



KNOCK KNOCK, WHO IS THERE? MAYBE A CONCUSSION!

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YOUNG REVIEWERS:



ABISHA
AGE: 13



ISHA
AGE: 15



KEYA
AGE: 13



MYRRA
AGE: 14



RISHA
AGE: 15



SAANVI
AGE: 12

Have you ever fallen over and hit your head when playing? Did you feel a little dizzy and have a pain in your head? If so, you could have had a concussion! Concussions can happen anywhere. They can happen during sport, playing with your friends, or even when going for a cycle with your parents. It can be tough to know if you are concussed. Lots of kids and parents are not sure what to do if someone gets a concussion. Doctors and scientists know that doing the right thing after a concussion helps you get better faster. This article will explain what a concussion is. It will help you to spot if you or a friend has a concussion and tell you what to do if you ever have a concussion.

CONCUSSION

A brain injury that temporarily changes how your brain works. It can happen when your head or body gets hit or if you fall, making your brain move inside your skull.

CEREBROSPINAL FLUID

This is a watery cushion that protects your brain from getting hurt.

NERVES

These are like lots of tiny, connected wires that carry messages back and forth between your brain and your body so you can move, feel, and react.

SIGNS

Things other people can see when you are injured, like stumbling, looking confused, or holding your head after an impact.

SYMPTOMS

Things you feel when you are not well, like a headache or dizziness. You tell someone about symptoms because others cannot see them.

WHAT IS A CONCUSSION?

A **concussion** is an injury to your brain. It changes how your brain works for a while. It can happen when you hit your head, but also if you get hit on your neck or body, which can cause your brain to shake inside your skull [1]. Lots of people know that concussions can happen in sports. They can happen from trips, falls, or car accidents, too. Basically, any situation where you could bump your head could lead to a concussion.

The skull and brain are a little like a Magic 8 Ball: you have a hard outer shell (the skull) and, on the inside, the brain is floating in a liquid called **cerebrospinal fluid**. This fluid acts to cushion the brain so that if the head is shaken a bit, the brain is protected. However, the brain is not hard like the piece inside of a Magic 8 Ball—it is more like a Jello salad dessert: soft and squishy.

A concussion can change the way the brain works in several ways. One such way is that it can lead to an energy crisis in the brain. The brain must work harder following the shake it received. However, the brain cannot store energy—it does not have a fuel tank like a car does. The brain gets its fuel from the blood flowing through it. The amount of blood flowing to the brain falls (by up to 50%) when a concussion happens. So, the brain must work harder, but there is less fuel. Another change is caused by stretching of the **nerves** in the brain. Nerves are like electricity wires or fiber optic cables. There are billions of nerves that connect and send messages to different parts of the brain. When the brain is shaken, the nerves can get over stretched. When you over stretch a muscle, the muscle does not work properly for several days afterwards. It might be weak or painful or difficult to move properly. Similarly, when a nerve is over stretched, it does not work properly for a period of time afterwards. That means that brain areas are not sharing messages as they usually would [2].

Together, these changes help to explain why a person develops the **signs** and **symptoms** of concussion.

HOW DO YOU FEEL IF YOU GET CONCUSSED?

Lots of different signs or symptoms can happen when someone has a concussion, which can make it hard to know if you have one. A sign is something you can see, like holding your head after a fall. A symptom is something you feel, like having a headache. **Figure 1** explains some signs and symptoms to watch out for [3]. These can come on straightaway or over the next few minutes, hours, or days after you get injured.

Lots of people might experience the same signs and symptoms. But not every sign and symptom will happen in each person. Have you

Figure 1

The signs and symptoms that a person might experience if they have a concussion (Figure based on [3]).

Symptoms		Explanation
Physical – affects what you feel in your body		
Headache		Pain in your head
Pressure in your head		Feeling as though someone is pressing or squeezing your head
Dizziness		Feeling wobbly – like when you spin around lots and stop suddenly
Nausea		Feeling like you might be sick
Blurry or double vision		Not being able to see clearly or seeing two fingers when someone is holding up just one
Sensitivity to light		Bright lights might feel extra annoying – just like when you wake up very early in the morning and don't want to get up yet
Sensitivity to noise		Some loud noises might feel extra irritating
Neck pain		Your neck feels sore after the injury
Just don't feel right		Not feeling yourself
Cognitive – affects how you think, learn and understand		
Difficulty concentrating		It is feeling like your brain is sleepy and it is hard to focus on something like when reading your favourite book
Difficulty remembering		Finding it hard to remember what you did before or after your injury
Feeling slowed down		Feeling like everything is in slow motion
Feeling in a fog		Feeling fuzzy or that you can't think clearly
Fatigue		Feeling tired
Emotional – affects your mood and how you feel		
Irritable		You get more easily annoyed than normal
Sadness		Feeling sad or crying for no reason
More emotional		Feelings are a bit bigger than they usually would be
Nervousness		You might feel more nervous about things than usual and feel jittery, with butterflies in your stomach or feel like you are trying something new and scary
Sleep – affects how much or little sleep you get		
Drowsiness		Feeling extra sleepy
Difficulty falling asleep		Finding it hard to fall asleep at night or taking longer than it usually takes you
Sleeping more than usual		Sleeping for longer at night and waking later than you usually would
Sleeping less than usual		Not sleeping for as long as you usually would, waking earlier in the morning or waking up more often during the night
Signs		Explanation
Balance problems		Feeling wobbly, unsteady on your feet and falling over
Losing consciousness		Being knocked out - like collapsing, fainting or taking a nap for awhile and not being able to respond to someone calling you
Confusion		Feeling out of it, with jumbled up thoughts and not able to answer an easy question like what day it is
Dazed look		Looking blank or like you are daydreaming, even though you are not meaning to

Figure 1

ever had a cold and were sneezing and coughing, but your friend just had a runny nose? Concussions are like that—they affect each person in their own way. Some might get a headache, some might feel dizzy. Others might not feel anything straightaway. So, it is important to know all the concussion signs and symptoms.

In the days after a concussion, you might experience a range of signs and symptoms. For example:

- Feeling more tired than normal—even simple tasks such as reading, scrolling on your phone, or talking with friends might make you feel more exhausted than usual. You might feel like you want to nap during the day.
- Feeling foggy or slow—it may feel like you cannot concentrate fully, or that you cannot find the words to say what you want to say. Your memory may be affected too, so you might have difficulty remembering things.
- Feeling more emotional—you might feel a bit more irritable than normal, or just a bit “off”. You might have times where you feel sad for no reason.
- Feeling more sensitive—you might notice that bright lights, screens, or loud noises are more irritating to you in the days following a concussion, and that they make your concussion symptoms worse.
- Experiencing headaches—you might notice that your head is aching on and off, and that these headaches can get worse when you watch screens for too long, or if you are concentrating a lot.

ARE THERE TESTS FOR A CONCUSSION?

Scientists and doctors have created tests to check if someone has a concussion [4, 5]. A doctor or trained healthcare professional (like an athletic therapist/trainer or physical therapist) can do these tests. First, they might ask if you have any concussion signs or symptoms. They may ask if you have had a head injury or any condition that affects your brain. Then, they might test your memory. For example, they may say a list of words or numbers and ask you to repeat them. They may check your neck for injuries by gently moving it in different directions. They might test your **balance** by asking you to stand on one leg with your eyes closed. Or they might get you to walk in a straight line. Your doctor might ask you to follow a moving object with your eyes or touch your nose with your finger. This is to test your coordination. If these tests are hard to do, or if your symptoms get worse during or after the test, you might have a concussion. Concussions affect different parts of the brain. This is why doctors use different tests to check each area. Sometimes, they test you when you feel fine, to have something to compare to if you ever get a concussion.

BALANCE

Your body's ability to stay steady and not fall over. A concussion can make you feel wobbly or off-balance.

CAN OTHER INJURIES ACT LIKE A CONCUSSION?

Other injuries can happen in the same way as a concussion. Sometimes it can be easy to tell what the problem is, like if you get a bad cut and you need stitches. Other times it can be more difficult to know what the injury is. But health professionals can tell something

RED FLAGS

Serious warning signs of a dangerous injury, like passing out, vomiting, or feeling numb. If someone shows red flags, they need medical help right away.

is not right. For example, a person may break a bone in their skull or neck, or there might be bleeding around the brain, and a bruise builds up. That is why there are a few things we must look out for. These are called “**red flags**” because they are important warning signs [3]. If we see them, the person needs to be quickly brought to hospital. In the case of head injuries, red flags include:

- If someone has a lot of neck pain, pins and needles or numbness in their arms or legs, or if they cannot move their arms or legs.
- If someone seems asleep and does not wake up when someone else speaks to them clearly.
- If someone is awake at first but then gets sleepier.
- If someone gets a bad headache, or it gets worse.
- If someone has a seizure, which is when their body starts moving or shaking in a way they cannot control.
- If someone starts vomiting or getting sick after the head injury.
- If someone sees double (e.g., see two fingers when someone only holds up one).

WHAT SHOULD YOU DO IF YOU THINK YOU HAVE A CONCUSSION?

If you think that you might have a concussion, *stop playing straightaway*. Then tell an adult, like a parent, teacher, or coach. They will be glad you told them. Stay away from things that make you feel worse, such as bright lights, loud noises, and screens. You should be taken to a doctor or healthcare professional who will ask how you feel and do some simple tests. They will tell you what to do next. Next steps could include resting and taking a break from things like reading, video games, or sports. This helps your brain heal! After your visit, keep paying attention to how you feel. If your headache gets very bad, you feel very sleepy, or something does not seem right, tell an adult right away. By following the advice from your doctor or healthcare professional, you will get better faster. Remember to look out for your friends as well. People do not think straight after a concussion, and your friend might not realize that they need some help.

HOW ARE CONCUSSIONS TREATED?

The brain is just like any other part of the body. If it gets injured, it does not work properly for a while. Then it starts getting better. Sometimes people will feel better bit by bit. They might gradually get back to school and sport without much help. Others will need more help from their doctor or a healthcare professional. For example, balance exercises for those with balance problems, or thinking exercises for those who have trouble focusing. There are lots of things to help people get back to themselves after a concussion.

WHAT CAN MAKE A CONCUSSION FEEL WORSE?

After you have a concussion, some situations might make you feel worse. They might cause your concussion to take longer to get better. Sometimes you might not even notice the things that make you feel worse until afterwards. Some examples are:

- Continuing to keep playing after you hurt your head,
- Screen time,
- Stress and worry,
- Busy environments like a crowded shop,
- Social activities with lots of conversations happening at the same time, like lunchtime in the canteen,
- Activities that you need to focus a lot for, like studying for a test, and
- Pushing yourself hard with exercise, especially without being advised to by a doctor or healthcare professional.

So, it is important to take care of yourself. Drink enough water, eat good food, and get into a good sleep pattern. While it is important to rest after a concussion, there are some safe activities you can do. You should avoid screens, but it is okay to listen to a short podcast, audiobook, or relaxing music. Make sure to keep the volume low and avoid using headphones. You could also spend some time drawing, coloring, painting, or doing some arts and crafts. The important thing to remember is avoid anything that could make your symptoms worse or lead to another head injury. Follow all guidance from your doctor or healthcare professional.

HOW DO I GET BACK TO SCHOOL AFTER A CONCUSSION?

Imagine your brain is like a phone battery. When you have a concussion you can still use it, but it will not last as long as usual. Your brain needs some rest. It must recharge before you can use it for schoolwork. Follow the return to learning pathway in [Figure 2](#) after a concussion [1].

HOW DO I GET BACK TO PLAYING SPORT AFTER A CONCUSSION?

After a concussion, what matters most is feeling Better and getting back to school. Going back to playing sports after a concussion also drains your brain's battery. You will be able to return to playing sports, but it is important to take it slowly. Follow some simple steps in [Figure 3](#) so you do not overload your brain too quickly [1].

Figure 2

When you get a concussion, your brain needs rest and time to recharge, like a battery. Returning to school should be gradual—start with rest, then add light mental activities. After a few days, it will get easier to focus and learn, and before long you will be ready for a full school day again (Figure based on [5]).



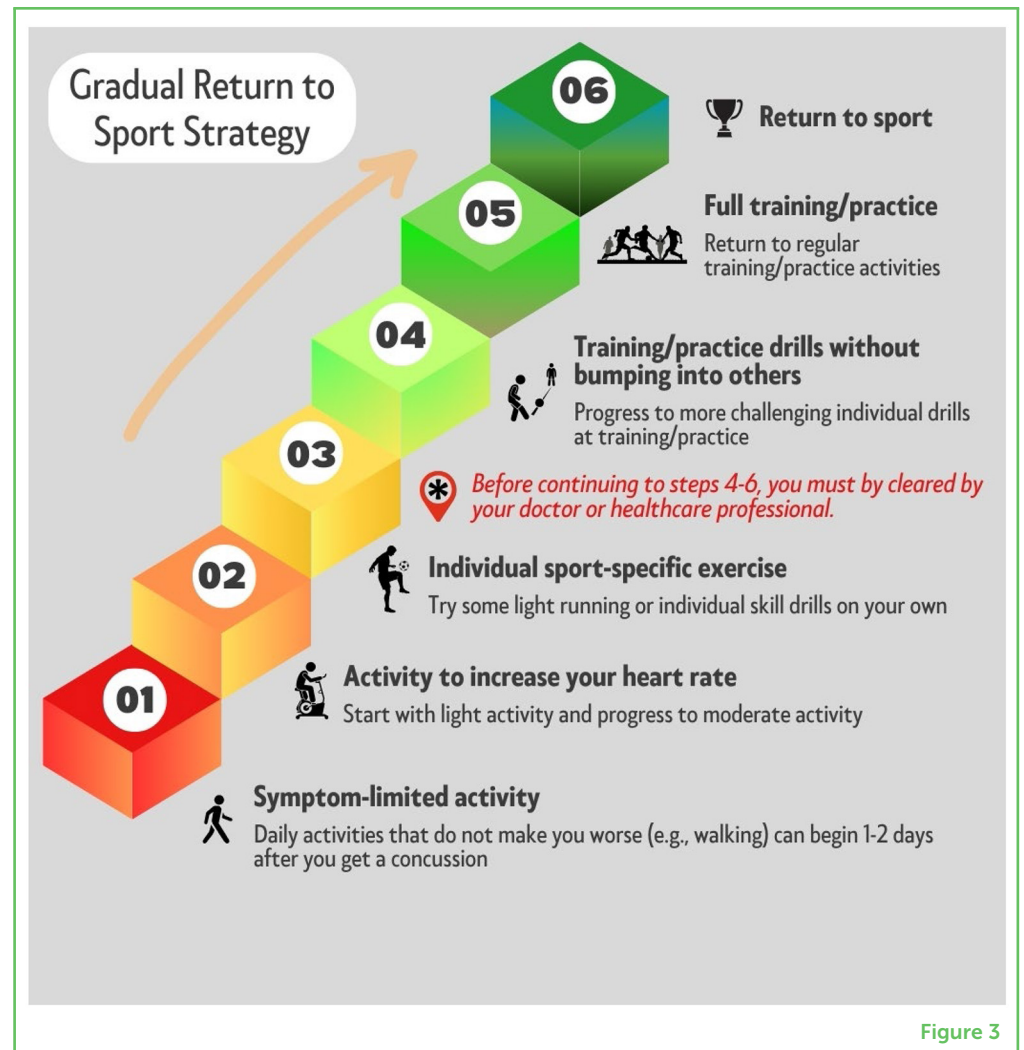
Figure 2

You can progress along each step after one day. If your symptoms get any worse, you must stop for the day and try that step again tomorrow. Speak to an adult if you are worried about any of your symptoms.

Concussions can be hard to spot, but knowing what they are, and what to do makes a big difference. If you or a friend ever hit your head, remember to stop what you are doing, tell an adult, and get checked out. With the right care and treatment, your brain can heal, and you will be back to feeling like yourself again. Looking after your brain is just as important as looking after the rest of your body!

Figure 3

Returning to sport safely after a concussion is a gradual process with several steps. It is important to take it slowly and progress through the steps day by day. If your symptoms get worse, stop for the day and try again tomorrow.



AI TOOL STATEMENT

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YOUNG REVIEWERS

ABISHA, AGE: 13

My name is Abisha and I am currently 13 years of age. My interests are reading, drawing, playing violin, biking, paddle boarding, and last but not least, listening to music. I really like Marvel, Transformers, Anime, Harry Potter, Squid Game, The Simpsons, etc., and I also am a black belt in martial arts.

ISHA, AGE: 15

My name is Isha and I am a high school student. I enjoy writing, music, and art.



**KEYA, AGE: 13**

My name is Keya and I am 13 years old. Some of my hobbies are playing tennis and basketball. I love to paint and draw. I also have been doing classical dance for 8 years now! I am very hardworking and caring. One dreams/goals is that I want to be a doctor when I am older.

**MYRRA, AGE: 14**

I am a 14-year-old whose mind reflects Kafka's complexity while my heart beats to guitar melodies. On stage, I thrive in the theatrical whirlwind, delivering dramatic monologs in Shakespearean tragedies and contemporary comedies. I love to ask questions and explore the scientific basis of everything. I am eager to merge science, literature, and music to make my mark on the world—one experiment, one chord, and one line at a time.

**RISHA, AGE: 15**

Hi! My name is Risha, and I am 15 years old. I am a high school student who loves learning about science, especially how the human body works. I am also really into robotics, dance, tennis, and playing the violin. I enjoy helping others understand important topics that surround the ideas of STEAM, and I joined this review because I want to make science clear and interesting for kids my age and younger!

**SAANVI, AGE: 12**

Saanvi loves to read, and wants to be a dermatologist when she is older. She enjoys running in her free time.

AUTHORS

**SIOBHÁN O'CONNOR**

I work in Dublin City University in Ireland. I moved from Cork to Dublin to study athletic therapy and training in college because I loved sport and wanted to help people. It was here I caught the research bug, and I realized I loved researching injuries in groups that not many people have looked at before, like kids and women. I have done lots of concussion research, especially in my favorite sports of Gaelic games and horseracing. When I am not in work, you will find me playing with my two amazing sons and my little dog, Cara. *siobhan.oconnor@dcu.ie

**EDDIE MCGUINNESS**

I currently teach college courses on athletic therapy and training, and sport science and health at Dublin City University. When I was 18 I had a serious knee injury, which inspired me to want to help other athletes with injuries. This led me to studying athletic therapy and training. Today, I continue to work and help athletes reduce their risk of injury and improve their physical performance. I am also interested in researching new ways to test and improve athletic performance.



ENDA WHYTE

I work in Dublin City University in Ireland. I played a lot of sport when I was younger (and I still play a bit now). It was this interest that inspired me to first study physiotherapy in Ireland and then specialize even more by studying athletic training in the USA. I really enjoy teaching athletic therapy and training and I love researching injuries in sport, trying to find ways of avoiding them, or rehabilitating them as best we can.



SINÉAD O'KEEFFE

I work at Dublin City University. Having played all my life, I love all things sport—playing, watching, and coaching. This love for sport gave me an interest in becoming an athletic therapist to help athletes and everyone involved in physical activity to stay healthy, recover from injuries, and perform at their best. I am also really interested in mental health and wellbeing, and I think looking after an athlete's mind is just as important as being physically healthy. Whether it is managing pressure, overcoming setbacks, or staying motivated, I love learning about how mental health impacts performance and recovery.



AOIFE BURKE

I work in the School of Health and Human Performance at Dublin City University. I played loads of different sports growing up and then specialized in football from the age of 14. My life revolved around sport, whether that was playing or watching. This inspired me to pursue a degree in athletic therapy and training. Upon graduation, I transitioned toward working in sport, trying to help injured athletes return to a better and stronger version of themselves. I am really interested in understanding the mechanics of human movement, and how we can use that to inform injury rehabilitation and performance.