we explicitly instructed to provide reasoning behind the results, while Llama gave a description of the research question and then provided reference articles. This demonstrates that the methods used by the different LLMs to generate results are also varied. Additionally, the articles recommended by the LLMs share common entries, such as *"The Effect of a Music Therapy Intergenerational Program on Children and Older Adults' Intergenerational Interactions, Cross-Age Attitudes, and Older Adults' Psychosocial Well-Being"* and *"Effect of music as a therapeutic resource in a support group for the elderly"*, while others are unique to each model. This comparison provides us with different perspectives on the results given by the 3 LLMs, allowing us to analyze and determine which model works best for our case study.

To determine the accuracy of the results from the three LLM models, we manually searched for the keywords in all the selected articles. The accuracy measure reflects the number of papers that contain the keywords related to the research question (*music, reminiscence therapy, elderly, intervention, well-being*). The following accuracy was obtained for each model:

Model	**Accuracy**
OpenAI	88%
Ollama	80%
Gemini	87%

Table 4: Accuracy measure of OpenAI, Llama3 and Gemini models

For our case study, we can conclude that the best results, with an accuracy of 88%, were provided by the OpenAI model. By analyzing the different results and recommendations from OpenAI, Ollama, and Gemini, we aimed to achieve the most accurate and relevant outcomes for our research question.

Impact and Conclusion

Impact

- Faster processing of large datasets compared to manual reviews.
- Helps healthcare professionals understand the evidence-backed benefits of music therapy.
- AI could help identify which types of music therapy work best for specific conditions.

Conclusion

AI can speed up research by streamlining paper selection and enhancing systematic reviews with LLMs. This approach can be applied to any scientific field by defining search parameters and exclusion criteria. In the end, the research question remains human-driven, with AI assisting in the process and analysis.

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