

Physical Activity and Cognitive Function

Tiffany Higginbotham MS, PT

Body Logic PT & Wellness

Erin Reilly, Ph.D.

Auburn University Montgomery Kinesiology

Times Have Changed

- More Kids with developmental delays, sensory processing and coordination issues
- Play behavior
- Early Education
 - Daycare / Baby equipment
 - Pre-school / Kindergarten
- Physical Education
- Nutrition / Sleep
- Parenting

Play behavior

- Kids don't play outside anymore
- Risk averse
- Playground equipment has changed
- Lack of basic motor skills
 - Skipping, hopping, swinging, etc.
- Video games instead of “Can I go outside?”

Early Education

Daycare

Baby Equipment

Lack of Creeping / Crawling

Preschool became Kindergarten

Kindergarten became First Grade

Early emphasis on reading rather than motor development

Lack of recognizing correlation b/w cognitive and physical readiness to learn

Physical Education

- Cut backs
- Too large of classes
- Lack of education on importance of physical activity as relates to learning / academic performance
- Lack of Neuromotor Components

More Kids with Sensory Issues

- Uncoordination / Crossing Mid-line/ Basic Motor Skills
- Vestibular / Balance
- Proprioception (body awareness)
 - Relaxed sitting / poor posture
- Retained Primitive Reflexes
 - ATNR
 - STNR
 - TLR

Primitive Reflexes

- Reflex – same stimulus always elicits the same response
- Basic necessity of survival is housed in the CNS- begins at conception and then follows a sequential pattern/developmental sequence (milestones)
- All babies are born with a set of primitive reflexes that provide rudimentary, physical movement before the cortex (high brain) is sufficiently mature enough to orchestrate a controlled response.
- Each reflex plays a huge role in growth and development and prepares the way for the next stage of development
- These are as rudimentary and automatic as someone hitting your knee with a reflex hammer
- Completely low brain / outside of conscious thought and control

Primitive Reflexes

- All primitive reflexes should be gone (integrated) by approximately 1 yr and are replaced by postural reflexes
- Rooting, Sucking, Palmar, ATNR, STNR, TLR, Moro, Spinal Galant
- For whatever reason, in some children, these can be retained (not enough tummy time, not crawling at all or long enough)
- When a reflex, that is extremely low brain function, is occurring when it should not, high brain, cortical function, cannot “kick in”
- ATNR example-classroom example
- STNR example-classroom example

Vestibular System

- System that helps us to orient ourselves in the earth's gravitational pull
- Feeds information to other senses
- Maintains posture and balance
- Our sense of center of gravity – the ability to feel “righted”
- 8th Cranial nerve – vestibular nerve (inner ear)
- Vestibular system on one side sends signal to opposite side of brain – when a child turns his head to one side, activates vestibular system of same side
- Primary vestibular system is on R side of brain beside area that controls our digestion (why we feel nauseous when we are dizzy)
- If underactive – constantly moving, spinning, jumping, swinging
- If overactive – gets dizzy and motion sick easily, afraid of heights, swings, elevators/escalators, roller coasters, typically will shy away from athletics/physical activity
- Highest form of balance is the ability to be perfectly still(tight-rope example)

Proprioceptive System

- Ability to know where my body is in space relative to gravity and where it is relative to itself and other people or objects
- Receptors are housed in spinal, postural muscles and in the tendons / ligaments of our joints
- Sixth Sense – only sense that is constant and unconscious due to constant pull of gravity – example of astronaut
- If this system is not working properly, affects learning of all spatial relationships- no point of reference for anything spatial(right/left, up/down, before/after)
- These children literally do not “feel” their bodies accurately (either not enough or too much)

These children tend to move more to “feel” their bodies and reorient themselves in space. They also constantly touch EVERYTHING

- Cortex is now being used to just sit still, balance in my chair, control my posture, to “feel” my chair (robbing Peter to pay Paul again)
- Moving more at early age prepares them to move less later

Proprioceptive Deficit

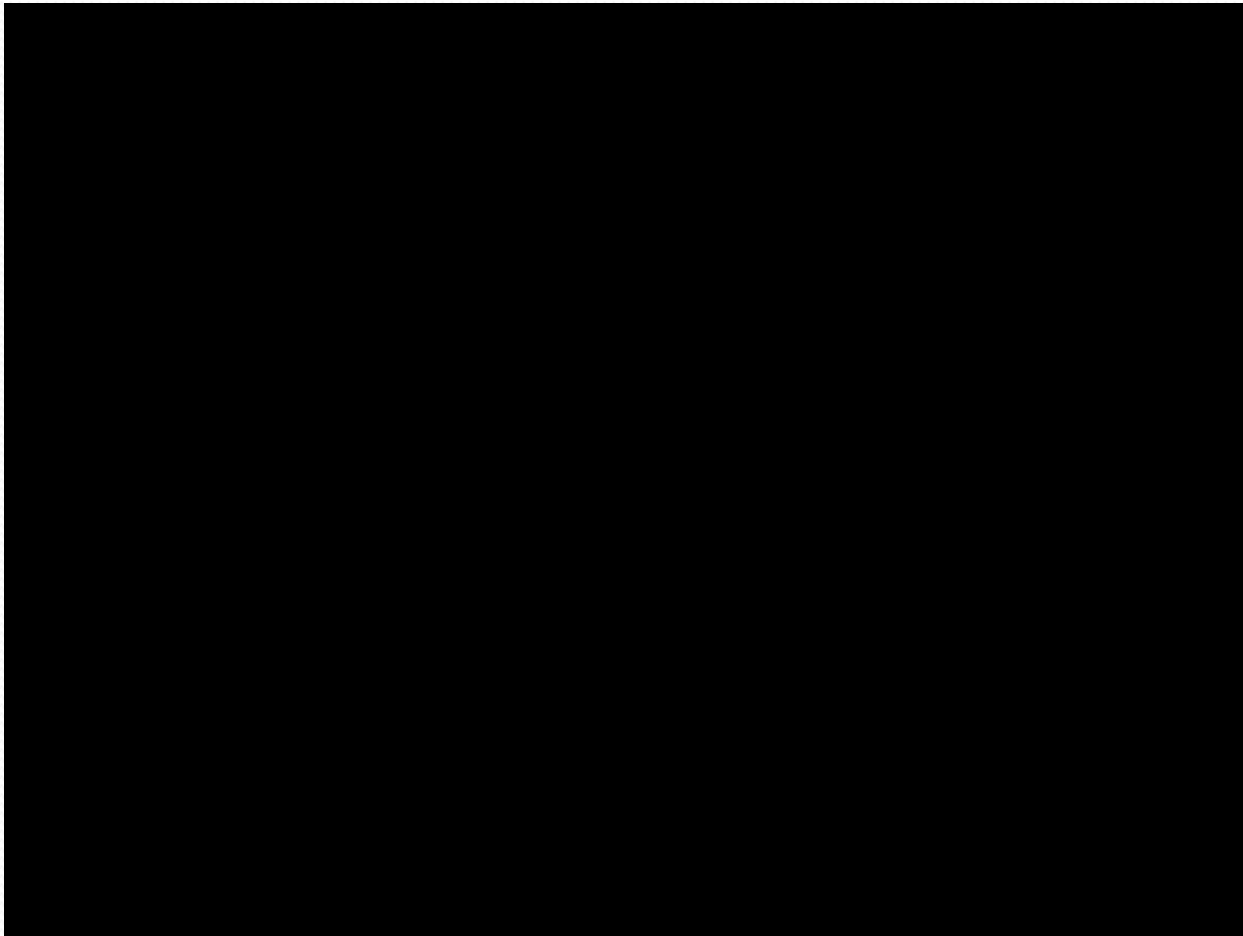
Muscle tone is often times great indication of proprioception

- If child has decreased muscle tone, muscles, tendons, joints will be undersensitive to movement because body has to move a lot more before the brain begins to react to that movement.
- Relaxed sitting inactivates these muscles – why abuse of screen times can be bad
- Must have balance of muscles front, back and sides of spine/trunk
- Spinal muscles should be 30-50 % stronger than abdominal muscles
- Left and Right spinal muscles should be balanced
- Child may test weak arm or leg but really muscles stabilizing the spine that are weak

Proprioception Continued

- Hypo (under sensitive) – this is the rough & tough high pain threshold kid, no personal space, likes contact sports, the bully
- Hyper(oversensitive) – this is the “weeny”, everything hurts and they “feel” everything, lots of sensory issues (tags, socks, textures, ect)
- Children who do not feel their bodies enough, also do not feel their boundaries. They will often push until they find one.
- Or the child who has overactive system, will tend to have a very small world and tend to be more cautious/fearful because they “feel” things more than other people do.

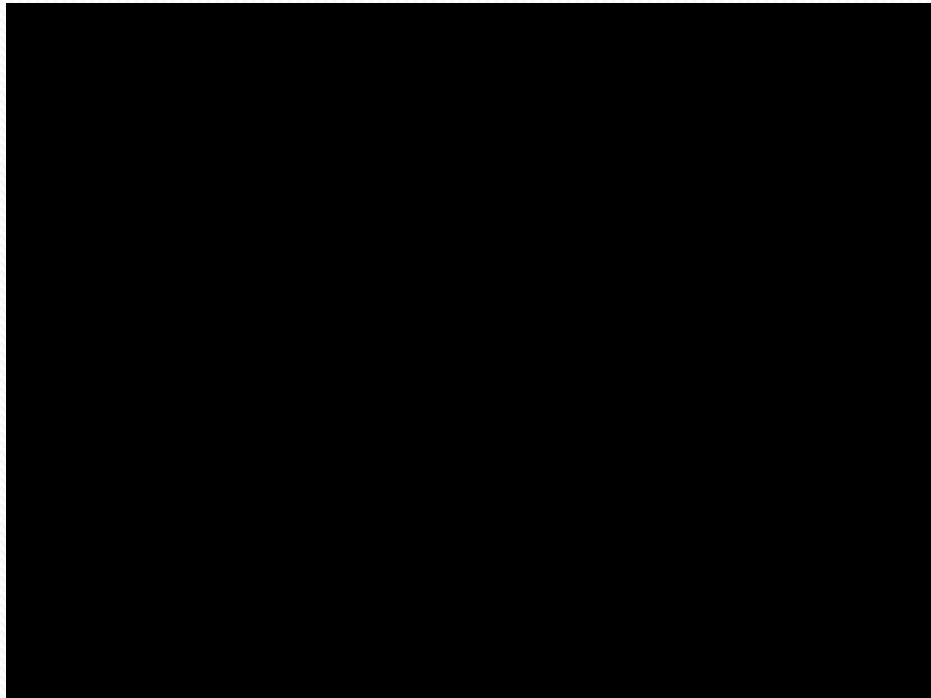
ATNR





Before

After



“ I don’t want to move!”

Movement is not something that is positively reinforced for child and being sedentary becomes more of a lifestyle than being active.

All of these things happening simultaneously-

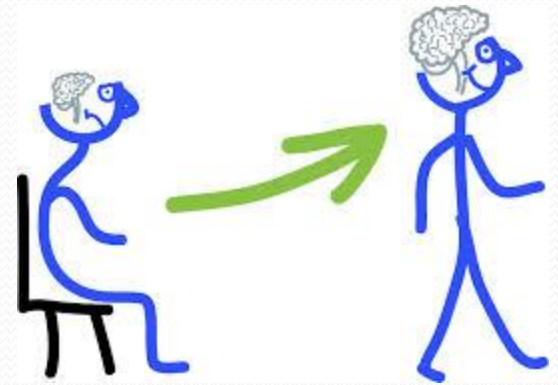
Kids with more issues, but an environment and social system that does nothing to “undo it”.

Research on Exercise and the Brain....

- Higher fitness associated with larger hippocampus (area of brain related to learning and memory)
- Better concentration and ability to stay on task after activity breaks
- Exercise helps alleviate symptoms of stress, depression, anxiety, and ADD
- Exercising moderately for ½ hour after learning new information increased long term recall significantly over a control group that did not exercise after learning. Both groups were about the same after 3 hours, but after 24 hours, and after 3 days, the exercise group had significantly better recall.

Exercise Builds Brain Cells

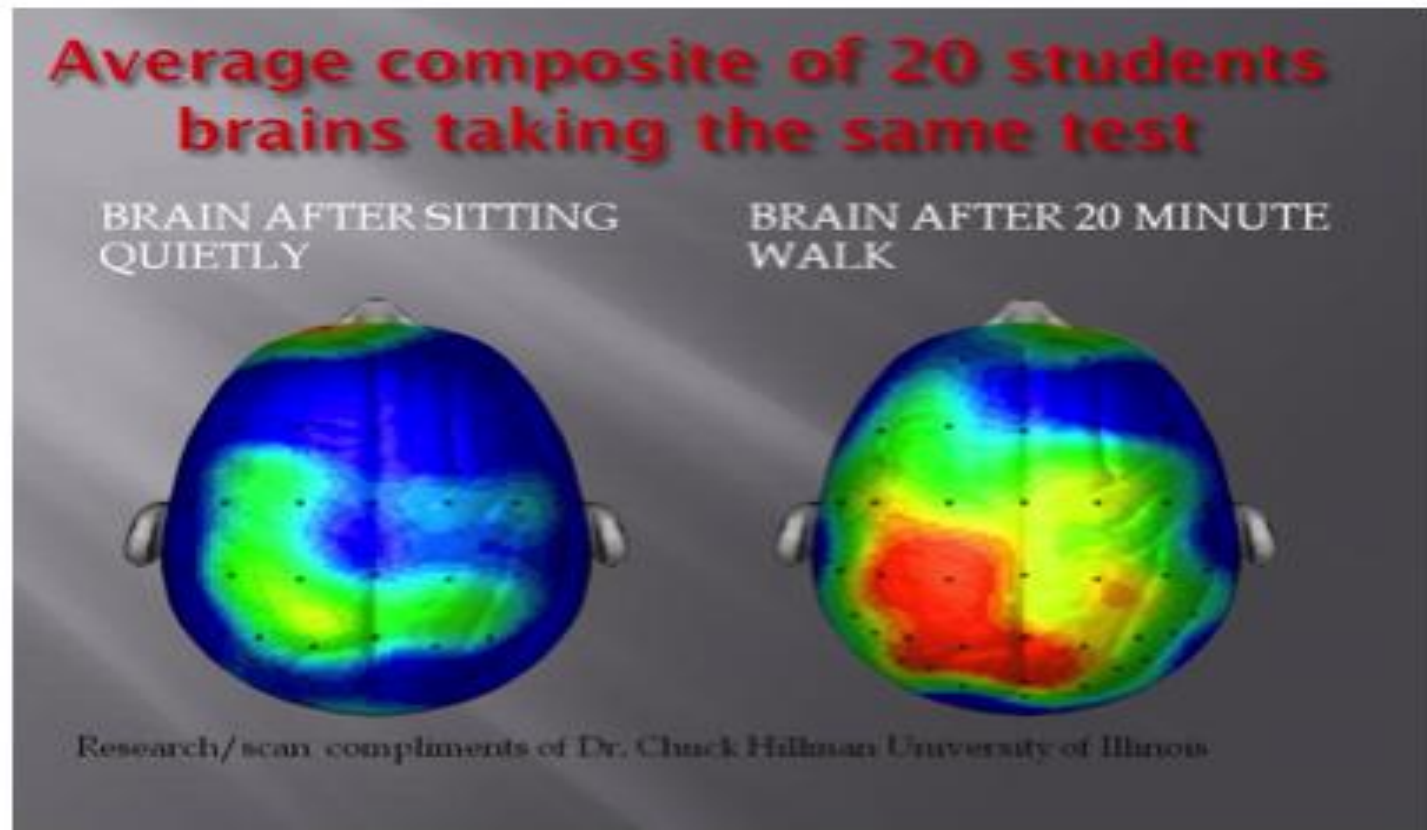
- Physical activity increases BDNF (fertilizer for the brain)
- Stimulates neurogenesis
- Stimulates synaptogenesis
- Consolidates memories better



In a nutshell-

- Exercise helps stimulate the growth of new neurons, and they are basically blank slates.
- For the new neuron to survive it needs to fire its axon and find a useful job in life.
- An enriching environment where the brain is stimulated and challenged gives the new neuron a purpose for living.

This is your Brain on Exercise



What 's the answer?

Research

Screening in schools for physical readiness to learn

Classrooms that promote movement rather than sitting still and listening all day, particularly preschool and Kindergarten.

Daily Physical Education with reasonable class sizes that understand and promote neuromotor components.

Education of parents & teachers

Early Intervention – building confidence early

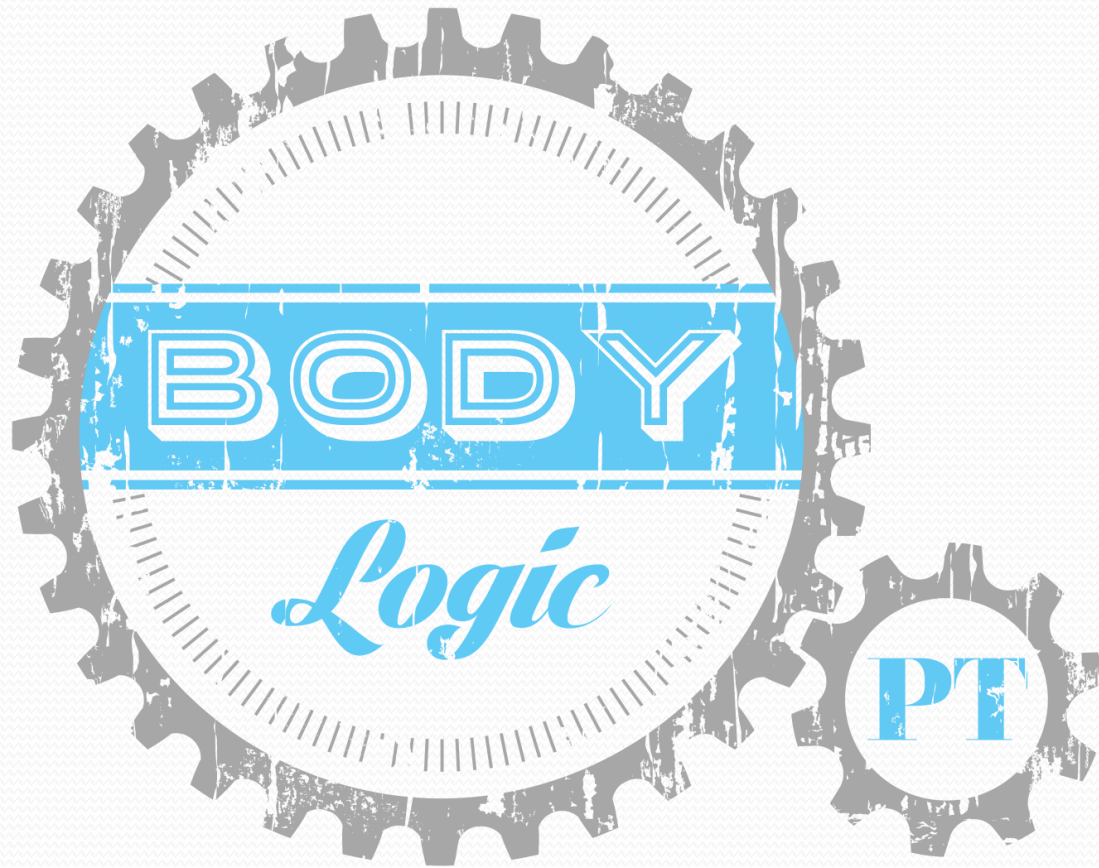
Giving Children a love for moving



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Tiffany Higginbotham MS, PT
7150 Halcyon Park Dr.
(Inside Metro Fitness)
(334) 380-5920

www.bodylogicpt.com

thigginbotham@bodylogicpt.com