



**Move It or Lose It (🌈 A Physical Health Story)  
(4<sup>th</sup> Grade – 9-10 yrs)**

Your body is made of lots of muscles, so it only makes sense that our bodies were made to move. This story is about how your body moves and how using your muscles to move your body makes both your body and your brain healthy.

- 🌈 You may have heard the phrase “use it or lose it”. “Use it or Lose it” definitely applies to the muscles of our body and the parts of our brain that move these muscles.
- 🌈 Moving our bodies causes chemicals – endorphins – to be released in our brain. These chemicals do lots of different things that help our body and our brain.
- 🌈 You may have also heard the phrase “muscle memory”. If you have, FORGET ABOUT IT! There is no such thing as muscle memory – it is cerebellar memory.

🌈 **SLIDE #1 - INTRODUCTION:**

Good Morning (Afternoon)!

My name is \_\_\_\_\_ and I (describe who you are and give your relation to neuroscience – ex. you are a Neuroscientist, you study neuroscience, you have a friend that is a neuroscientist or you have recently been learning a lot about neuroscience).

Neuroscience, that’s a really big word! But, a neuroscientist is a person who knows a lot about the brain.

I am here today to talk to you about how you can help to make your brain healthy – feeling good. It is REALLY easy and anyone can do it.

I love to talk about Brain Health because it’s SPECTacular!!! SPECTacular means “GREAT”. When your brain is SPECTacular, you are a happy and healthy person.

This story is about Physical Health – which is the P in SPECTacular. Physical Health means you are keeping your brain healthy because you are taking care of your body.

Being “physical” means you move your body, you eat – to give your body energy and you sleep – because sleeping does a LOT to take care of your body.

When you take care of your body by moving it and giving it the energy and sleep that you need, that also makes your brain healthy.

So, let’s see how you can keep your brain healthy.

🌈 **SLIDE #2 – MOVE IT OR LOSE IT**

Our bodies are made of lots of muscles and muscles move our body, so it make sense that we are supposed to move.

This story will describe how moving our body is important for our bodies and our brains to stay healthy.

### **SLIDE #3 – MUSCLES**

Every time that you move, you are using your muscles.

When you get out of bed in the morning, you are using your muscles.

When you are eating, getting ready for school, reading or writing, you are using your muscles.

When you are playing with your friends or doing your chores, you are using your muscles.

In fact, even when you are not moving you are using your muscles.

What?!? How does that work?

### **SLIDE #4 – DIFFERENT KINDS OF MUSCLES**

You actually have different kinds of muscles. Some of your muscles are anti-gravity muscles and these muscles hold you up when the forces of gravity try to pull you down.

So, as you sit up straight in your chairs and listen to this story, even though you are not moving, your anti-gravity muscles are working to hold you up even though gravity is trying to hold you down.

So, just balancing is a way of using your muscles even though you are not moving.

### **SLIDE #5 – STRONGER & BIGGER**

When you use your muscles a lot, they get bigger and stronger. There are lots of ways that you use your muscles.

Some ways involve vigorous exercise, running, jumping, lifting weights, playing sports, and swimming (although you cannot see the sweat because you are in water!) and dancing. All of these things help your muscles get bigger and stronger.

But, you can also help your muscles get bigger and stronger by doing things like walking, riding your bike and doing yoga. These things require balance and we now know that balancing uses our muscle too.

### **SLIDE #6 – USE IT OR LOSE IT**

When it comes to your muscles, it is “use it or lose it”. When you do not use your muscles, they get smaller and weaker.

Even in hospitals, when people have to stay in bed they still have someone come in to move their bodies so that the muscles can be used so that the patient will still be able to move when they get out of bed.

A whole field of science called “physical therapy” is about helping people to move their bodies after some sort of injury. It teaches people how to make their muscles stronger.

You need to use your muscles, move your body, so that you do not lose the ability to move or balance. So, a good thing to remember is Move It or Lose It.

## SLIDE #7 – HOW MUSCLES WORK

What actually happens when you “use your muscles”?

When you move your body, some of your muscles contract – get shorter. After the movement then your muscles relax.

Your muscles can also extend or stretch – get longer.

Hmmm...I wonder why all that happens.

Muscles are attached to your bones. That is how the muscles move your body, when the muscles contract they pull on your bones.

## SLIDE #8 – MUSCLES AND BONES

All your bones have some muscles that move your body one way and other muscles that move your body in the opposite direction.

Now, if both of the muscles moved at the same time – then your body would not move.

Plus, if both of them were pulling on the bone at the same time – the muscles would rip off. YIKES!!!

So, what is controlling all the moving of the muscles? The brain of course!

## SLIDE #9 – MOTOR PART OF YOUR BRAIN

In order to move, your brain talks to your spinal cord which then talks to your muscles in your body so you can move.

In fact, there is an actual map of your body in your brain with different parts of your brain controlling the different muscles in your body.

In the front of your brain, in the frontal lobe, is the part of your brain that controls your muscles. There is actually a “picture” of your body on your brain to show which parts of your brain control which parts of your body. It is called a homunculus.

You can see that the homunculus has big hands – that is because a bigger brain area is needed to control all of the muscles that you have in your hands. Your hands move a LOT.

There is only a small area of the brain that controls the muscles in your back. That is because your back does not do a lot of moving.

So, when you want to walk – your brain tells all the muscles that control your legs to work.

The muscles take turns contracting and stretching and your brain and spinal cord are controlling which muscles and when the muscles are working.

When you walk, there are also other muscles that are working too. Like the muscles in your body and neck. They have to work to keep your body and your head up straight.

## SLIDE #10 – YOU MOVE TO STAY ALIVE

Your brain likes it when you are using your muscles because using your muscles moves your body and that does a lot of things to help your brain stay healthy.

The first and obvious thing that moving your body does is it helps your brain get the things it needs to stay alive.

Your body has to move to get food, water, put on clothes to stay warm, etc. So, moving is very important for your survival which is important for the health of your body and your brain.

## **SLIDE #11 – MOVING CAUSES THE RELEASE OF CHEMICALS THAT MAKE YOU HAPPY**

When you move your body, your heart has to pump blood to the muscles so they can work. This causes the release of some very special chemicals in your brain – such as endorphins and endocannabinoids.

When these chemicals are released in the brain, they activate the reward center or your brain's "happy place" and you feel good.

These chemicals are released as soon as your heart rates starts to work faster and your muscles start to move in rhythmic ways – like running, walking or swimming.

This has been called a "runner's high" which means that running or any kind of exercise will make you feel happy. Just like you might feel when you do well on a test, or how you feel when you score a goal, or get to the next level of a video game. Because the endorphins and endocannabinoids are released when you move a lot, the brain likes you to move because your brain likes to be happy.

The chemicals do lots of good things to help your brain stay healthy, so by activating your reward center it makes you want to move your body more.

Plus, moving your body makes you feel good about yourself and this may also help you if you are feeling sad or depressed.

## **SLIDE #12 – MOVING CAN REDUCE STRESS**

The release of endorphin and endocannabinoids when you are moving your body also reduces the body's stress hormones - adrenaline and cortisol.

A little bit of stress is a good thing, it helps you get ready to do what you need to do – like running away from a bear that is chasing you.

But, we know that if you have too much stress in your life, then the stress hormones can hurt your brain and your body.

The endorphins will lower your levels of stress and any anxiety you may be feeling which will help you reduce your stress and help your brain to stay healthy.

## **SLIDE #13 – NUTRITION**

Moving your body is also helping you with other aspects of physical health – such as nutrition and sleep.

Moving your body and eating right work together to help your metabolism – which is a big word that means your body is working to balance what you eat and how much you move.

Your metabolism helps your brain to balance all the nutritional needs of your body.

Muscle cells need a lot of energy, which means they burn a lot of calories.

Moving your body when you exercise is very good at helping us burn fat and convert food into energy.

Muscles burn more calories than fat cells, even when you're not exercising. So, making sure that you use your muscles is important so that you do not lose your muscles and you can lose the calories.

#### **SLIDE #14 – SLEEP**

Moving your body will also help you with your sleeping behaviors, which we know is important for keeping our brain healthy.

People who exercise have more of the slow wave sleep – or the sleep activity that helps to repair our brain and body when we are sleeping.

That is why it is really important for older people to exercise, because the amount of slow wave sleep declines as you get older. This means that **if** older people exercise, they will have **more** slow wave sleep and their brains can do more repairs and clean out all the “garbage” that your brain makes during the day while it is working.

#### **SLIDE #15 – PRACTICE MAKES PERFECT**

Oh...one thing that moving your body will not do – help you to remember how to do a movement.

Practice makes perfect is true of moving your body.

When you practice movements – like playing the piano or shooting a basketball – you become better at doing those movements and you do not have to think about moving all the different parts of your body.

So, somewhere the “memory” for how to do movements must be stored.

#### **SLIDE #16 – NO MUSCLE MEMORY!**

Because you need to use your muscles to move your body, people started to talk about muscle memory.

Well, as science will tell us - FORGET ABOUT IT!!! Muscle memory is not a real thing.

Muscles contract and relax – they do NOT store memory of the movements. But, you know that when you practice a movement over and over – you get better at it and you do not have to think about doing it.

Take walking – you do not have to tell your legs to move one at a time – when your brain wants you to walk, you just do it.

So.... somewhere your brain “remembers” how to walk – so where is it?

#### **SLIDE #17 – CEREBELLAR MEMORY**

When you practice a movement, this movement becomes a habit.

A habit is something that you do without really thinking about it. This actually saves energy – because we all know how much energy it takes to think about something.

Your brain likes to save energy, so it has a place that helps you to store habits – your cerebellum.

Your cerebellum is actually a big part of your brain that sits in the back of your head.

Scientists have known for a long time that the cerebellum helps other parts of your brain to move your body. So, it makes sense that is the part of the brain that stores memories for moving your body.

## SLIDE #18 – CEREBELLAR MEMORY

The next time that you hear someone say “muscle memory”, I want you to politely tell them that there is no such thing as muscle memory – it is “cerebellar memory”.

Say it with me....”cerebellar memory”.

The cerebellum is the part of the brain that helps you remember how to do all those moving behaviors that you do without even thinking about it.

When you were learning how to ride a bike, you had to think about what your hands and feet were doing. You had to try to balance on the bike. Now, you get on the bike and ride.

When you were learning how to write. You had to think about how to hold a pencil (or pen) and you had to concentrate on how to write the different letters – now, you just write.

Same thing about using your controller to play your video game. You had to think about how to hold it and which buttons to push or move to get the game to work. Now, you just play.

These movements have become habits for you and your cerebellum allows your brain to remember how to move without having to think – and waste all that energy doing it.

Cerebellar memory is now the new muscle memory – so, let’s pass that information on to our friends.

## SLIDE #19 – MOVING OUR BODIES

So, moving our body means that we are using our muscles. Using our muscles is good not only for body – but it also helps your brain.

There are so many fun ways that we can move our body to help our brain stay healthy.

We can do all kinds of exercises, we can go for walks, we can do yoga (remember our anti-gravity muscles which help us to balance), we can stretch.

You have lots of different muscles, so you need to do lots of different kinds of movements to use all of them.

Practicing different kinds of movements creates habits that are stored in your cerebellum. Which is why when we get good at doing a movement we can say we have “cerebellar memory”.

Cerebellar memory helps us to do movements without thinking about them and that saves our brain the energy that it would take to think about doing the movements step by step.

Move it or lose it – good advice for helping your body and your brain stay healthy.

## SLIDE #20 – CONCLUSION

Thank you all for letting me talk to you about how moving your body helps your muscles and your brain to stay healthy.

I have enjoyed spending time with you today talking about the brain. I hope that you have had some fun and learned something about your brain.

REMEMBER, your body is made of lots of muscles and your muscles are there to be used. When it comes to our body, we need to “move it or lose it”. The endorphins and endocannabinoids that your brain releases when you are moving your body help both your brain and body stay healthy. And, helping your brain stay healthy is SPECTacular.

**THANK YOU SO MUCH FOR ALL OF YOUR HELP!!! Brain Health is not just SPECTacular...it is FUN!!!**