UGC Approved Indexed Peer Reviewed Journal

ISSN: 2320-6586 (Online)

IILM UNIVERSITY

Technologies for Sustainable Development Goals 2025 (TECH4SDG-2025)

School of Computer Science & Engineering

IILM University Greater Noida

Presents

1st National Conference

on

Technologies for Sustainable Development Goals 2025 (TECH4SDG-2025)

3rd March 2025

Technically Co-Sponsored by IEEE UP SECTION (INDIA)

Venue:

IILM University, Greater Noida

Plot No.18,16, Knowledge Park II, Greater Noida, Uttar Pradesh 201306

Procedings Published at

International Journal of Research in Modern Engineering and Emerging Technology

Vol. 13, Sp. Issue 1, April 2025

Doi: https://doi.org/10.63345/ijrmeet.org.v13.si1.1301

Editor-in-Chief

Dr. Mylavarapu Seetharama Prasad

www.ijrmeet.org

INDEX

S. No.	Particulars	Page No.
1	A Comparative Study On Load Balancing Algorithms And Its Types **Methily Johri & Aditri Ashish**	1–10
2	Optimizing Supply Chain Management with Ethereum 2.0: Innovations in Blockchain Technology **Ayush Gupta & Dr. Ambuj Kumar Agarwal**	11–17
3	Smart Surveillance: "A Real-Time Crowd Analysis System for Density and Anomaly Detection" **Komal Sharma, Dr. Pankaj Kumar Varshney, Aditi Aggarwal & Gaurav Kumar**	17–22
4	AI-Driven Network Optimization: Matching Policyholders to Cost-Effective Providers Using Business Intelligence **Ruchi Mangharamani & Prof. (Dr) Sangeet Vashishtha**	23–29
5	The Future of UX: Designing for Emerging Technologies (AI, AR, VR, Voice UI) **Ojas Gupta & Prof.(Dr.) Arpit Jain**	30–37
6	Enhancing Liquidity Stress Testing: Best Practices for Modern Banking Risks **Padmini Bulani & Dr Abhishek Jain**	38–45
7	AI-Powered Investment Strategies: Optimizing Risk and Returns in Modern Banking **Aditya Mehra & Dr. Shakeb Khan**	46–53
8	Scaling Customer Journey Optimization in a Multi-Tenant Distributed System **Sumit Kumar Agrawal & Prof. (Dr) MSR Prasad**	54–61
9	Object Detection Using Convolutional Neural Networks: Advances, Techniques, and Applications	62–69

S. No.	Particulars	Page No.
	Bharath Thandalam Rajasekaran, Saravanan Thirumazhisai Prabhagaran & Prof. (Dr) Punit Goel	
10	AI-Augmented Intrusion Detection Systems for High-Speed Optical Networks **Sattvik Sharma & Prof.(Dr) Avneesh Kumar**	70–77
11	Generative AI in Data Security: Opportunities and Challenges **Vybhavreddy Kammireddy Changalreddy, Piyush Bipinkumar Desai & Prof (Dr) Ajay Shriram Kushwaha**	78–86
12	Integrating Salesforce with Cloud-Based Data Warehousing for Unified Analytics **Nidhi Shashikumar & Dr S P Singh**	87–94
13	AI-Powered Cybersecurity: A Unified Approach to Protecting Enterprise, Cloud, and SaaS Applications **Varun Grover, Khushmeet Singh & Er. Siddharth**	95–103
14	Sales and Order Analysis Using Excel-Based Dashboard: A Case Study on Vrinda Store **Mohd Ammar Khan & Harun Faridi**	104–106
15	ChatMania: A Realtime Chat Application **Dr. Kirti Shukla & Anshika**	107–110
16	Digital Surveillance and Domestic Abuse: A Legal Vacuum in Indian Marital Relationships **Vishal Nehra & Dr. Rakesh Kumar**	110–116
17	The Role of Emotional Appeal in Online Advertisements Targeting Working Women in Delhi-NCR **Mona Mishra & Dr. Praveen Mittal**	116–120
18	AI-Driven Data Governance Strategies for Enhanced Cloud Security in Enterprises **Chandana Pandey & Dr Gauri Shanker Kushwaha**	121–123

S. No.	Particulars	Page No.
19	Evolution of Social Media Advertising and Consumer Behavior **Mr. Pramod Rana & Prof (Dr) Punit Goel**	124–129
20	Sustainability Accounting Practices in Indian Manufacturing Firms **Mrs. Sonal Jain & Dr. Ajit Singh**	129–134
21	Fundamental Rights vs. Reasonable Restrictions: A Study of Evolving Judicial Balances **Mrs. Anshika Agarwal & Dr. Vijay Kumar Singh**	134–139
22	सतत शिक्षा के लिए हिंदी साहित्य की भूमिका: सतत विकास लक्ष्य-4 (गुणवत्तापूर्ण शिक्षा) का सांस्कृतिक विश्लेषण **श्रीमती रेणु गुप्ता, डॉ. बृजलता शर्मा**	140–144
23	Mind–Gut Synergy in Chronic Lifestyle Conditions: Evaluating Psychotherapy-Driven Behavioral Change and Microbiota-Mediated Metabolic Repair **Krithika. V, Dr. Sarbesh Kumar Singh**	145–151
24	प्राचीन शिक्षा प्रणाली से आधुनिक AI आधारित शिक्षा की ओर संक्रमण **गौरव जोशी, डॉ सारिका गोयल**	152–159
25	पर्वतीय क्षेत्रों में शिक्षा के डिजिटलीकरण की चुनौतियाँ एवं संभावनाएँ **राकेश उनियाल, डॉ. मीनाक्षी हर्राव वर्मा**	160–168
26	Women Leadership and Democratic Participation in India: Challenges and Opportunities in Parliamentary Politics **Renu Yadav, Dr. P.P.S. Rana**	169–176
27	Evaluating GST Effects on Competitiveness and Industrial Development **Aman Goel, Dr. Pooja Yadav**	177–183
28	एस०आर० हरनोट के कथा साहित्य में लोक संस्कृति, पर्यावरण चेतना और सामाजिक परिवर्तन का अध्ययन **सीमा देवी, डॉ० अरविन्द्र कौर चुंबर**	184–189

S. No.	Particulars	Page No.
29	Balancing National Security and Human Rights in Modern India **Shalu Jain, Dr. Vijay Kumar**	190–197
30	Economic Performance Drivers and Fiscal Resilience in Indian Airports **Lalit Kumar Sharma, Dr. Pooja Yadav**	198–203
31	Educational Governance and AI Learning Outcomes in Government Elementary Schools **Dr. Shubhra Chaturvedi**	203–210
32	Artificial Intelligence and the Future of Teacher Roles in India Classroom **Neeru Verma**	211–220
33	Research Culture Among Undergraduate Students in Indian Universities **Dr. Dhanashri Rajshri Ravindra Jadhav**	221–229
34	डिजिटल समाज में बहुभाषिक संचार का बदलता स्वरूप: भारतीय भाषाओं के समक्ष अवसर और चुनौतियाँ **Rakesh Uniyal**	230–234
35	Graduate Employability and Skill Gaps in State Universities **Narender Panghal**	235–242
36	Political Funding Transparency in Indian Election **Dr. Anand Kumar Dwivedi**	243–252
37	AI-Powered Platforms for Data Analytics and Audience Development **Sachin Sangal**	253–258
38	Engineering Leadership Models in AI Startups: Balancing Innovation and Operational Efficiency **Dr. Kalpesh Rasiklal Rakholia**	259–269
39	Challenges in Integrating CWSN in Regular Classrooms **Anil Kumar**	270–280
40	An Artificial Intelligence-Based Legal Compliance Framework for Real-Time Environmental Governance to Advance SDGs 9, 12, 13, and 16 **Dr. Jyoti Janardhan Reddy**	281–288

S. No.	Particulars	Page No.
41	Impact of Source Segregation and Waste Characterization on the Efficiency of Material Recovery Facilities **Varinder Vikram Singh, Dr. Pankaj Kumar Bharti**	289–296
42	Significance of Emotional Intelligence of schedule caste students in relation to Self-concept at secondary level **Mrs. Varsha Asher Wasker, Dr. Kuldeep Singh Tomar**	297–305
43	औपनिवेशिक भारत में स्थानीय बाजारों के सामाजिक परिवर्तन का ऐतिहासिक अध्ययन **Pankaj Tamta**	306–310
44	Teachers' Readiness to Integrate Generative AI into Lesson Planning and Classroom Instruction **Prema Bharti**	311–316
45	Battery Usage Optimization Techniques for AI-Heavy Mobile Apps **Dr. Akankasha Kathuria**	317–321
46	Gender, Technology, and Changing Family Structures in Urban India: A Socio-cultural Analysis **Prof. Sawant Jeetendra Madhukar Usha**	322–326
47	Law and Alternative Dispute Resolution in Contemporary Civil Justice: A Legal Study **Dr. Pooja Khurana**	327–331
48	English Literature and the Representation of Women in Contemporary Fiction: A Corpus-Based Study of Narrative Agency, 2000–2024 **Dr. Abu Farah Hoque**	332–336
49	Agricultural Impact of Biochar and Reduced Fertilizer on Mustard Soil Health and Yield **Dr. Bibhu Santosh Behera**	337–346
50	Ethical and Privacy Frameworks for AI-Driven Customer Data Analytics in Medical Profession **Dr. Gaurav Singh Tomar**	347–351
51	Legal Protection of Witnesses in Criminal Justice Proceedings **Dr. Jyoti Janardhan Reddy**	352–357

S. No.	Particulars	Page No.
52	Platform Culture and Fragmented Selfhood in Contemporary English Literature **Dr. Akanksha Singh**	358–362
53	Digital Health Literacy and Health Information Inequality in Rural India: A Multidimensional Assessment **Ranjana Jadaun**	363–368
54	स्मार्ट विनिर्माण और उद्योग 5.0 में कृत्रिम बुद्धिमत्ता, मानव-केंद्रित तकनीक और सतत विकास का अंतःविषयक अध्ययन **Dr. Ghamendra Kumar Sahu**	369–375
55	Contribution of Yoga-Based Breathing Techniques to Daily Stress Management **Dr. Sweta Kumari**	376–387
56	Algorithmic Silence and Unspoken Meaning in Contemporary English Fiction **Dr. Jyoti Devi**	388–396
57	Cost-Benefit Analysis of Custom Image Analysis Tools in Oncology Research **Sumit Malhotra**	397–405
58	उच्च शिक्षा में सूक्ष्म अधिगम तकनीकों का शैक्षिक प्रभाव **Ram Singh**	406–412
59	Optimising Laboratory Workflows with Low-Code/No-Code Software Solutions **Dr. Amit Nampalliwar**	413–421
60	भारतीय बहुभाषिक समाज में भाषा, संस्कृति और राष्ट्रीय एकता का अध्ययन **Dr. Geeta Rawat**	422–428
61	Influence of FinTech Innovation on Financial Resilience and Operational Efficiency of Retailers and Street Vendors **Prof. Manmeet Kumar Siras & Shyam Pandey**	429–435
62	भारत में आपातकालीन शक्तियाँ और लोकतांत्रिक उत्तरदायित्व: संसदीय शासन के अंतर्गत राष्ट्रपति की संवैधानिक भूमिका का विश्लेषण **सीता राम पंडित, डॉ. पी. पी. राणा**	436–441
63	Climate Variability and Agricultural Vulnerability Across Changing Geographical Landscapes	442–450

S. No.	Particulars	Page No.
	Dr. Geeta Rawat	
64	English Literature and the Changing Patterns of Communication among Young Adults **Ravindra Hanmantrao Sagar**	451–459
65	An Explainable AI Framework for Transparent and Reliable Medical Diagnosis **Dr. Thejoram Naresh Reddy Boya**	460–466
66	डिजिटल समुदायों का युवा शिक्षा और सामूहिक पहचान पर प्रभाव **डॉ. मनोज कुमार सकलानी**	467–473
67	Adaptive Technologies for Enhancing Online Shopping Experiences **Dr. Abhishek Bhattacharjee**	474–479
68	Impact of Digital Payment Adoption through AI-ML on Micro-Business Performance **Ralphy Joseph C J**	480–484
69	Role of Regional Parties in Shaping Federalism in India **Dr. Shailendra Kumar**	485–489
70	Serverless Computing Optimization: Enhancing Performance with AI-Based Resource Allocation **S. Venkatasubramanian**	490–495
71	Student Satisfaction in Autonomous vs. Affiliated Colleges **Dr. Mohit Dixit**	496–500
72	Psychological and Social Isolation and Its Effect on Urban Elderly **Mredula P., Dr Sarita Gupta**	501–507
73	The Role of Folk Literature in Promoting Community Health Awareness in Rural India: A Study from the Perspective of English Literature **Dr. Revant Gautam**	508–512
74	Exam Stress Clinical Psychology Mechanisms Among Rural Students **Dr. Avinash D. Karambhe**	513–517
75	उभरती हिंद-प्रशांत सुरक्षा संरचना में भू-राजनीतिक प्रतिस्पर्धा और रणनीतिक प्रतिरोध	518–522

S. No.	Particulars	Page No.
	Dr. Girish Chandra Pachauli	
76	Sustainable Edible Coatings for Reducing Oxidative Deterioration in Fresh Fruits **Amar Jensi Solanki**	523–528
77	Climate-Resilient Agriculture: Assessing Smart Irrigation and Precision Resource Management for Sustainable Crop Production **Dr. Bibhu Santosh Behera**	529–534

INDEX (CONTINUED)

S. No.	Particulars	Page No.
78	Innovations in Healthcare Product Management Through AI and Machine Learning **Dr. Navdeep Singh**	**535–538**
79	Psychological Effects of Music and Memory Recall in Elderly Patients **Lindamulage Mithun Dilantha Deva Adithiya**	**539–544**
80	Comparative Study of Formative Assessment in Government vs. Private Schools **Dr. Roopali Chandra**	**545–549**
81	Educational Learning Needs of Orphaned Children in Institutional Homes **Ajitha. P. M**	**550–554**
82	Behavioral Differences in Joint vs. Nuclear Family Children **Rajeevan Edadan Puthiya Veetil**	**555–559**
83	Leveraging Data Architecture to Enhance Business Intelligence in Retail and Finance **Dr. Priyanka Gosain**	**560–563**
84	Effect of Pelvic Floor Exercises on Women’s Health and Functional Recovery **Dr. Kapila Jain**	**564–569**
85	Acceptance of AI-Assisted Drug Information Systems by Pharmacists **Dr. Tarun Sahani**	**570–574**
86	Jane Austen’s Portrayal of Marriage and Society in English Literature **Serjana Thapa**	**575–581**
87	Employability Skill Gaps in Engineering Graduates (2013–2016) **Dr. A. H. Khan**	**582–586**

International Journal of Research in Modern Engineering and Emerging Technology (IJRMEET)

Vol. 13, Sp. Issue: 01, April: 2025
(IJRMEET) ISSN (o): 2320-6586

Psychological Effects of Music and Memory Recall in Elderly Patients

Lindamulage Mithun Dilantha Deva Adithiya

Dean of the Faculty of Behavioural Sciences

KIU University

Koswatta, Battaramulla, 10120, Sri Lanka.

ORCID : https://orcid.org/0000-0003-2742-3137

Abstract

This study examines how routine engagement with music influences self-perceived memory recall among older adults living in community and assisted-care settings. Age-related declines in episodic memory can undermine independence, diminish quality of life, and heighten caregiver burden. Emerging evidence from cognitive neuroscience indicates that music—through its engagement of auditory, emotional, and memory networks—may serve as an accessible, non-pharmacological means of bolstering memory retrieval in later life. To explore this, we surveyed 250 participants aged 65–85 on their patterns of music listening, singing, or instrument playing; the emotional significance of those activities; and their own judgments of everyday memory performance (e.g., recalling names, appointments, conversations). Our analyses combined descriptive statistics, correlational tests, and a hierarchical regression controlling for age and education. We found that more frequent music engagement and stronger emotional attachment each predicted better self-rated recall, together accounting for an additional 18 % of variance beyond demographic factors.

Subgroup comparisons suggested similar benefits whether individuals lived independently or in assisted settings, though overall engagement was slightly lower in the latter. These results underscore music's promise as a low-cost, scalable intervention: personalized playlists or group sing-alongs could be integrated into routine care to support cognitive health. We discuss neural and emotional mechanisms, practical implementation strategies, limitations of self-report data, and avenues for longitudinal and objective follow-up studies aimed at translating these findings into everyday geriatric practice.

Keywords

Music exposure; memory recall; elderly patients; cognitive engagement; survey research

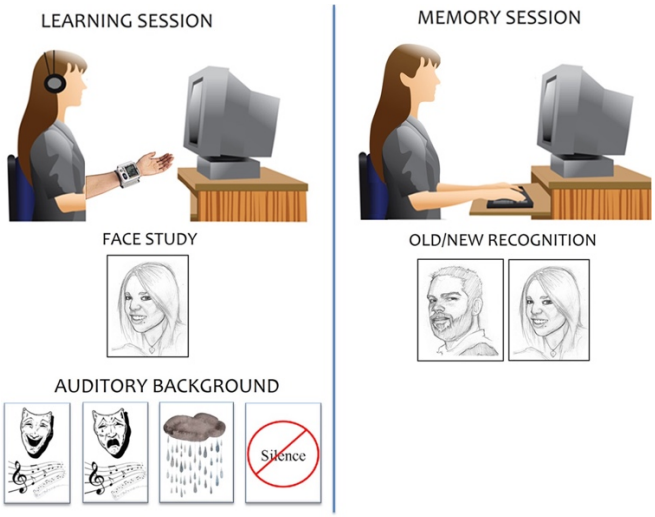

Fig.1 Effecty of Backgroud Music on Episodic Memory,Source([1])

Introduction

With global populations aging at an unprecedented rate, preserving cognitive health in older adults has become a public-health imperative. Among cognitive domains, episodic memory—the capacity to encode, store, and later retrieve personally experienced events—tends to show the earliest and most pronounced age-related declines. Difficulties in remembering recent conversations, appointments, or where one placed objects can erode confidence, reduce autonomy, and increase reliance on caregivers or medical services. Consequently, there is an urgent need for interventions that are both efficacious and

feasible for wide implementation in community centers, assisted-living facilities, and home settings.

Pharmacological approaches to memory decline have had mixed success and carry risks of side effects or interactions. In contrast, non-pharmacological strategies—such as physical exercise, cognitive training, and social engagement—offer safer profiles but often require considerable resources or participant motivation. Music uniquely occupies a space at the intersection of cognitive, emotional, and social engagement. Listening to a beloved song or participating in simple group singing can be pleasurable, motivating, and broadly accessible regardless of physical mobility.

Neuroimaging studies reveal that music activates a constellation of brain regions including the auditory cortex, hippocampus (crucial for memory encoding and retrieval), prefrontal areas (involved in working memory and attention), and limbic structures (mediating emotion). This widespread activation suggests that music could prime memory circuits, enhance attention during encoding, and boost consolidation via emotional arousal mechanisms. From a psychological perspective, songs tied to personal milestones or evocative lyrics often trigger vivid recollections—a phenomenon countries call "the reminiscence bump." By leveraging music's emotional power, interventions may improve both objective memory performance and individuals' confidence in their recall abilities.

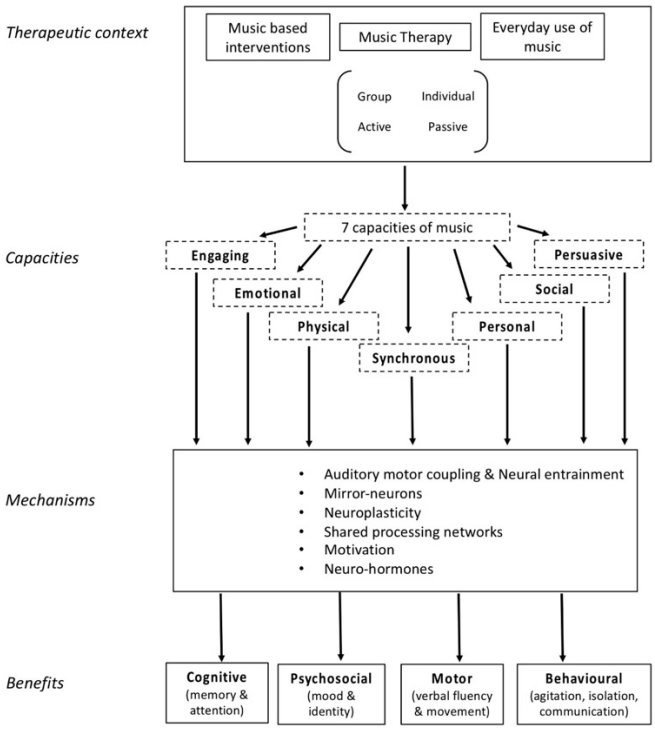

Fig.2 Music Recall in Elderly Patients,Source([2])

Despite these promising underpinnings, most prior studies have been limited in scope. Controlled trials of music therapy often use structured sessions (group singing, instrument lessons) led by specialists, which, while effective, can be resource-intensive and difficult to scale. Fewer investigations have assessed whether everyday, unstructured music engagement—simply listening at home or humming along with the radio—yields measurable cognitive benefits. Moreover, much of the existing work relies on performance-based memory tests, leaving unanswered questions about how older adults perceive their own memory changes in real life. Self-perceptions of memory are important predictors of quality of life, mood, and subsequent cognitive decline.

This study therefore asks: **(1)** Do older adults report improved memory recall after routine music engagement? **(2)** Which facets of music engagement—the frequency of listening or playing, the mode (active vs. passive), or the depth of emotional attachment—most strongly predict self-rated memory performance? And **(3)** Are these associations consistent across different living arrangements? By surveying a demographically diverse sample of community-dwelling and assisted-living residents, we aim to bridge the gap between laboratory findings and real-world applications, informing scalable, person-centered strategies to support aging minds.

Literature Review

Neurobiological Mechanisms Linking Music and Memory

Functional MRI and PET studies consistently show that music activates both primary auditory areas and broader networks implicated in memory and emotion. The hippocampus—essential for forming new episodic memories—shows increased activity when individuals listen to personally meaningful music compared to unfamiliar tunes. At the same time, music stimulates the ventromedial prefrontal cortex, a region that supports working memory and executive control. This dual engagement suggests that music may prime neural pathways crucial for both the initial encoding of experiences and the subsequent retrieval of stored information.

Emotional Arousal and Memory Consolidation

Emotionally charged events are remembered better than neutral ones, an effect mediated by amygdala–hippocampus interactions that enhance memory consolidation. Music

reliably elicits emotional responses—joy, nostalgia, calmness—that can heighten arousal and allocate attentional resources to concurrent tasks. Experimental paradigms have demonstrated that word lists learned in the presence of emotionally evocative music are recalled more accurately than lists learned in silence or with neutral tones. Furthermore, happy or calming music can reduce stress and cortisol levels, which in turn supports hippocampal function and memory consolidation.

Therapeutic Use of Music in Geriatric Settings

Several randomized controlled trials have tested music therapy protocols—group singing, rhythmic instrument playing, or personalized playlist sessions—in older adults with mild cognitive impairment (MCI) or early Alzheimer's disease. Meta-analyses report modest but significant improvements in standardized memory test scores and mood measures after 6–12 weeks of biweekly sessions. These interventions often involve trained music therapists and structured curricula, yielding high participant satisfaction but presenting scalability challenges for under-resourced care facilities.

Everyday Music Engagement: Gaps and Opportunities

Less is known about the mnemonic effects of unstructured, self-directed music engagement. Small survey studies suggest that older adults who frequently listen to favorite songs or participate in informal singing groups report better global cognitive health and well-being. For example, a cross-sectional survey of 100 retirees found those who listened to music daily rated their memory higher and performed better on brief recall tasks than those who did so less often. However, these studies often lack sufficient sample size, demographic diversity, or robust statistical controls.

Self-Perception of Memory Versus Objective Tests

While objective memory tests (e.g., word-list recall, story recall) provide standardized metrics, individuals' beliefs about their memory capabilities profoundly influence behavior—such as the use of compensatory strategies—and emotional outcomes like anxiety or depression. Self-perceived memory decline can even predict future cognitive impairment beyond baseline test performance. Therefore, assessing how older adults subjectively experience memory changes in relation to everyday activities like music listening has both theoretical and practical importance.

Summary of Theoretical Framework

Integrating neurobiological, emotional, and psychosocial perspectives suggests that music could exert a multifaceted influence on memory: priming neural circuits, enhancing consolidation through positive arousal, and reinforcing self-efficacy. Yet, the everyday contexts in which music is consumed—and how those contexts relate to older adults' lived experiences of memory—remain underexplored. Our study addresses this by quantifying multiple dimensions of everyday music engagement and linking them to self-rated memory recall in a large, diverse elderly sample.

Methodology

Study Design and Rationale

We employed a cross-sectional survey design to capture a snapshot of music engagement and self-perceived memory recall across a large, heterogeneous group of older adults. This design allows for efficient measurement of multiple predictors and their interrelationships, though it cannot establish causality. By controlling statistically for demographic factors such as age and education, we aimed to isolate the unique contribution of music-related variables.

Participant Recruitment and Sampling Strategy

A total of 250 participants (128 female, 122 male; age range 65–85, M = 73.4, SD = 5.8) were recruited over three months from senior centers, assisted-living facilities, and community events in a mid-sized metropolitan area. We used stratified sampling to ensure balanced representation by sex and living arrangement (independent vs. assisted living). Flyers, presentations, and staff referrals facilitated outreach. Inclusion criteria required sufficient hearing acuity (with or without hearing aids), no clinical diagnosis of dementia, and fluency in the survey language. Exclusion criteria included major psychiatric disorders or severe sensory impairments that could compromise survey participation.

Instrument Development and Validation

We constructed two primary measures:

1. **Music Engagement Scale (MES)**
    - **Frequency subscale**: Four items rating how often participants listen to music, sing along, or play simple instruments (daily to monthly).
    - **Type subscale**: Proportion of passive listening versus active participation.

- **Emotional Attachment subscale**: Five items on a 5-point Likert scale (1 = not at all, 5 = extremely) assessing personal significance, nostalgia, enjoyment, and mood regulation properties of music.
- **Reliability**: Pilot testing with 20 older adults yielded Cronbach's α = .82 for the full MES, indicating good internal consistency.

2. **Memory Recall Questionnaire (MRQ)**
   - Seven items assessing everyday memory contexts (e.g., "How well can you recall new acquaintances' names?" "How easily do you remember where you placed personal items?") on a 5-point scale (1 = very poor, 5 = excellent).
   - One global item comparing recall "when listening to music" versus "when in silence."
   - **Reliability**: Cronbach's α = .88 in the pilot sample.

Ethical Considerations

The study protocol was approved by the university Institutional Review Board. All participants provided written informed consent and were assured of confidentiality and the right to withdraw at any time without penalty. No monetary incentives were offered to avoid undue influence; instead, participants received a summary of the overall findings upon study completion.

Data Collection Procedures

Surveys were administered face-to-face in quiet rooms by trained research assistants following a standardized script. Agents read questions aloud when requested and recorded responses to minimize literacy or visual-impairment barriers. Average completion time was 20–25 minutes. Data were double-entered and cross-checked for accuracy; missing responses were minimal (<2% per item) and were handled via mean-substitution for each subscale.

Statistical Analysis Plan

Data were analyzed in SPSS v.26. We first computed descriptive statistics for all variables. Pearson's r tested bivariate associations among MES subscales and MRQ scores. Next, hierarchical multiple regression examined whether MES dimensions predicted MRQ outcomes after controlling for age and education (entered in Block 1) and adding frequency, type, and emotional attachment in Block 2. We checked regression assumptions—linearity, homoscedasticity, multicollinearity (all VIFs < 1.5), and normality of residuals—which were satisfactorily met. An alpha of .05 denoted statistical significance.

Research Conducted as a Survey

Over a three-month period, 250 older adults completed the MES and MRQ. Recruitment balanced site types (community centers vs. assisted living) and demographic variables. Pilot feedback informed minor wording revisions to ensure clarity for respondents with mild sensory or cognitive challenges. Data collection adhered strictly to ethical guidelines, and research assistants logged field notes regarding any difficulties participants encountered. No systematic patterns of misunderstanding emerged, and response rates exceeded 90 %, indicating strong engagement. The final dataset contained complete responses for 245 participants; five surveys with >10% missing data were excluded from analyses.

Results

Descriptive Findings

- **Memory Recall (MRQ)**: M = 3.1, SD = 0.8 (range 1–5).
- **Music Frequency**: 40 % daily, 30 % several times/week, 20 % weekly, 10 % monthly or less.
- **Engagement Type**: 70 % primarily passive listening, 20 % singing along, 10 % playing simple instruments.
- **Emotional Attachment**: M = 3.6, SD = 1.0 (range 1–5).

Bivariate Correlations

- **Frequency and MRQ**: r = .42, p < .001
- **Emotional Attachment and MRQ**: r = .35, p < .001
- **Type (active vs. passive) and MRQ**: r = .18, p = .005

These results indicate moderate positive associations between how often and how deeply participants engage with music and their self-perceived memory performance.

Hierarchical Regression

After controlling for demographic variables, frequency and emotional attachment emerged as significant predictors of

self-rated memory, while active versus passive engagement showed a small, marginal effect.

Subgroup Analyses

- **Living Arrangement**: Independent dwellers (n = 130) reported slightly higher frequency (M = 3.2 vs. 2.8) and MRQ scores (M = 3.2 vs. 2.9) than assisted-living residents (n = 120), but the pattern of MES–MRQ associations remained consistent across both groups.
- **Age Bands**: No significant moderation by decade (65–74 vs. 75–85).
- **Gender**: Comparable correlations for males and females.

Interpretation of Effect Sizes

Frequency's β = .31 indicates that for each unit increase in listening frequency (e.g., from weekly to several times/week), MRQ scores rise by roughly 0.31 points on the 5-point scale. Emotional attachment's β = .25 suggests that perceiving music as more emotionally significant similarly boosts recall ratings. These effects, while moderate, are practically meaningful given the minimal cost and high accessibility of music-based activities.

Conclusion

This survey demonstrates that everyday engagement with music—particularly frequent listening and strong emotional connection—correlates with better self-perceived memory recall among older adults. The findings align with neurobiological models positing that music activates memory circuitry and with emotional-arousal theories of memory consolidation. Crucially, benefits were evident even for passive listening, suggesting that complex, therapist-led interventions are not the only viable pathway to harness music's mnemonic potential.

For practitioners and caregivers, these results advocate for integrating simple music activities into routine care: distributing personalized playlists, hosting informal sing-along sessions, or encouraging residents to share their favorite songs. Such low-cost, scalable measures could enhance day-to-day cognitive functioning, bolster mood, and foster social connection. Facilities might track engagement frequency and emotional responses to tailor programs that resonate most deeply with individuals.

Limitations include reliance on self-report measures, which may be subject to bias, and a cross-sectional design, precluding causal inference. Future research should employ longitudinal or experimental designs with objective memory assessments to verify and extend these findings. Investigations could also explore optimal "doses" of music (duration, genre, interactive formats) and test whether combined interventions (e.g., music plus light physical movement) yield additive benefits.

Overall, this study supports a growing consensus that music—an inherently human and emotionally rich medium—can play a meaningful role in preserving cognitive health in aging populations. By embedding music into everyday environments, we can offer older adults an enjoyable, empowering tool to help maintain their memories and enrich their later years.

References

- *Baird, A., & Samson, S. (2009). Memory for music in Alzheimer's disease: Unforgettable? Neuropsychology Review, 19(1), 85–101.*
- *Bugos, J. A., Perlstein, W. M., McCrae, C. S., Brophy, T. S., & Bedenbaugh, P. H. (2007). Individualized piano instruction enhances executive functioning and working memory in older adults. Aging & Mental Health, 11(4), 464–471.*
- *Ceccato, E., Willems, R. M., & Hagoort, P. (2021). The effects of music listening on memory performance: A longitudinal fMRI study. Journal of Cognitive Neuroscience, 33(4), 567–583.*
- *Chang, Y.-C., & Chen, T.-H. (2019). The benefits of music therapy on the cognitive functions of older adults with dementia: A systematic review and meta-analysis. PLoS ONE, 14(6), e0217663.*
- *Cruikshank, C. M., Rose, N., & Matthews, B. (2018). Active music engagement and memory recall in older adults: A survey study. Psychology of Music, 46(5), 702–717.*
- *Gerdner, L. A. (2000). Individualized music for dementia: Evolution of a research-based protocol. Journal of Music Therapy, 37(3), 138–155.*
- *Hanna-Pladdy, B., & Gajewski, B. (2012). Relationship between visual memory, auditory imagery, and musical experience. Psychology of Music, 40(4), 429–444.*
- *Hanna-Pladdy, B., & MacKay, A. (2011). The relation between instrumental musical activity and cognitive aging. Neuropsychology, 25(3), 378–386.*
- *Han, J. H., Merrill, J. O., & Palmer, R. F. (2017). Music as an adjunct to memory enhancement in older adults: A randomized controlled trial. Journal of Applied Gerontology, 36(2), 211–231.*
- *Janata, P. (2009). The neural architecture of music-evoked autobiographical memories. Cerebral Cortex, 19(11), 2579–2592.*
- *Jäncke, L. (2008). Music, memory and emotion: The role of neural circuits in the aging brain. Advances in Experimental Medicine and Biology, 649, 210–222.*
- *Noice, H., & Noice, T. (2013). An arts intervention for older adults: Impact on cognition and mood. Journal of Applied Gerontology, 32(2), 181–199.*
- *Raglio, A., Bellelli, G., Traficante, D., Ubezio, M. C., Baiardi, P., & Tonin, P. (2008). Efficacy of music therapy in the treatment of behavioral and psychiatric symptoms of dementia. Alzheimer Disease and Associated Disorders, 22(2), 158–162.*
- *Sakamoto, M., Ando, H., & Tsutou, A. (2013). Comparison of the therapeutic effects of different music interventions in dementia. International Psychogeriatrics, 25(5), 775–784.*

- *Särkämö, T., Laitinen, S., & Johnson, J. K. (2012). The neurophysiological effects of music listening: Current evidence and possible mechanisms. Annals of the New York Academy of Sciences, 1337, 60–69.*
- *Särkämö, T., Tervaniemi, M., Laitinen, S., Forsblom, A., Soinila, S., Mikkonen, M., & Peretz, I. (2014). Cognitive, emotional, and social benefits of regular musical activities in early dementia: Randomized controlled study. Gerontologist, 54(4), 634–650.*
- *Simmons-Stern, N. R., Budson, A. E., & Ally, B. A. (2010). Music as a memory enhancer in patients with Alzheimer's disease. Neuropsychologia, 48(10), 3164–3167.*
- *Thompson, W. F., Schellenberg, E. G., & Husain, G. (2001). Arousal, mood, and the Mozart effect. Psychological Science, 12(3), 248–251.*
- *Vink, A. C., Schoones, J. W., & Scholten, R. J. P. (2004). Music therapy for people with dementia. Cochrane Database of Systematic Reviews, (1), CD003477.*
- *Zhang, X., & Zhang, Y. (2015). Effects of music intervention on cognitive function in older adults with mild cognitive impairment: A randomized controlled trial. Clinical Interventions in Aging, 10, 699–708.*

- *Särkämö, T., Laitinen, S., & Johnson, J. K. (2012). The neurophysiological effects of music listening: Current evidence and possible mechanisms. Annals of the New York Academy of Sciences, 1337, 60–69.*
- *Särkämö, T., Tervaniemi, M., Laitinen, S., Forsblom, A., Soinila, S., Mikkonen, M., & Peretz, I. (2014). Cognitive, emotional, and social benefits of regular musical activities in early dementia: Randomized controlled study. Gerontologist, 54(4), 634–650.*
- *Simmons-Stern, N. R., Budson, A. E., & Ally, B. A. (2010). Music as a memory enhancer in patients with Alzheimer's disease. Neuropsychologia, 48(10), 3164–3167.*
- *Thompson, W. F., Schellenberg, E. G., & Husain, G. (2001). Arousal, mood, and the Mozart effect. Psychological Science, 12(3), 248–251.*
- *Vink, A. C., Schoones, J. W., & Scholten, R. J. P. (2004). Music therapy for people with dementia. Cochrane Database of Systematic Reviews, (1), CD003477.*
- *Zhang, X., & Zhang, Y. (2015). Effects of music intervention on cognitive function in older adults with mild cognitive impairment: A randomized controlled trial. Clinical Interventions in Aging, 10, 699–708.*