

A blue-tinted photograph of a classroom where students are engaged in physical activity. They are wearing white t-shirts and dark shorts, and many have their arms raised. The background shows classroom furniture like desks and chairs.

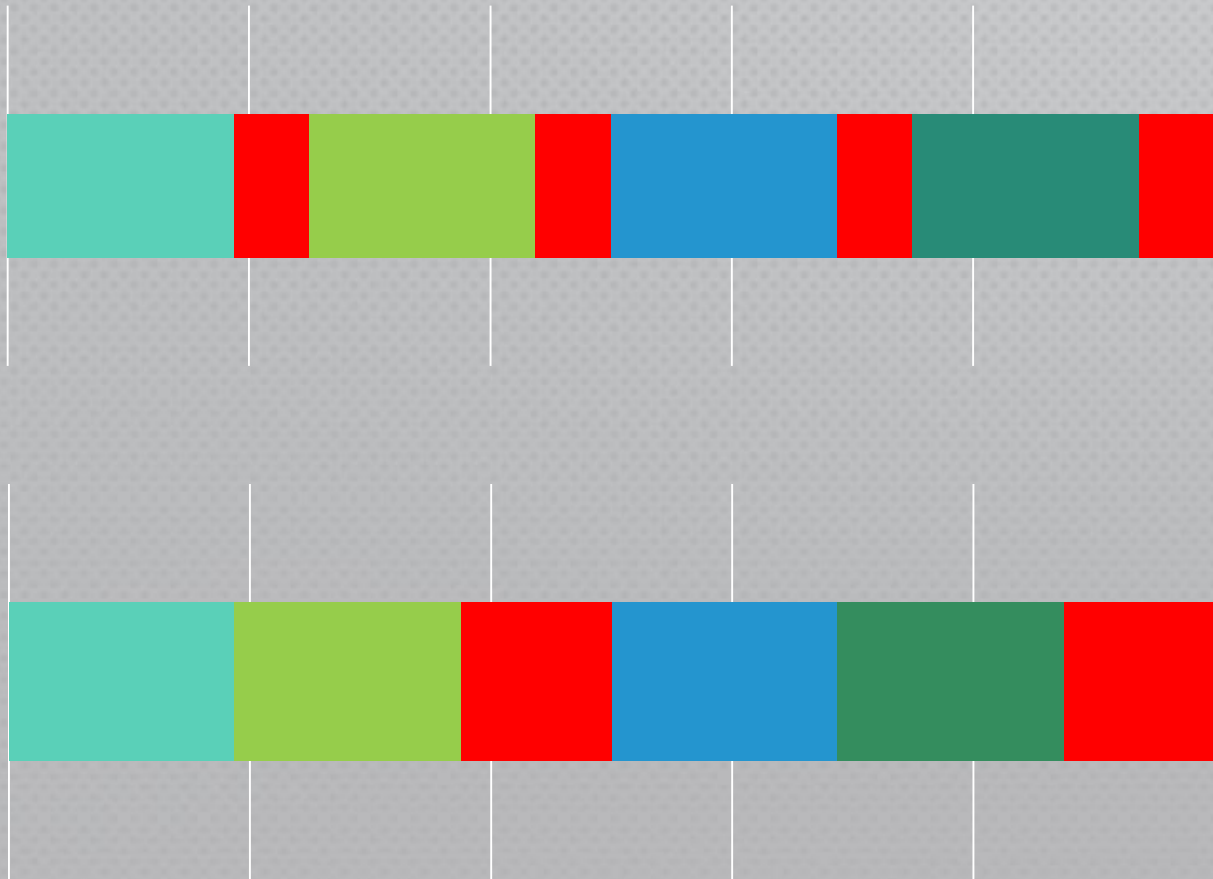
LEARNING IN MOTION

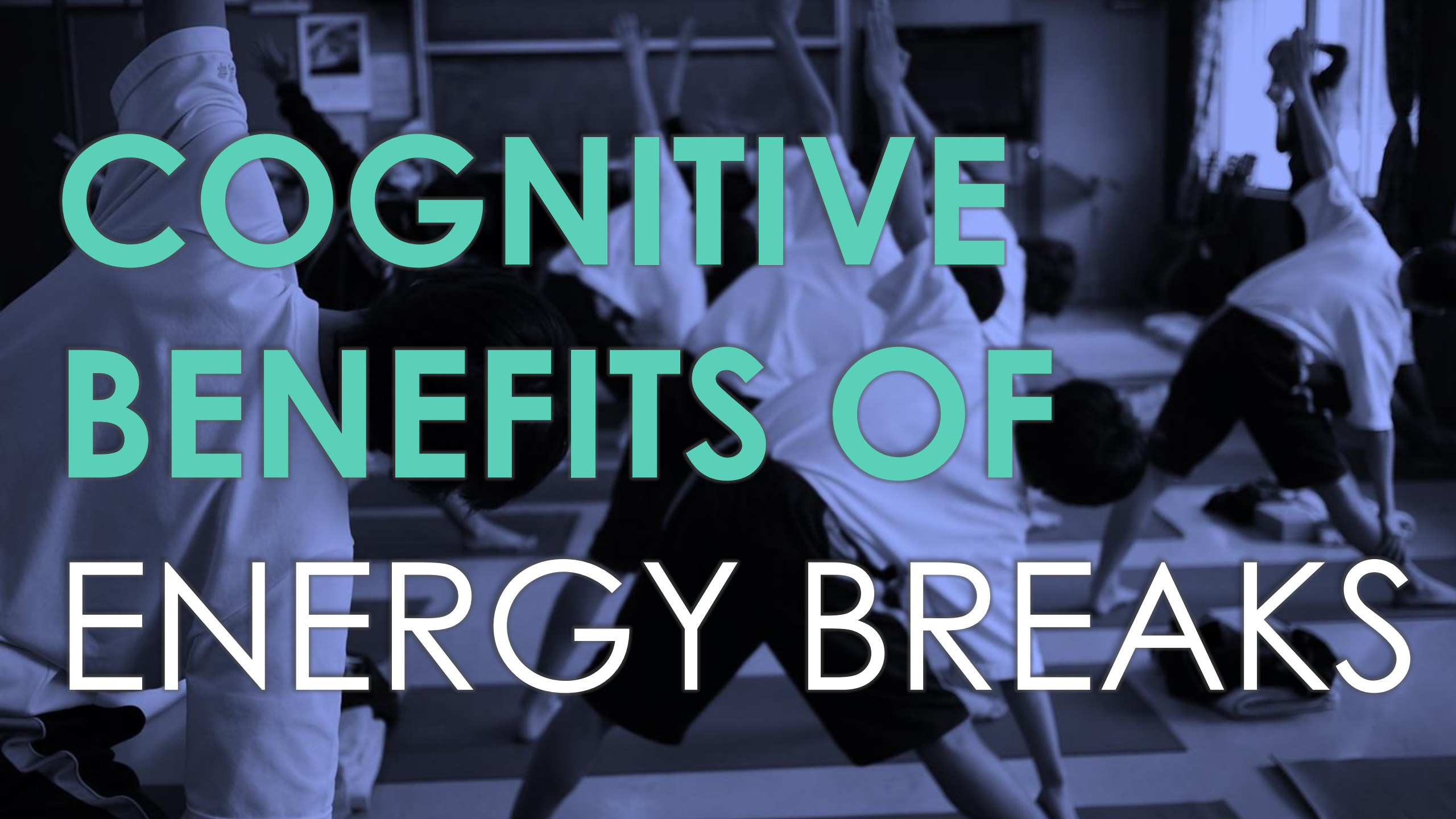
BRAIN SCIENCE AND PHYSICAL
ACTIVITY IN THE CLASSROOM

TIMOTHY WALKER

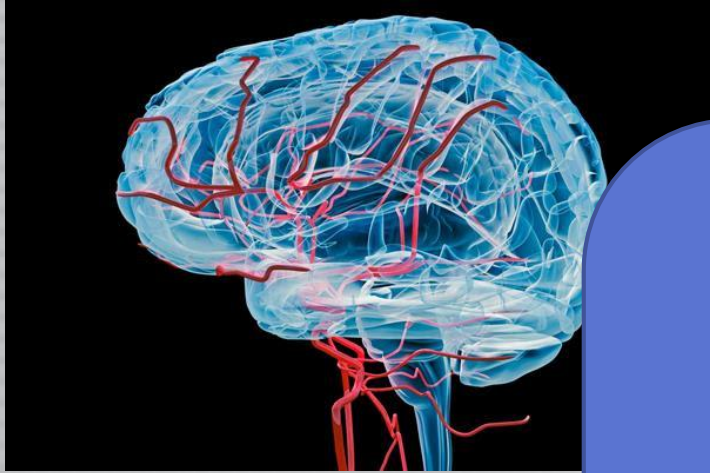
FIFTH GRADE TEACHER

Class Schedule





**COGNITIVE
BENEFITS OF
ENERGY BREAKS**



BLOOD FLOW AND BRAIN FUEL

One minute of
movement

=

15% increase in blood
flow to the brain

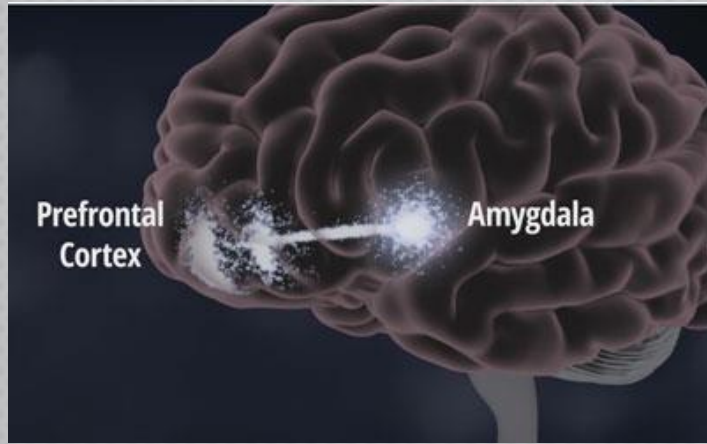
(Sousa, 2011)

When we sit for too long, the brain falls
asleep!

and oxygen,

minutes, the
body changes

hamstrings,



MEMORY FORMATION

Amygdala – emotional filter that new information passes through



Information overload, fear, or stress activate this filter, hindering the formation of new memories

Energy breaks are brain breaks – physical activity allows this filter to “reset” by changing the brain’s chemistry

ENGAGEMENT AND NEUROTRANSMITTERS

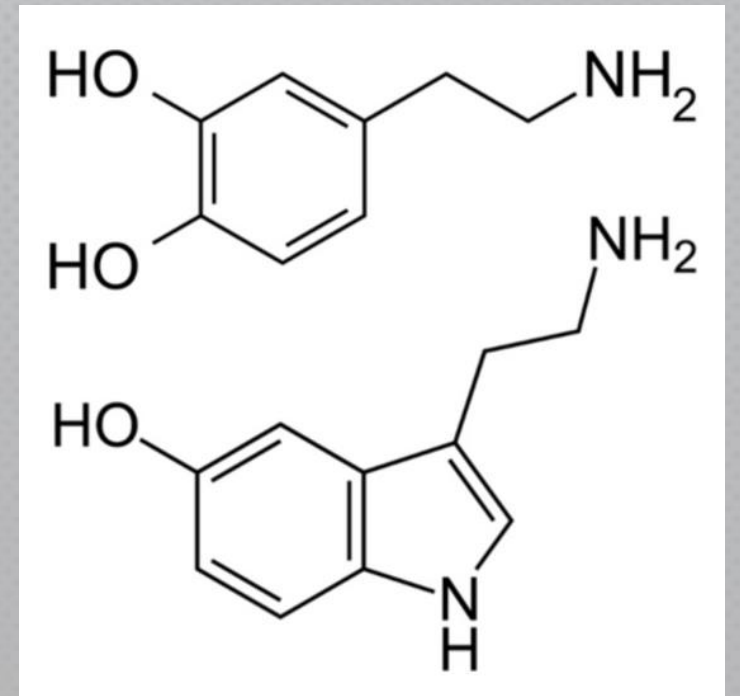
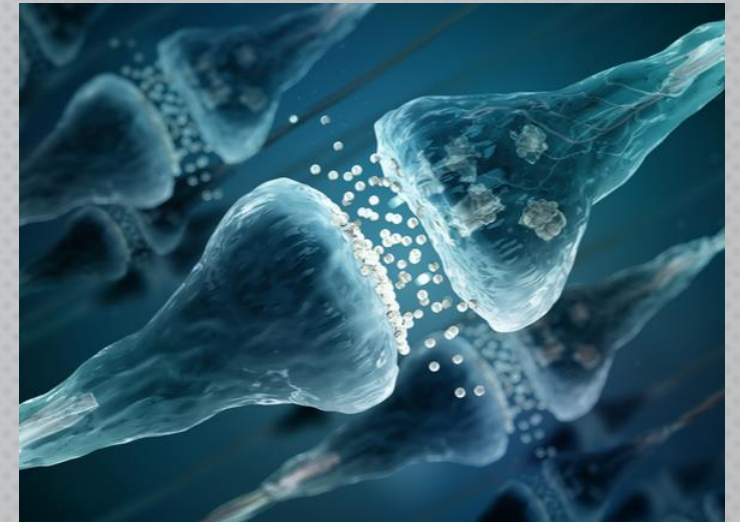
The body's chemical messengers

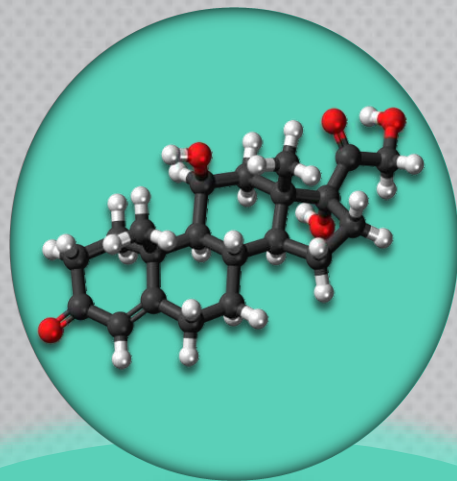
Produced both in the brain and the body

Cognitive diseases (Alzheimer's, etc.) and some learning disabilities are associated with deficits in certain neurotransmitters

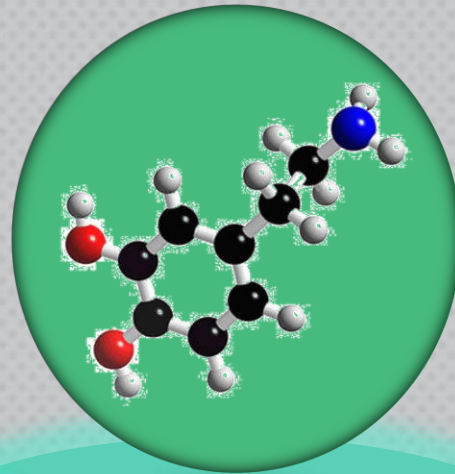
Physical activity directly influences our students' production of certain neurotransmitters

Imbalances can affect learner engagement

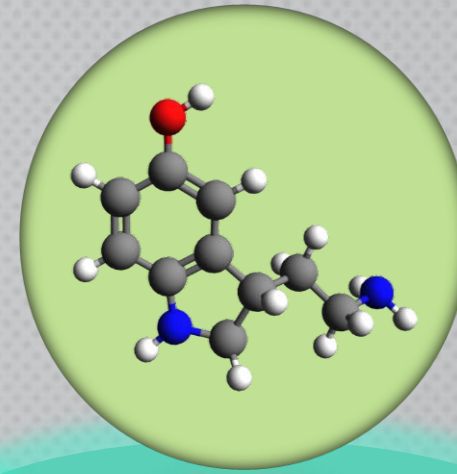




CORTISOL



DOPAMINE



SEROTONIN

Released into the brain when we are rewarded

Mood regulator
“Fight or flight” chemical
Unpredictability keeps dopamine production active
Social engagement, sense of community, smiles
Stress, social anxiety, excessive “screen time,” poor nutrition
Physical activity, praise, music, “changing it up”
Increased serotonin = attentive engagement with new
Students may begin “shutting down” as soon as class begins
Information and emotional engagement with peers
Assists in memory formation by moderating the amygdala

Physical activity directly reduces cortisol levels in the brain
Directly increased by physical activity

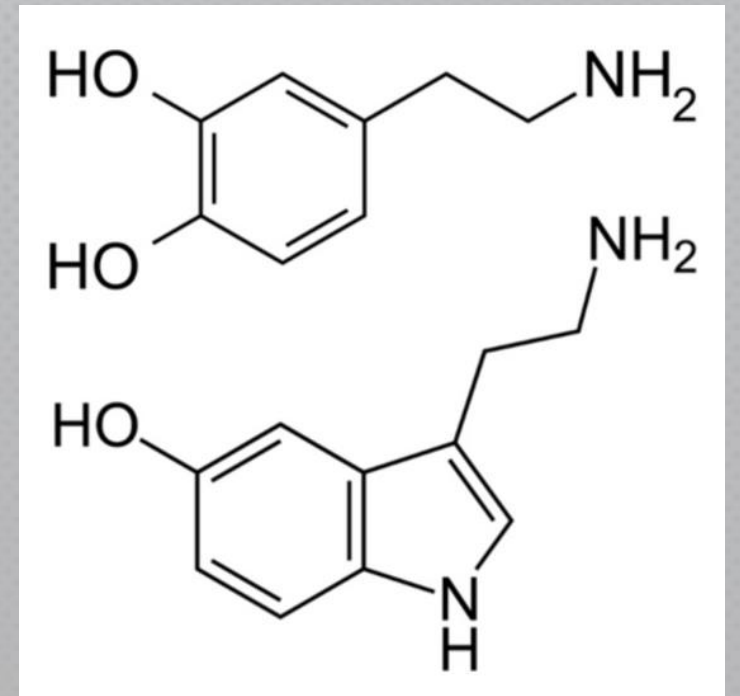
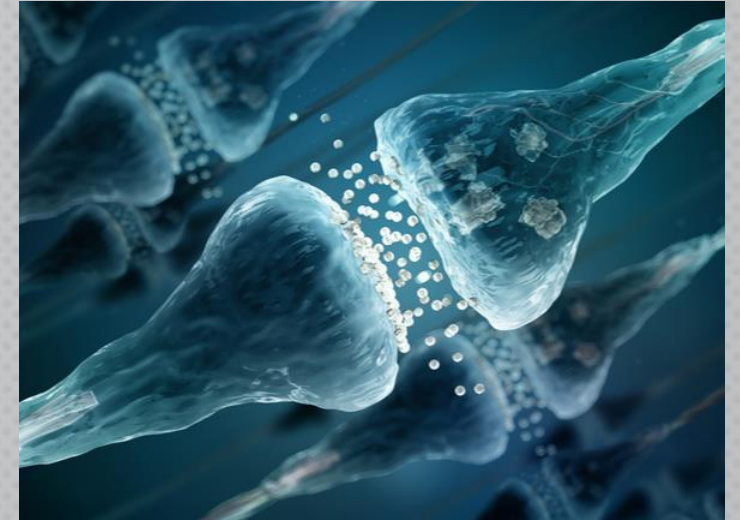
IMBALANCED RELEASE OF NEUROTRANSMITTERS

Low Dopamine = fatigue, feelings that something is “missing,” boredom

Low Serotonin = depressed mood, sadness, feelings of confusion, short attention span

High Cortisol = panic, “freezing up,” social avoidance, indecisiveness, quick temper

PHYSICAL ACTIVITY WILL IMPROVE THIS BALANCE



STUDIES ON PHYSICAL ACTIVITY IN THE CLASSROOM

Physical activity leads to better performance on tests (Castelli et al., 2007)

Physical activity combats symptoms of ADHD in younger children (Smith et al., 2013)

Regular opportunity for exercise appears to improve overall cognitive development and to enhance concentration (Sattlemair & Ratey, 2009)





ENERGY BREAKS

5-MINUTE PHYSICAL ACTIVITIES FOR ANY CLASSROOM

Power Poses

Nonverbal "Get to Know You" Games

<https://www.eltandhappiness.com/health-and-your-body.html>

Body Clocks

Walking Fluency Practice

THANK

YOU

JWALTERS@NUFS.AC.JP

Castelli, D. M., Hillman, C. H., Buck, S. M., & Erwin, H. E. (2007). Physical fitness and academic achievement in third-and fifth-grade students. *Journal of Sport and Exercise Psychology, 29*(2), 239-252.

Field, T., Hernandez-Reif, M., Diego, M., Schanberg, S., & Kuhn, C. (2005). Cortisol decreases and serotonin and dopamine increase following massage therapy. *International Journal of Neuroscience, 115*(10), 1397-1413.

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Meeusen, R., & De Meirleir, K. (1995). Exercise and brain neurotransmission. *Sports medicine, 20*(3), 160-188.

Sattelmair, J., & Ratey, J. J. (2009). Physically Active Play and Cognition: An Academic Matter?. *American journal of play, 1* (3), 365-374.

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