



Sleep Basics (🌈 A Physical Health Story) (3rd Grade – 8-9 yrs)

This story describes sleep, what it is, how it changes over time and most importantly, why you do not act out your dreams.

- 🌈 There are actually different stages of sleep that do different things.
- 🌈 People have different sleep needs based on their age. Babies sleep up from 14-17 hours a day (and there are only 24 hours in a day!), while older people, like your grandparents, may only sleep between 6-8 hours a day.
- 🌈 We have 2 kinds of dreams, the ones that are more realistic and occur during SWS (slow wave sleep) and the ones that are more bizarre and occur during REM (rapid eye movement). Your brain has a way to protect you from acting out your dreams that occur during REM sleep.

🌈 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 – SLEEP BASICS

We are always told how important sleep is for our health, but did you ever wonder why?

In this story, titled “Sleep Basics”, we will describe what sleep is and why it is important to your Physical Health and your Brain Health.

We will also talk about how our sleeping behaviors change during the course of our lifetime AND, most importantly, we will talk about what the heck dreams are all about.

SLIDE #3 – ROLE OF SLEEP

Being asleep is a behavior that all animals do. And yes, people are animals too.

Sleep is necessary because the body and the brain need to repair itself from all of the activity that animals do when they are awake.

Sleep is also necessary to clean up the brain from all of the activity of the day.

While you are sleeping, the brain actually stores information that occurred during the day. It puts this information into long term storage so that you can use the information again.

These are just some of the things that we know the brain is doing while animals are asleep. Scientists have been studying sleeping behaviors for a long time and while we now know a lot about this behavior, there is still a lot we do not know.

SLIDE #4 – BRAIN ACTIVITY

When you are asleep, your brain is actually still working. We know this because we can record the activity of your brain.

We can look at the activity in your brain just by putting electrodes on your head. In this way, we can see what your brain is doing while you are awake and while you are sleeping.

The “activity” that we are recording with electrodes is called an EEG. What we are actually measuring is the electrical activity that is created when the cells in your brain, called neurons, are talking.

SLIDE #5 – TYPES OF BRAIN ACTIVITY

There are 2 main types of activity that we see during sleep.

Slow Wave Sleep – SWS – is known as the growth and repair stage of sleep – when your brain is preparing itself to get ready for the next day’s activities and it is when your brain gets rid of all the waste that is made during your day of activities.

Rapid Eye Movement – REM – occurs when your brain is reorganizing and making new connections between all the billions of cells in your brain.

Both REM and SWS are needed to store new memories in your brain – although more storage is done during REM. Interestingly, not only is your brain storing information when you sleep, but it is also getting rid of information that you do not need. So, it is helping you to forget things too.

Dreaming occurs during both REM and SWS – although they are different kinds of dreams.

SLIDE #6 – REPAIRING YOUR BODY AND BRAIN

So, you may be saying...“That’s nice – my brain is active during sleep getting my body and my brain ready for the next day – and there is slow wave sleep and rapid eye movement sleep – so, why do I care?”.

Well, we all know that sleeping is important for the health of your brain. If you do not sleep, then your body and brain cannot repair itself.

In particular, it is your immune system that has the major problem.

Your immune system is the body's defense system against infections. The immune system attacks germs and helps to keep you healthy.

Sleep is needed to strengthen the immune system and to help it get ready to attack germs. You can think of the immune system as the body's internal defense system.

Sleep may also be necessary for helping your immune system to "remember" bad germs it has had to fight. Making it easier to fight off these germs in the future.

When you do not get enough sleep, your immune system cannot protect your body and your brain that well. This means that you are more susceptible to germs that are trying to attack you.

SLIDE #7 – SWS & IMMUNE SYSTEM

Ok...so you may be saying, "This is nice...why do I need to know about SWS and REM?". I am so glad that you asked.

We know that sleep is helping the immune system during SWS. We also know that your sleep habits change when and how much SWS you get.

If you do not get enough sleep, this is going to decrease the amount of time that you spend in SWS when you do sleep. When you don't get enough SWS, your immune system does not work that well.

This is going to be bad for your health – both body and brain – because the world we live in is full of germs. You need your immune system to be working or else your body and your brain will not be healthy.

Let's look at how our sleep habits change when and how much SWS occurs. You will see that your sleep habits also change when and how much REM occurs.

SLIDE #8 – SLEEP CYCLES

When we look at your brain's activity during a "normal" night of sleep, you will see that you go through about 90 – 110 minute cycles of sleep.

You first go through a long period of SWS and then a short period of REM sleep.

As the night continues, the amount of SWS gets shorter and the amount of REM gets longer.

This is what happens when you get a "good night's sleep" – usually about 8 hours.

SLIDE #9 – CHANGE IN SLEEP CYCLES

When you do not get enough sleep, we see that REM sleep happens more at the beginning of the night and you do not get as much of the SWS that you need.

Ok...why? This probably has survival implications.

SWS is when the growth and repairing gets done to your body. It is also the time when your body's defense system is strengthened.

During REM, the brain is storing information that you need to survive.

For example, we can use a zebra and a lion. A zebra has to learn that a lion is not an animal that the zebra can be friends with because lions eat zebras. So, if a zebra has spent the entire day running away from lions and only gets a little bit of sleep, then it is important for the zebra to spend more time in REM sleep so that the zebra will remember to hide and get away from lions when the zebra sees a lion.

If the zebra did not store that information and spent the time sleeping in SWS making the immune system stronger, then the zebra would not live long enough to need a strong internal defense system.

So, getting enough sleep is all about helping your brain to help itself and your body stay healthy.

SLIDE #10 – SLEEP TIME CHANGES WITH AGE

We also know that the amount of time that you spend sleeping changes as you age.

Let's compare how much time people of different ages sleep during the night.

Babies sleep between 12-16 hours, and there are only 24 hours in a whole day! That makes sense because sleeping is the time for growing and repair. Babies are growing fast – both their bodies and their brains. So, babies spend most of their day sleeping – with some eating and drinking added in.

By the time you get to be elementary school age (your age) and throughout your adolescence (middle school, high school and college), you should be sleeping about 8-10 hours a night. This makes sense because you are still growing, but now you need to have more time to learn about the world around you. You need to do more things by yourself, so you need to learn how to do this.

Adults need to sleep between 6-8 hours a night. Again, this makes sense because there is not so much growing going on as an adult.

By the time you get to be your grandparents age, you pretty much only need about 5-7 hours of sleep.

Now, these are estimates and we all know that everybody is different. So different people may need different amounts of sleep to keep their body and their brains healthy.

SLIDE #11 – CHANGES IN BRAIN ACTIVITY WITH AGE

Plus, the amount of SWS (also called NonREM) and REM activity that happens during sleep, changes as you age.

What is true for all the ages is that in a “normal” night of sleep, you should be spending most of your time in SWS.

Everyone needs more SWS sleep during the night because this the brain activity that we see when we are repairing, cleaning up, and getting rid of the waste in the brain. Remember, this helps to make our immune system – which protects us – stronger.

Babies and children need more SWS than adolescents and adults because they are growing more.

Adults need more SWS than the elderly – because they tend to be doing more – so they need more repair, cleaning and strengthening of the immune system.

SLIDE #12 – REM

The amount of REM sleep in babies and toddlers is greater than any of the other age groups – babies need to learn about the world around them.

More REM sleep makes sense as the brains of babies and toddlers are much more immature than the other age groups and so there is more work that needs to be done in making all the connections that we make the brain ready to do all the thinking and learning that children start to do when they go to school. REM sleeps helps us to learn and remember.

After the baby stage, people of all ages then need about the same amount of REM sleep so that they can continue to learn about the world around them. This information is then stored so that people can continue to learn new things rather than relearning things they have already learned.

SLIDE #13 – SLEEP IS IMPORTANT

So, it is important to get the right amount of sleep for your age. That way you are getting the right amount of SWS and REM sleep to take care of your body and your brain and make sure it is healthy.

Remember, when you do not get enough sleep and you are tired this messes up the amounts of SWS and REM. You get less SWS and more REM.

We need SWS because this is when all the fixing and cleaning of brain take place – when you get too little SWS, our brain is not happy or healthy. And while REM is important too, if your brain is not healthy – you will not be able to do the behaviors you need to do to keep your body healthy.

When you get a right amount of sleep for your age, you have more SWS to take care of your brain and you still get the right amount of REM to make sure you remember information that is important and will keep you healthy. This makes your brain happy and healthy.

SLIDE #14 – SLEEP HABITS

There are a couple of things that we can do to make sure we have good sleep habits so that we can get the sleep that we need to keep our brain healthy.

Going to bed at a regular time and getting up at a regular time will help your brain develop a good sleep habit. This actually helps the internal clock that we have in our brain work right.

Try not to use too many electronic devices before you go to bed. Or, if you do use them – try to be sure they have a “blue light” filter. There are some kinds of “blue light” which are not good for a brain that needs to sleep. The reason we do this is because the blue light that is not good for you brain stops it from releasing the chemicals that are needed to tell your brain that it is time to sleep. So, the blue light messes up your internal clock.

Good sleep habits are important because if you do not spend time sleeping, then you will not be able to store all the things that you learned during the day. Unlike the zebra, you probably will not get eaten by a lion – but, you may not be able to remember the information you learned for the test you need to take.

SLIDE #15 – DREAMS

That brings us to dreams. And, even if you do not remember your dreams, everyone dreams.

In fact, it is thought that all mammals dream – but, we are not sure about what they are dreaming about.

Some people insist that they never dream, but they are probably wrong...everyone dreams – although this is hard to prove.

Most dreams are usually forgotten. Unless a person wakes up during or immediately after a dream, the dream will not be remembered.

Scientists used to think that you only dreamed during REM sleep. We now know that this is not true. You have dreams during both SWS and REM sleep. And, they are very different kinds of dreams.

Over the years, there have been many theories as to why we dream and what our dreams mean. We will talk about what scientists know right now about dreams.

SLIDE #16 – SWS DREAMS

Dreams that happen during SWS, which we now know is earlier in your sleep cycle, are usually more realistic.

In the dreams you have during SWS, you may be thinking about something that happened during the day at school, or during soccer. You may just be thinking about how cool it will be when you can drive a truck or how much you love your cute little kitty.

You may be trying to figure out a problem that you had. You may have had a fight with someone during the day and during your dream you are trying to figure out how to fix it.

So, dreams that you have during SWS is more about your brain going through the day's events. If you spent time thinking about something during the day, then it will most likely appear in your dreams during SWS.

SLIDE #17 – REM DREAMS

Dreams that happen during REM, which happens later in your sleep cycle, are more unusual and may not involve things that happened during the day.

The dreams that you have during REM, are usually more emotionally intense (funny, scary – like you having to fight as a knight – scary – aliens – and more scary – you have to climb a mountain) and they are usually bizarre. This is because during REM sleep, there are parts of your brain that are randomly active. The neurons in those areas are talking and your brain tries to make sense of what is being “said”.

You may dream that you found a baby bear in the woods and you went over to see the bear, but then he turned into a giant bear that was trying to eat you. You are running as fast as you can to escape.

Now, the interesting thing about REM dreams is that they may start out having something to do with things that are real – like you seeing a bear in the woods. That is where bears live. But, you may live in a place that does not have bears – or even woods – so this would be unrealistic.

SLIDE #18 – ACTING OUT DREAMS

During REM sleep, your brain actually protects you. What??? This is actually one of things that make dreams during REM sleep so interesting.

Remember, during REM sleep you have bizarre dreams – like being chased by an angry grizzly bear.

It turns out that during REM, your brain stops all of our voluntary muscle activity – these are muscles that we can move ourselves. So, during REM sleep your brain basically does not let you to move by yourself!

Scientists think this happens so that you do not “act out” your dreams. So, you would not get up and start running away like a bear was chasing you. Your brain does this to protect you.

You still have muscles that work, these are the involuntary muscle movements – or reflexive, automatic movements – which means you can still breathe and your heart can still beat and pump blood.

In fact, REM is called rapid eye movement sleep because even though you cannot move your eyes yourself during this stage of sleep, your reflexive eye movement still occur. In fact, if you watch someone sleeping you can “see” when they are in REM sleep because their eyeballs under their eyelids will be moving back and forth.

SLIDE #19 – REM DREAMS

The other interesting thing about dreams during REM sleep is that what scientists think is happening is that a part of your brain (brainstem) activates another part of the brain where a memory is stored. It may be the place where you store what a bear looks like and where he lives.

So, you are asleep, but you randomly “think” bear. Your brain tries to make sense of this information so it “makes up” a story. You were going for a walk in the woods and you see a bear. The bear tries to eat you – so you run!!!

Obviously because of the emotional content – giant scary bear chasing you – the emotional part of the brain is also involved. But, there is still a lot we do not know about the dream pathway.

What we do know is that everyone has dreams and that they happen during both SWS and REM sleep.

SLIDE #20 – SUMMARY

So, now you know why all animals need sleep.

While there is still a lot of information that I could tell you about sleep, you now know enough to understand why when someone tells you it is time to go to bed – they are actually trying to help you help your brain to be healthy.

You now know that there are different stages of sleep, SWS and REM, that do different things to help your brain stay healthy. SWS helps to repair and clean your brain. REM sleep does most of the storing of information that you learned during the day. Both of these stages of sleep help our brain to protect us.

You also know that your sleep needs change as you get older – you don’t have to sleep for 12 hours a day like a baby – but, you still need sleep. So, staying up late when you have to get up early is not a good thing.

You know that when you do NOT get enough sleep, both your SWS and REM stages of sleep get messed up. This means your brain cannot do what it needs to do to repair and clean your brain. It also cannot do what it needs to do to help you remember all the things that you learned during the day. This does not just mean school stuff – you may forget the best way to defeat the enemy in your video game!

So, sleep is definitely necessary to keep your brain healthy!!!

SLIDE #20 – CONCLUSION

Thank you all for letting me talk to you about sleep.

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, sleep is a very important part of helping your brain to stay healthy. Developing good sleep habits now will help you to be sure you get the right amount of sleep that you will need throughout your entire

life. Going to bed is not a bad thing – it is actually a way that you can help your brain. 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!!!