THE MUSICAL BRAIN

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Agenda

• Music and You
• Hearing Music
• Anatomy of the Brain
• Music and the Brain:
  • Physical
  • Cognitive
  • Emotional
• Neurological Anomalies and Music
  • Musicogenic Epilepsy
  • Earworms
  • Amusia
  • Amnesia
• Recommendations
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• Questions
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MUSIC AND YOU

Some Basics About Music
a. Music is part of every human culture, although its functions may vary

b. Music is not biologically necessary for survival, but plays a relevant role in all cultures

c. Music is sound which is not considered noise or speech

d. Musical sound is usually considered pleasant by its listeners

e. Music is usually connected to aesthetics (i.e., art, beauty)
Hearing
Music
ANATOMY OF THE BRAIN
The Brain and Music

Autonomous Nervous System
Cerebellum
Limbic System
Cerebral Cortex
Subcortical System

Hippocampus
Amygdala
Thalamus
Cerebral Cortex
Two Hemispheres
Four Lobes
Corpus Callosum
MUSIC AND THE BRAIN
The Musical Brain

a. The human brain has the ability to respond to and participate in music.

b. The musical brain operates at birth and persists throughout the lifespan.

c. Humans can recognize music in any key because of our ability to process relative pitch; animals cannot.

d. Early and ongoing musical training improves the organization of the brain.

e. The musical brain consists of extensive neural and receptor systems that are widely distributed throughout the body.

f. The musical brain is highly resilient and accessible for persons with brain damage.
The Musical Brain: Physical
Gate Theory of Pain Control
Neuron Structure

1. **Dendrites**: Receive information from other neurons and sensory receptors.
2. **Nucleus**: Provides energy for the neuron to carry out its functions.
3. **Cell body**: The cell's life support center.
4. **Axon**: Carries neuron's message to other body areas.
5. **Myelin sheath**: Covers the axon of some neurons and helps speed neural impulses.
6. **Terminal branches of axon**: Form junctions with other cells.

Neurons
- Nucleus
- Synapses
- Dendrites
- Axons
- Neurotransmitters
- Neural Receptors
Physical Responses to Music: 
The Musical Chemical Factory

Gate Theory of Pain
Endogenous Opiates
Neurotransmitters
Stress Hormones
Entrainment
The Musical Brain: Cognition

- Cognitive
Corpus Callosum
How Music Changes the Brain: Cognitive

- Corpus Callosum
- Short Term Memory-Hippocampus
- Long Term Memory
- Interhemispheric Communication
The Musical Brain: Emotion

• Emotional

- Physical
- Cognitive
- Emotional
- Spiritual-Religious
Emotion

Limbic system responses
  thalamus-relay center
  amygdala-strong emotions
  hippocampus-memory

Extramusical associations
How Music Changes the Brain

https://www.youtube.com/watch?v=R0JKCYZ8hng&t=11s
Neurological Anomalies and Music

- Musicogenic Epilepsy
- Earworms/Brainworms
- Amusia
- Amnesia (Clive Wearing)

https://www.youtube.com/watch?v=Vwigmktix2Y&t=6s
MUSICAL EXAMPLES
Breathing with Music

- Increase O2
- Decrease CO2
- Decrease Stress Hormones
- Increase Energy/Vitality
- Entrain Physiological Rates
Guided Musical Support

Improves Mood
Decreases Stress Hormones
Increases Neurochemical Production: dopamine, endorphins, and endogenous opiates
We are going, heaven knows where we are going,
We'll know we're there.
We will get there, heaven knows how we will get there,
We know we will (get there).

It will be hard we know
And the road will be muddy and rough,
But we'll get there, heaven knows how we will get there,
We know we will (get there).

Wo-ya-ya

- Improve respiratory rates
- Increased oxygen
- Lyrics facilitate feelings of hope, support, feeling better
- Decreased stress hormones
Musical Examples

• Common Threads. Sung by Bobbie McFerrin. From On a Starry Night.

• Shiny Shell Lullaby, played by Keola and Kapono Beamer, from On a Starry Night.

How to Choose Music for Brain Health

Preferred Music

Familiar Music

Pleasant Music

Positive Extramusical Associations

Music Feels Comfortable for Body, not taxing or too loud
- Faster, upbeat music for exercise/movement/crafts/housework
- Slow, sedative music for stretching / meditation/rest/prayer
References


Questions?

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