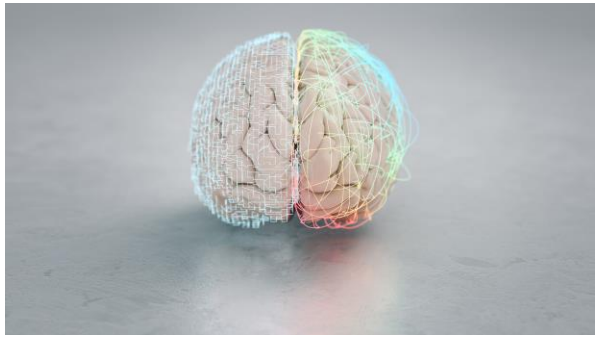
Music and Dementia

Ann Braus, MD

Clinical Associate Professor

UW School of Medicine and Public Health, Division of Geriatrics

Medical Director, Capitol Lakes Health Center



My background/interest in this topic

- Geriatrics
- Clinic, hospital and nursing home work
- MANY patients with dementia
- Many patients with neuropsychiatric symptoms of dementia and significant behavioral challenges

A case with music and memory…

https://www.youtube.com/watch?v=G7vkKHYosuQ

Outline

1. What is dementia and how does it affect us?

2. How does music affect the brain?

3. What evidence is there for music as a therapy in dementia?

1. What is dementia and how does it affect us?

“Dementia” is…

A decline in mental function - including memory, thinking, and reasoning - severe enough to impair daily life activities

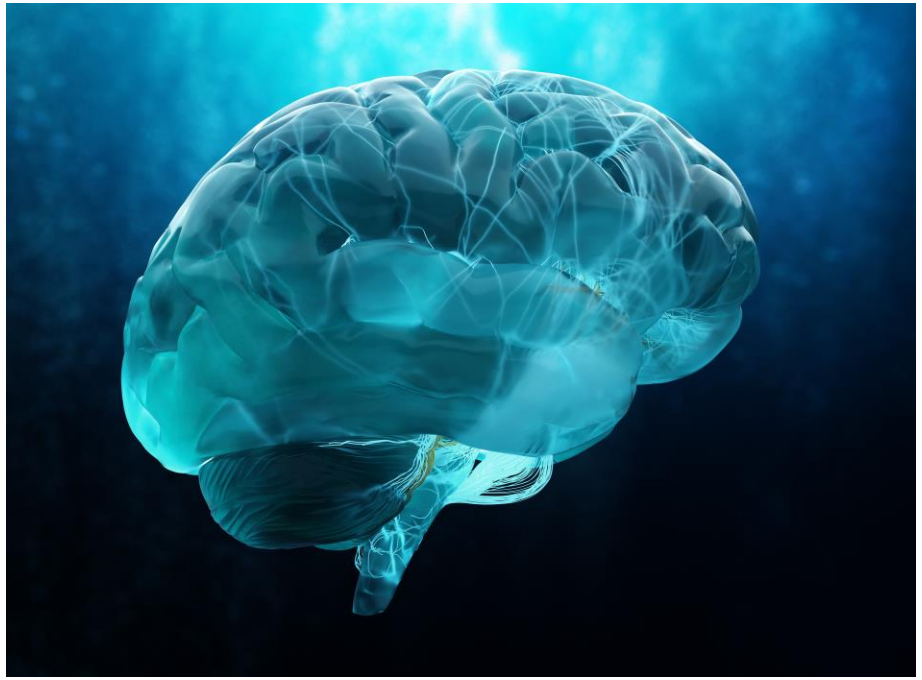
Many things can cause dementia!

- Strokes
- Brain tumors
- Parkinson’s disease
- Vitamin deficiencies
- Long-term heavy alcohol use
- Alzheimer’s disease (AD) or other neurodegenerative disorders

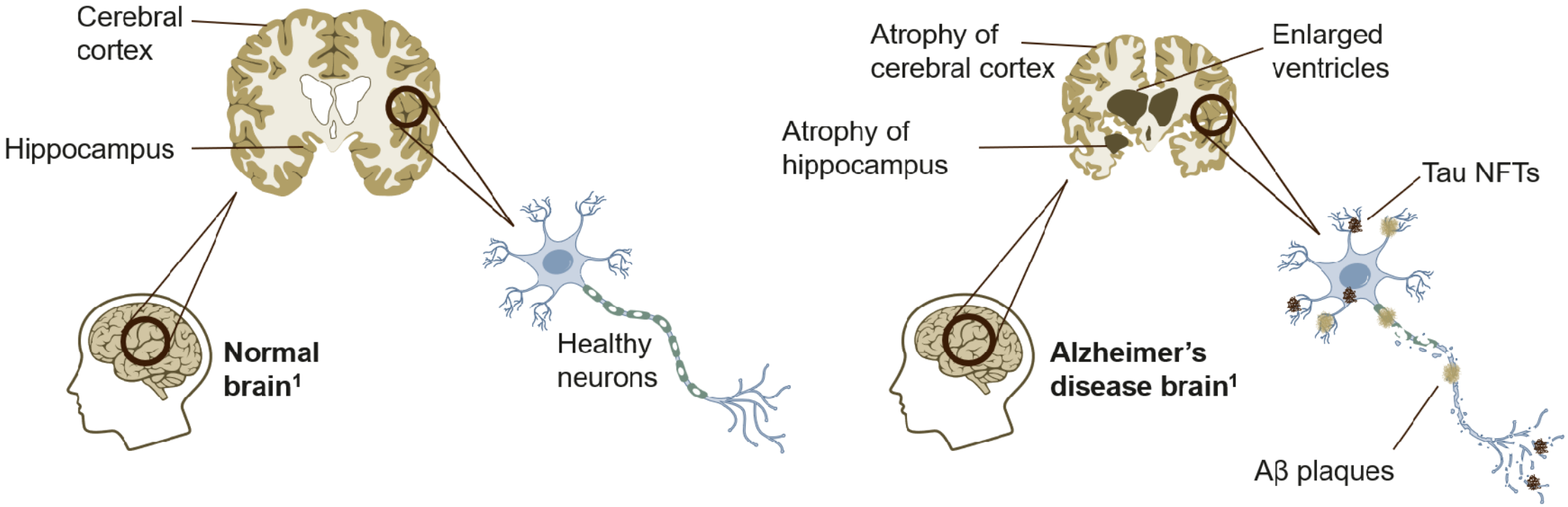
What is Alzheimer's Disease (AD)?

- Most common of the neurodegenerative disorders
- Affects 2.1 million (36%) 85 years of age and older
- Caused by aging, genetics and environment
- Accumulation of irregular proteins in the brain
  → death of brain cells and connections between brain cells (synapses)

  → Irreversible and progressive decline in cognition
- Leads to:
  - Memory loss
  - Gradual loss of ability to perform daily activities
  - Changes in behavior and emotions
  - Physical decline and death in late stage

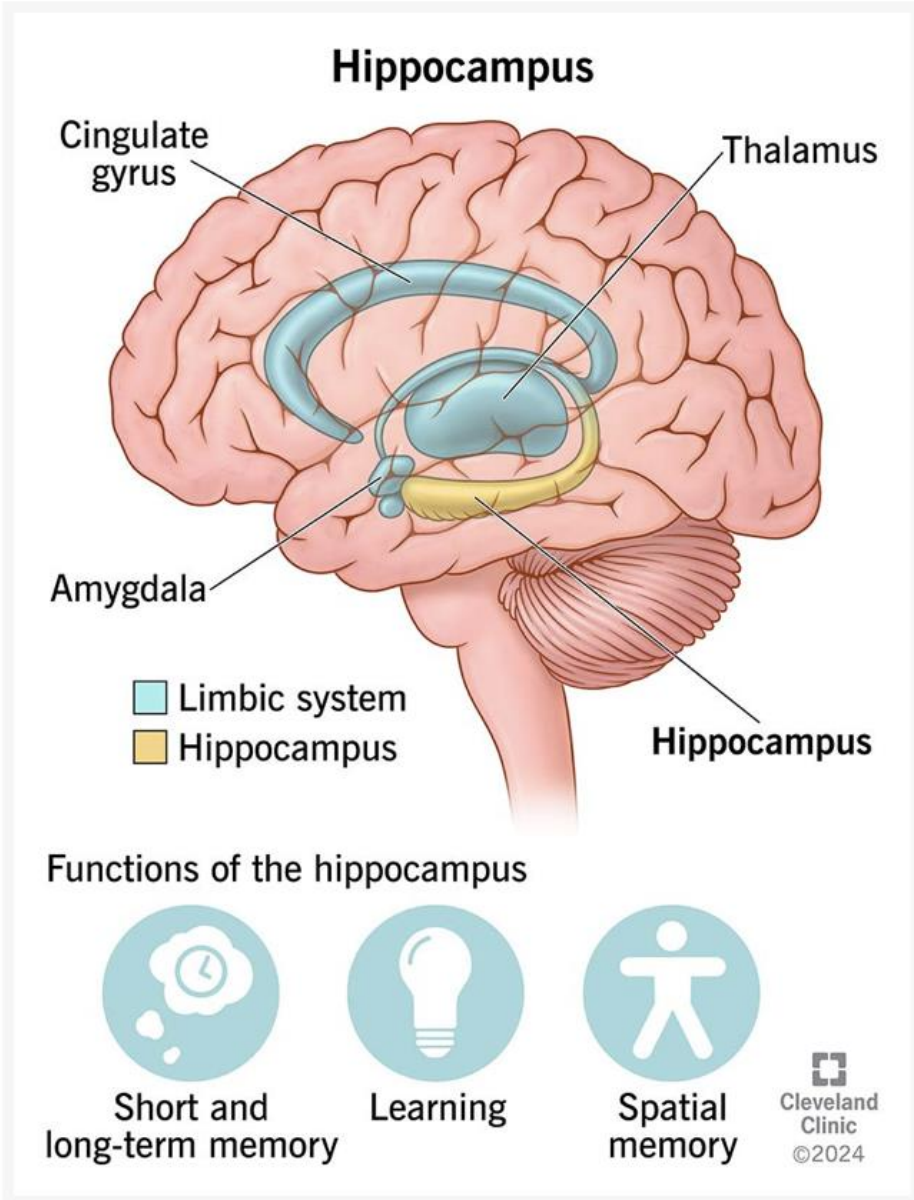


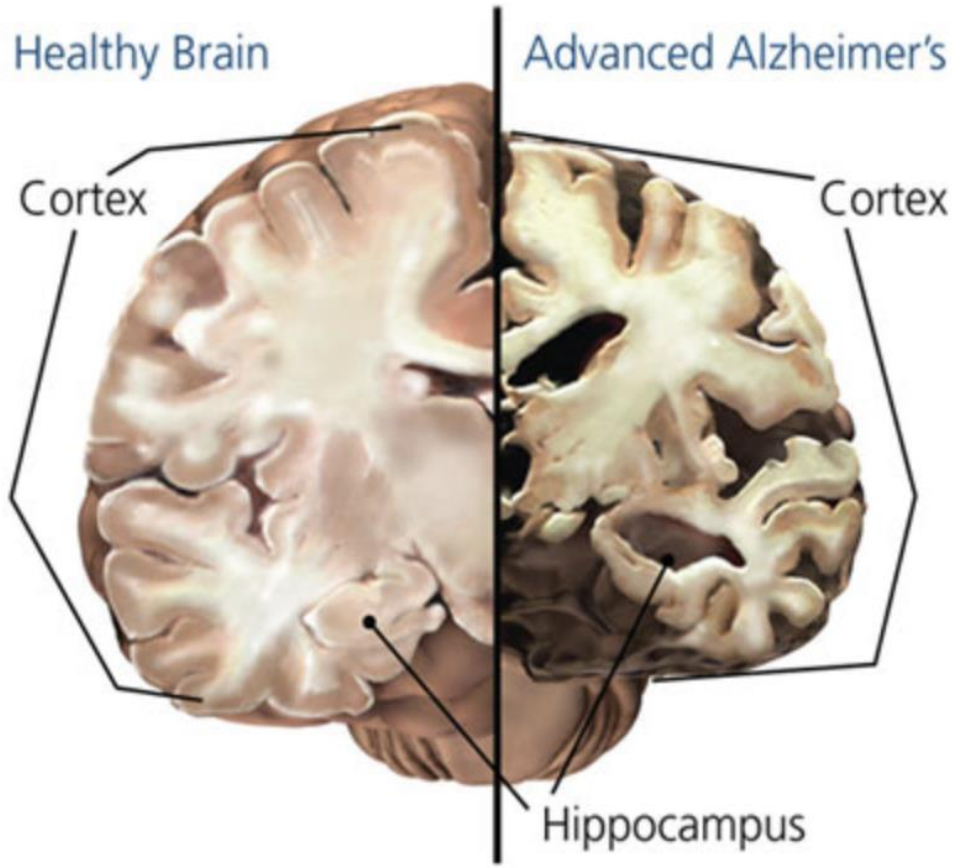
Typical brain vs brain affected by Alzheimer's



Aβ=amyloid-β; NFT=neurofibrillary tangle

neurotorium


Hippocampus
Cingulate gyrus
Thalamus
Amygdala
Limbic system
Hippocampus
Hippocampus
Functions of the hippocampus
Short and long-term memory
Learning
Spatial memory
Cleveland Clinic
©2024



As Alzheimer's disease progresses, it kills brain cells mainly in the hippocampus and cortex, which leads to impairments in learning, memory, and thinking.

People with dementia often develop behavioral complications

Neuropsychiatric symptoms of dementia

Delusions
Hallucinations
Depression
Anxiety
Euphoria
Aggression
Apathy
Irritability
Disinhibition
Wandering or pacing
Sleep disturbances

How do we manage behavioral agitation in dementia?

Medication (pharmacologic tactics) ☹

- Sedating meds like quetiapine, haloperidol, olanzapine, risperidone, lorazepam
- Risks include oversedation, increased confusion, falls, aspiration, death
- Try to reserve this only for dangerous agitation

Non-pharmacologic tactics ☺

(much preferred and more effective)

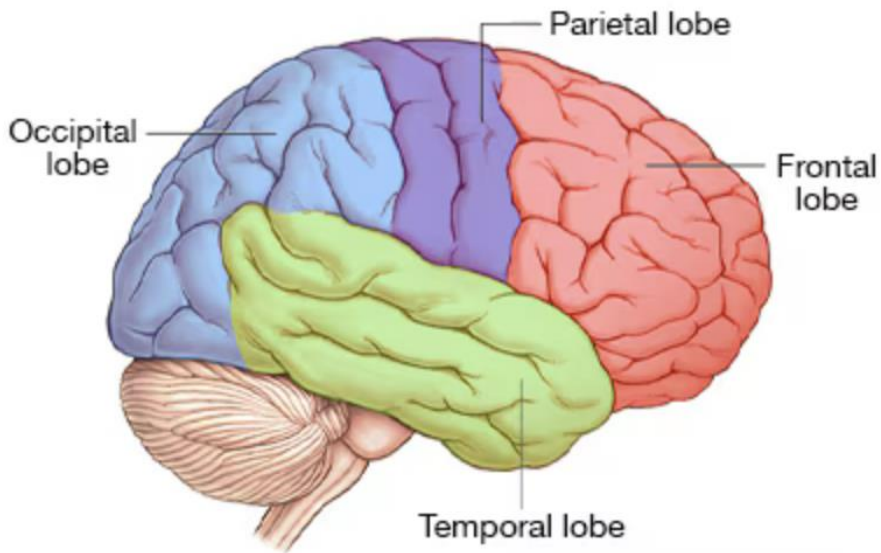
- Identify and address unmet needs (pain, bathroom, hungry, thirsty)
- Reorientation, distraction, redirection
- Bring to familiar environment, familiar routine
- Rest/sleep
- Use glasses, hearing aids
- Natural daylight exposure
- Music!

2. How does music affect the brain?

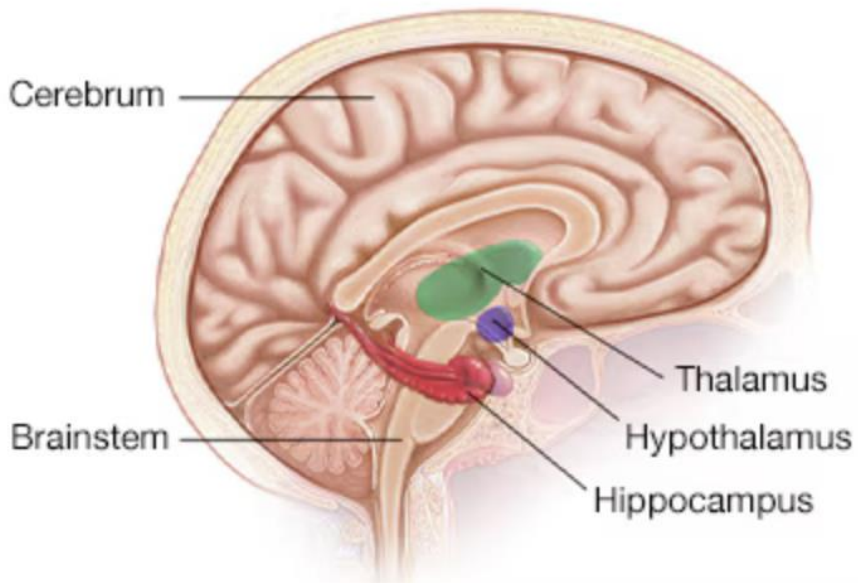
(…especially in people with dementia?)

A little neuroanatomy review first

- **The frontal lobes** help control thinking, planning, organizing, problem-solving, short-term memory and movement.
- **The parietal lobes** help interpret feeling, known as sensory information. The lobes process taste, texture and temperature.
- **The occipital lobes** process images from your eyes and connect them to the images stored in your memory. This allows you to recognize images.
- **The temporal lobes** help process information from your senses of smell, taste and sound. They also play a role in memory storage.



- **The thalamus** acts as a gatekeeper for messages passed between the spinal cord and the cerebrum.
- **The hypothalamus** controls emotions. It also regulates your body's temperature and controls functions such as eating or sleeping.
- **The hippocampus** sends memories to be stored in areas of the cerebrum. It then recalls the memories later.



- Music stimulates numerous parts of the human brain simultaneously

- We can observe human brain responses to music using fMRI imaging

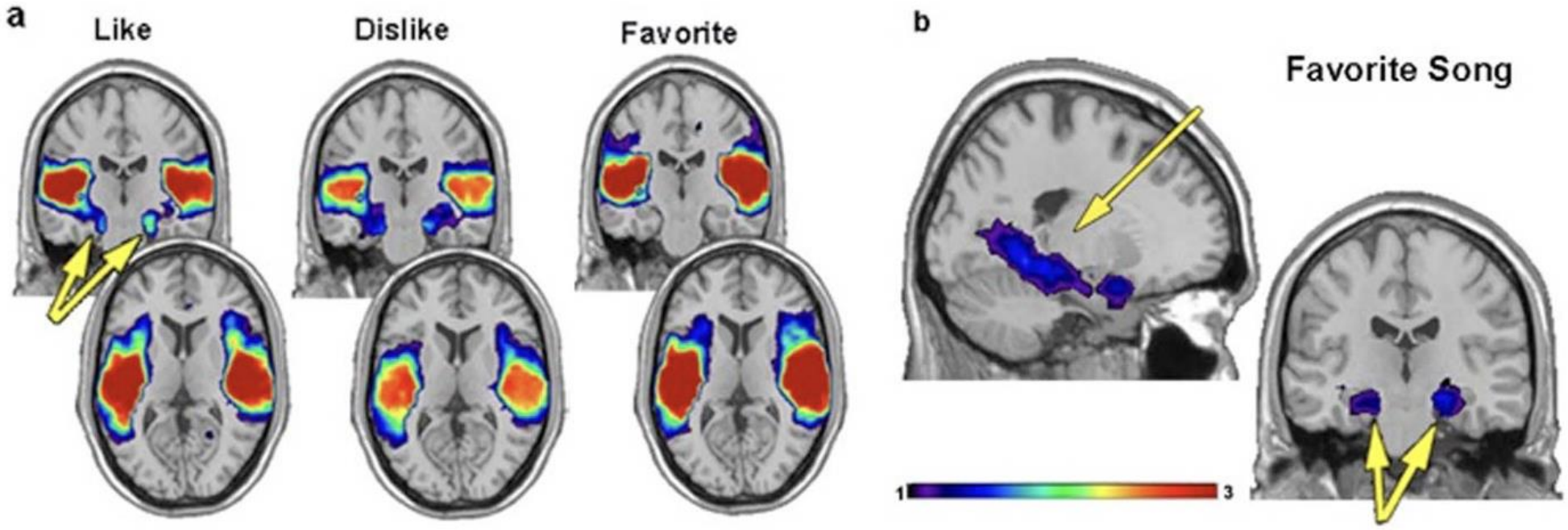
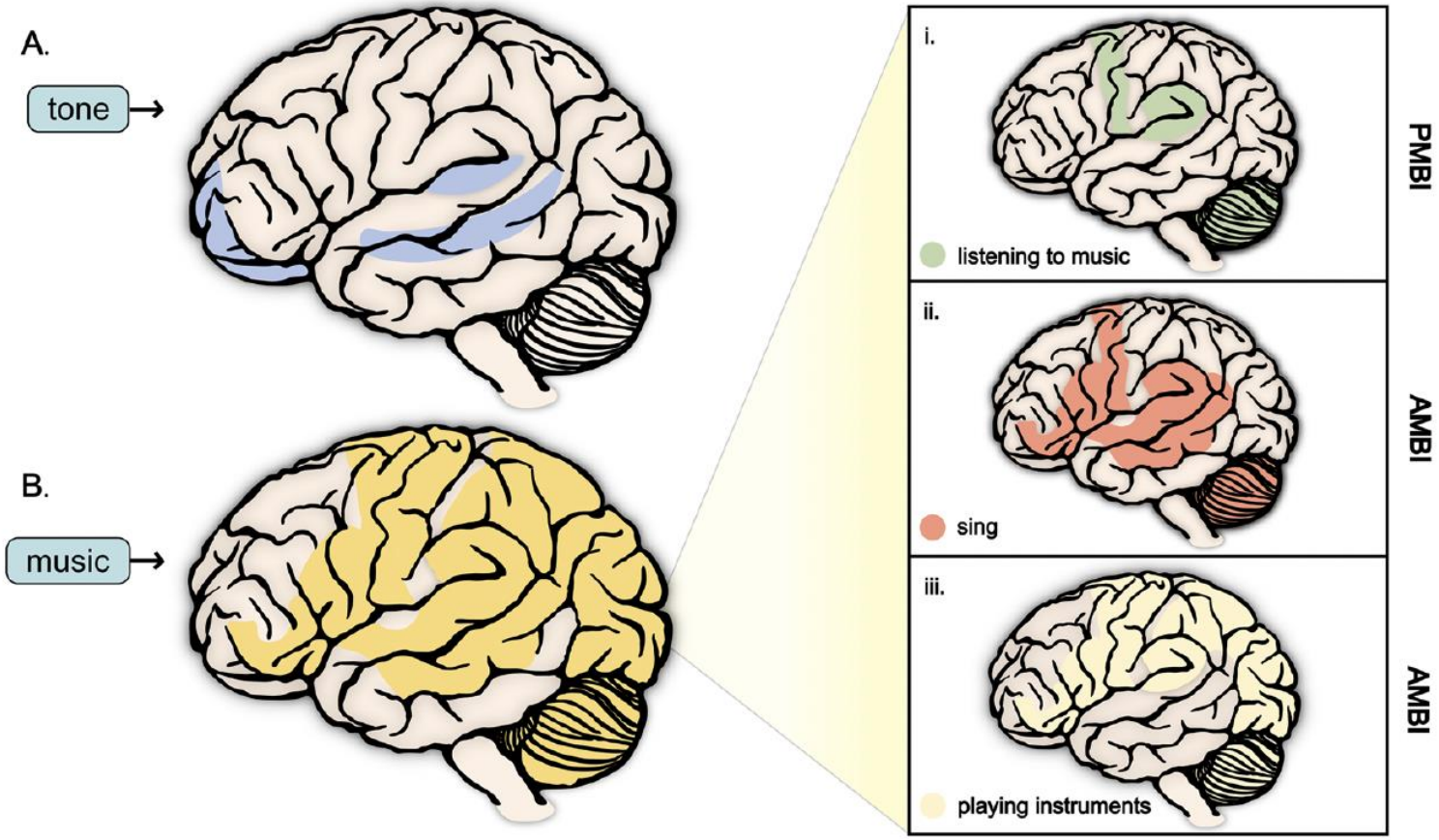


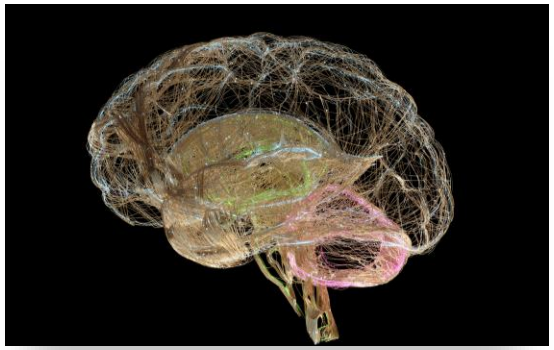
Figure 4 | Demonstration of differences in the community structure of the hippocampus and auditory cortex when listening to a favorite song. When listening to liked and disliked music, the hippocampi and auditory cortex were within the same community (a). The location of the hippocampi is indicated by the yellow arrows. When listening to a favorite song, the hippocampi were functionally separate from the auditory cortex and became an isolated community (b). Color indicates the consistency across subjects as assessed using scaled inclusivity (See Methods and Supporting Information).

Areas of brain affected by tone vs music



PMBI = passive music based intervention

AMBI = active music based intervention



Physiologic benefits of music

1. Music helps many different parts of the brain connect and communicate
   - Especially when the music is familiar or meaningful
   - Active involvement even better than just listening

2. Music enhances brain activity
   - Increases blood flow to numerous areas
   - More blood flow = more oxygen and energy to brain cells

3. Music helps regulate the brain
   - Stress hormones (↓ cortisol)
   - Mood chemicals (dopamine, serotonin)

These physiologic effects can have short-term and long-term benefits in dementia

3. What evidence is there for music therapy in dementia?

Original Study

The Impact of Music and Memory on Resident Level Outcomes in California Nursing Homes

- 3 yr study. Followed >4,100 residents in 365 nursing homes in CA

- Study intervention: Music and Memory program participation. Provided iPod and earphones with personalized music playlists

- <u>Outcomes:</u>
  - Antipsychotic meds reduced 11%
  - Antianxiety meds reduced 13%
  - Antidepressant use reduced 9%
  - Aggressive behaviors reduced 20%
  - Depressive symptoms reduced 16%
  - Pain expression reduced 17%
  - Falls reduced 8%

Musical Bridges to Memory

A Pilot Dyadic Music Intervention to Improve Social Engagement in Dementia

- 12 week study. Followed 28 people with dementia (with AD, TBI, brain tumor) and their caregivers

- Study intervention: Music therapists conducted assessment of musical preferences, caregiver communication training, live music concerts and small group breakout sessions

- <u>Outcomes:</u>
  - Nonverbal social interactions significantly improved among the people with dementia
  - Caregivers had significantly less distress related to neuropsychiatric symptoms of their loved ones

Conclusions

- We know from our own experience that music feels good
- Science is illuminating the physiologic benefits of music on the brain, and how we can use it to benefit people with dementia
- Active participation in music is even better than passive listening
- We should include music as therapy! Low risk, potentially high yield

Looking forward to your questions/comments at end of session!

References

- Bakerjian D, et al. *J Am Med Dir Assoc*. 2020;21:1045-1050.
- Press D. *UpToDate*. 2026.
- Schafer R, et al. *Alzheimers Dis Assoc Disord*. 2022;36:312-318.
- Sun L, et al. *Ageing Res Rev*. 2024;96:102265.
- Thaut MH, et al. *Alzheimers Dis Assoc Disord*. 2020;34:267-271.
- van der Steen JT, et al. *Cochrane Database Syst Rev*. 2025;3:CD003477.
- Wilkins R, et al. *Sci Rep*. 2014;4:6130.
- NPR. Music and Alzheimer's. 2023.
- https://www.mayoclinic.org/diseases-conditions/epilepsy/in-depth/brain/art-20546821

- Thaut et all, Neural basis of long term musical memory
- Why is long-term musical memory lreatively preserved among cognitively impaired older persons?
- Exposure to long-known music preferentially activated particular brain regions relative to recently-heard music (prefrontal, emotional, motor, auditory and subcortical regions). These areas are involved in autobiographical memory and associated emotional responses. In addition, these areas are minimally affected by early stage AD pathology and may help demonstrate why long-term musical memory is relatively preserved among cognitively impaired older persons