

HEADWAY

FOUNDATION

real concussion progress.

Education Packet

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What is a Concussion?

A concussion is a brain injury caused by a force transmitted to the head from direct or indirect contact with the head, face, neck, or body. This can cause either a collision between the brain and skull or a strain on the neural tissue and vasculature (1,2,3).

When there is trauma to the brain in this way, a wave of cellular and molecular changes occur. In our brain we have axons that are very thin, delicate strands connecting different thought processes and chemicals. When you take a blow to the head these axons are damaged and prevent vital processes from working correctly (1,2,3).

Fast Facts:

- Approximately 80-90% of concussions resolve in 7 to 10 days, although concussion-like symptoms can last months or even years. If this is surprising or confusing, check out our section on Post Concussion Syndrome (7).
- The CDC estimates that 1.6 to 3.8 million concussions occur in sports and recreational activities annually (9).
- A concussion does not require a direct blow to the head, just the jolting of the head (ex: whiplash) (8).
- An individual does not have to lose consciousness in order to have a concussion. In fact, 81-92% of concussions *do not* involve a loss of consciousness (1,4,5,6).

What are common symptoms?

Symptoms of a concussion vary from person to person. Concussion is not a one-size-fits-all injury, and no two concussions are alike, even in the same person.

Common symptoms include:

- Headache
- Fatigue
- Poor Memory
- Poor Concentration
- Drowsiness
- Sensitivity to Light
- Sensitivity to Noise
- Dizziness
- Poor Balance
- Poor Sleep
- Blurred Vision
- Irritability
- Nausea
- Depression
- Impaired hearing

Some of the symptoms of a concussion can appear immediately after the injury, while others may not show up for several days or later (8).

Parents, coaches, and teammates should inquire about these symptoms if a concussion is suspected. If a player experiences any of these symptoms after a blow to the head or body, the

player should be removed immediately from play and not resume physical activity until cleared by a doctor.

Why is removal from play important?

The whole focus of our New Tough Pact revolves around this question.

We've learned from both published studies and personal experience that neglecting to report possible concussions happens a lot in sports. The Center for Disease Control performed a study that indicated 69% of student athletes do not report possible concussion symptoms (10). We're talking over two-thirds of athletes here. That's too many. As former and current athletes ourselves, we believe this stems from a lack of understanding about the impact playing with concussion symptoms can have on your health.

So, why is it so critical to create a safer sports culture? Why is it so important to report concussion symptoms immediately?

Here are the basics:

- Physical activity **immediately after** concussion negatively affects your brain in a few ways:
 - **Neuroplasticity** decreases

You might be wondering, what is neuroplasticity? Great question. It's your brain's ability to recover itself after it gets banged around. It allows neurons to compensate for injury and reorganize pathways in the brain so it can still function properly.

- **Cognitive performance** decreases
Cognition includes memory and the ability to pay attention, organize, learn and plan. When cognition is reduced, you might not be able to think as clearly as you normally would.
- **Neuroinflammation** increases (11,12)
- In a recent study, athletes who continued to play with a concussion required nearly **twice as long** to recover than those who were immediately removed from play (13). This statistic speaks for itself. Nobody wants to be out of the game longer than they have to be, so **why risk it?**
- The brain is vulnerable to subsequent injury immediately following a head injury. After a concussion, changes happen in your brain that limit blood flow and throw off your body's energy-supply balance. One of the possible causes for this is a reduction of glucose availability after a concussion (14).

- Continuing to play with a concussion puts you at risk for Second Impact Syndrome (SIS).

What is Second Impact Syndrome?

Second Impact Syndrome is a potentially catastrophic injury that occurs when an individual who has a concussion sustains a second head injury before symptoms related to the first have resolved. Remember how we mentioned that concussion can increase neuroinflammation in the brain? Well, if someone sustains a second head injury during this vulnerable period, the brain has the potential to swell so much that there isn't enough space in the skull, which can destroy brain tissue and in some cases lead to death (17).

SIS is very rare, with less than twenty confirmed cases presented in published medical literature (17). Even so, it should drive home the point that concussions are to be taken seriously. There is still more to learn about Second Impact Syndrome, but what's clear is that things *can* go wrong when concussion isn't managed properly.

That's why we are all about the education, so you can get ahead of the game and continue competing in sports the *right way*.

What is Post Concussion Syndrome (PCS)?

The term "concussion" is thrown around a lot these days. It is a simple, straightforward term and it encompasses a wide variety of physical and cognitive symptoms. The problem with using this term is that it can sometimes oversimplify a patient's condition, especially if symptoms last longer than a few weeks.

PCS is a complex disorder involving a collection of symptoms that can persist from weeks to years after a concussion is endured. One study found that 10-15% percent of people who sustain a concussion experience these lingering symptoms for a year or more (50).

According to Dr. Jeffrey Kutcher, a sports neurologist specializing in this field, concussion and PCS are not the same thing. He explains the complexities of PCS in his most recent book, "Back In The Game: Why Concussion Doesn't Have To End Your Athletic Career", and drives home the point that PCS is not a long-lasting concussion (17). While a concussion is the inciting event that causes PCS to walk through the door, they are two separate diagnoses that should be treated differently as a result (17).

There are a number of concurrent factors that can contribute to PCS symptoms, which makes it a complex disorder to effectively treat. Factors such as neck injury, ocular-motor dysfunction, sleep deprivation, depression, and anxiety can all play a role in prolonged symptoms (51,52,17).

This is why it's important to see a doctor who has experience not only treating concussion, but the problems associated with Post Concussion Syndrome as well.

What are factors that could contribute to PCS?

Ask your doctor about the following:

1. Whiplash

A concussion occurs when a blow to the head or body transmits enough force to cause a rapid acceleration and deceleration of the brain within the skull (1,2,3). If this force is great enough to jostle the brain, don't you think it might have an impact on the neck too? Interestingly, studies have found that damage to the neck and brain often go hand in hand. One study found that *every athlete they saw who was diagnosed with a concussion had concurrently suffered a whiplash injury as well* (32).

Because whiplash is so closely linked to concussion, the neck may play a role in symptoms *even though there might not be any neck pain* (32).

What is whiplash and how can it affect you?

Whiplash is defined as an acceleration and/or deceleration of the head and neck resulting in symptoms of cervical muscle strain and/or ligament sprain (33,34).

Okay, so that means damage outside of the brain. Why are we talking about this?

Well, symptoms of neck injury have been shown to closely mimic those of concussion in athletes (35). Studies have found whiplash to be associated with headache, dizziness, blurred vision, nausea, and vertigo (32, 36, 37). These are all common concussion symptoms too, right? Yes, which suggests that in certain cases typical post concussion symptoms may actually be coming from musculoskeletal dysfunction in the neck rather than the brain.

In fact, a high proportion of post concussion headache sufferers displayed physical signs of cervical musculoskeletal dysfunction and many had decreased range of motion and muscle tension in their necks (38). More research needs to be done to explore this link, but it's worth inquiring about to your doctor.

How can this be assessed and treated?

A careful physical examination of the cervical spine and a neurologic examination focusing on the vestibular system and oculomotor responses can help identify the neck as a source for symptoms that mimic concussion (39).

Once diagnosed with neck problems, physical and manual therapy have the potential to reduce symptoms and speed up recovery (40).

A thorough evaluation of your neck can be done by a doctor or trained physical therapist to explore this connection. Ask your doctor about it at your next visit!

Headway Concussion Education Webinar Series pt. 3 featuring MMTR Physiotherapy's Dr. Terry Moore.

2. Ocular-Motor Dysfunction

Vision is more than just seeing 20/20. It is how each eye focusses and moves, how your eyes work together, and how your eyes communicate information to your brain. Your ocular-motor system is extraordinarily complex and is wired throughout many parts of the brain (51).

A concussion can affect specific areas of the brain, as well as the pathways needed for proper eye, brain, and body integration (51,52). Because our ocular-motor system is so complex and wired throughout many parts of the brain, it is very susceptible to being thrown off when a concussion occurs (51,52). This can affect *all* aspects of vision. (51, 52).

In fact, one study found that 69% of its pediatric patients had at least one vision problem diagnosed after concussion (51). When looking at adults, 30%-42% have been shown to develop vision problems post concussion (57-62).

Some of the most prevalent types of binocular vision dysfunction found in post concussion patients include:

- *Convergence insufficiency* - problems with both eyes working together (51)
- *Deficiency of pursuits* - problems with the eyes' ability to follow a moving target (53)
- *Reduction in stereopsis* - problems with your brain's ability to judge visual depth (54)
- *Strabismus* - when your eyes don't look at the same point in space or gaze in exactly the same direction (52)
- *Saccadic dysfunction* - problems with the ability to move quickly from one visual target to the next (51).
- *Accommodative insufficiency* - problems with your eyes' ability to focus (51)

Do you get headaches while reading or read slower than you used to? Feel overstimulated in a grocery store? Does your vision sometimes seem blurred?

All these problems and more can be linked to ocular-motor dysfunction typically associated with concussion (52, 55).

How are these vision problems assessed and treated?

Vision therapy is essentially physical therapy for your eyes, and has proven to be effective to treat vision problems in post concussion patients (56). It relies on the brain's neuroplasticity, which is the ability to form new neural pathways through repetition. Certain eye exercises are used to target the use of and retrain each aspect of your eye-brain connection.

Post concussion ocular-motor dysfunction should be assessed by a knowledgeable concussion specialist, neuro-ophthalmologist, developmental pediatric optometrist, or neuro-optometrist who specialize in these problems. Ask your doctor if this could be a factor in your particular case and for recommendations on who to see.

3. Exercise

You may already know that a concussion affects you cognitively and physically. But did you know that a concussion can also affect other physiological systems in your body, such as the cardiovascular and autonomic nervous systems (41,42,43)? *(FYI - the cardiovascular system enables blood to circulate throughout the body, and the autonomic nervous system regulates things your body does automatically, such as heart rate and breathing.)*

Studies suggest that dysfunction within these physiologic systems can contribute to PCS symptoms (44). In some cases patients experience altered autonomic function and impaired cerebral autoregulation, which is one reason why your symptoms may worsen with exertion (45,46).

Think about it - if the systems that govern circulation, heart rate, and breathing get thrown off after a concussion, it makes sense that this could factor into your symptoms and make them worse with physical activity.

Studies have found that one way to address this is through personalized rehabilitative exercise therapy.

What is exercise therapy?

Exercise therapy is the utilization of aerobic activity to help “reset” the autonomic nervous system after the acute phase of a concussion. A patient will gradually increase the amount and intensity of aerobic activity as he or she builds up a tolerance to it.

PCS may be safely treated by using a program of quantitative, individualized, and progressive sub-symptom threshold aerobic exercise rehabilitation (45,47).

Keep in mind, however, that exercise therapy should be done under the strict supervision of a trained medical provider such as a doctor or physical therapist.

How does it work?

Exercise does a few things to your body naturally that can help with concussion related physiologic dysfunction: it increases parasympathetic activity, reduces sympathetic activation, and improves cerebral blood flow (48,49). *(FYI - the sympathetic nervous system is referred to as*

our “fight or flight” system, while the parasympathetic is known as our “rest and digest” system. Think of adrenaline for sympathetic, and relaxation for parasympathetic.)

This suggests that exercise helps normalize these two branches of the autonomic nervous system, which may alleviate some concussion-like symptoms.

In fact, a study at the University of Buffalo found that 72% of PCS patients who participated in the exercise rehabilitation program returned to full daily functioning (47). The rate of symptom improvement was related directly to the exercise intensity achieved (45).

Ask your doctor whether exercise therapy may be beneficial to your specific case.

4. The Emotional Element

Aside from the science of how concussion affects the brain, there is also the emotional tax that sometimes comes with lengthier recoveries. We know from experience that PCS can take a toll on your mental well-being because it is an injury that often affects every facet of your life. It's all too easy to become anxious and depressed, which are factors linked to concussion (8).

These mental health problems are serious and need to be addressed.

It may help to have someone to talk to. Talk to your family and ask your doctor about seeing a psychologist or psychiatrist who is familiar with concussion and PCS patients. Finding someone who specializes in Cognitive Behavioral Therapy might also be beneficial as he or she can provide tools to help manage PCS symptoms.

If you are depressed or experiencing suicidal ideations, please get help immediately. Talk to a trusted adult or contact the National Suicide Prevention Lifeline, which offers free and confidential assistance from a trained professional, by calling 1-800-273-TALK.

Are there ways to prevent concussions?

Helmets are designed to prevent skull fractures and other more catastrophic injuries from head trauma. Unfortunately, there are currently no helmets that are known to successfully prevent concussions. This could be because helmets are ineffective at preventing rotational accelerations, the primary underlying mechanism of concussions (12).

Think of it this way: when you take a check in hockey and your head hits the boards, the helmet protects your skull, but it can't keep your brain from sloshing around inside of your skull.

However, there is a protective mechanism built into the very fabric of the body that might be able to limit this impact: the neck.

In fact, new studies show that neck strengthening may help prevent concussions in sports. One in particular found that weaker neck strength was significantly associated with concussion (18).

Remember the bobblehead toys everyone used to play with as a kid? The heads on those toys whip around like crazy. Why? Because it is held up by springs rather than more durable structures such as wood or plastic.

Think of a weak neck as the unstable springs on a bobblehead. If there is weak support from the structures that hold up the head, it is more likely to get whipped around like a bobblehead does.

Neck strength can help turn those weak springs into a more stable support structure for the head. Studies have found that stronger necks decrease head acceleration, rapid change in velocity, and displacement after a collision, which in turn may reduce the risk of sports-related concussion (16,19).

Stronger necks = reduced bobblehead movement = reduced brain-to-skull collisions

A recent study found for every one pound increase in neck strength, odds of concussion decreased by 5% (18).

Ask your team's certified athletic trainer or doctor about neck strengthening during the season or as part of a return to play protocol.

For Coaches & Trainers

In 2013, the Institute of Medicine and National Research Council concluded that the culture of sports negatively influences concussion reporting and that athletes, coaches, and parents do not fully acknowledge the risks of playing while injured (31).

What can you do as a coach to help create a safer sports culture?

Create an environment where players feel safe to come to you when reporting symptoms. Trust is key.

Here's how you can start the dialog:

Educate your team.

Utilize this site's information to teach your players about concussion and the need to take this injury seriously. Be sure to emphasize how vital the brain is to each individual and that continuing to play with a concussion can be damaging. For more information, see our section on why removal from play is important.

Raising awareness is what we do. We actively seek out opportunities to speak with teams and organizations to provide concussion education. If you are interested in having us to an event, fill out our contact form here.

Form a Plan.

Concussions are going to happen. Sports are rough, people fall, and balls go flying. The easiest way to be prepared and maximize the brain safety of your players is to form a plan of action to utilize when a concussion is suspected.

Here are a few recommendations:

1. Establish guidelines for removal from play and stick to them

Creating guidelines ahead of time about concussion assessment and removal from play will eliminate any confusion and debate in the heat of a game situation or practice. It also sets a good example for your players by prioritizing safety, particularly when concussion is involved.

2. Investigate the latest concussion diagnostic testing tools

Here are a few examples of sideline diagnostics deemed effective by medical professionals (20). They only last a few minutes and are simple enough to be administered by any adult. Explore each test and consult with a doctor to determine what is best for your team. The more tests you perform, the more likely you are to catch a concussion. Keep in mind that ten minutes of testing after a player sustains a blow to the head or body can potentially save a life.

Sideline Symptom Assessment

BESS Test - Balance Assessment

King-Devick Test - Visual and Oculomotor assessment

SAC Test - Standard Assessment of Concussion

Regardless of the specific tests employed, the evaluation should include measures of concussion related symptoms, balance, and neuropsychological function (21).

Once you've selected the types of diagnostic tests, educate trusted parents and assistant coaches on what to look for and how to administer them. If a trainer is not present, designate

someone to be in charge of concussion evaluation. This way, you can still focus on the game and your athlete is being taken care of.

3. Consider baseline testing options

Baseline testing is when athletes take concussion diagnostic tests before an injury has occurred. Once you decide which tests you will use with your team, administer them to each player to establish each individual's baseline score. This score will be used for comparison when an injury occurs. Current standards recommend testing athletes on these measures prior to athletic participation, in order to serve as a baseline for comparison, in the event that the athlete sustains a concussion (22, 7).

The ImPACT Test is a widely used computerized neurocognitive test. Since it is computerized, it can't be used as a sideline diagnostic, but it can be a useful tool when considering return to play. Players should be encouraged to explore getting baseline tested in this as well.

This test **should not supplement the evaluation by a licensed medical professional** and needs to be interpreted by someone experienced in using the test and in the context of a complete clinical evaluation for concussion.

Make the New Tough Pact.

Through athletics, players learn resilience, commitment, and teamwork. We know the life lessons players develop from overcoming adversity and fighting through pain. However, athletes and coaches should know that concussions are a type of injury that should never be pushed through. The New Tough Pact provides an opportunity for players and coaches to be proactive in creating a safer sports culture where concussions are handled with diligence and care.

Players commit to report symptoms, stay patient during concussion recovery, play with integrity, and support teammates who have sustained a concussion.

Encourage.

It is on coaches and leaders to establish a safe team culture. Rewarding safe play, listening to players' needs, and encouraging athletes to report concussion symptoms goes a long way. If a concussion does occur, make sure that player is taken care of. Ask how he or she is doing, encourage teammates to offer support, and model patience throughout recovery.

For Parents

Get involved to ensure your child's safety. Here are some recommendations:

Learn and Discuss

Help protect your child by learning about concussion. Get the facts by exploring the Resources section of our website.

Then, have a conversation about it! Do your best to make sure your child understands concussion before participating in a sport. Children should be made aware of concussion symptoms and existing protocols for their team. The more they understand, the more likely they are to report symptoms and avoid confusion if an injury occurs.

Identify Concussion Experts

One way to be proactive about your child's brain health is to be prepared in case of injury. Before your child starts his or her sports season or school year, make sure to do research ahead of time. Start by identifying the people and places in your community who can care for your child if a concussion occurs. See our "Recovery Tips" section for more details on this.

It's important to select a doctor/concussion clinic that is up to date with the latest findings, offers a rehabilitation plan, and has extensive experience in dealing with concussion. There are still many unanswered questions when it comes to concussion but, making sure the doctor you chose is up to date with the latest findings will help put your child on the right path to recovery.

Investigate Concussion Protocols

Connect with your child's school administration and sports organizations to learn about what measures are in place for your child. Inquire about the school or team's existing concussion protocols and baseline testing. If no plan is in place, learn how to create one in our "For Coaches" section.

Consult a doctor with any inquiries you may have.

Support your child.

Concussions can affect every aspect of a child's life and they are often very isolating. Here are some tips to show support:

Concussions can affect every aspect of a child's life and they are often very isolating. Here are some tips to show support:

Keep your child's spirits high!

- Cook or order in their favorite meal - our favorite foods have a way of cheering us up and making us feel special
- Play a game - games are a great way to keep your child entertained as long as it doesn't cause symptoms so, break out that deck of cards or grab a board game and have fun!

- Plan an outing - Just because your child has sustained a concussion does not mean they have to be confined to the house. If your child is feeling up to it, go outside for a walk, apple picking, or out to a quiet restaurant.

Prioritize Recovery.

Every concussion is different and every child recovers at a different pace, which means patience is key. We have learned from experience that pushing too hard, too soon can be detrimental to the recovery process and leads to added stress. Work with your doctor to make sure your child is re-acclimating to daily life at the correct pace.

In the meantime, let your child know that you are there to help with their school work, be their advocate, and provide reassurance about their situation.

Your child may benefit from:

- Creating a schedule for making up assignments, recommended therapeutic exercises, and doctor appointments.
- Reading assignments out loud to them

Listen To Your Child.

Give your child the opportunity to articulate how they are feeling, how recovery is going, what is working, and what is not. Listen to their complaints and struggles. Consider keeping a log of symptoms to show the doctor and try to help eliminate their stress.

The patient is the only one who knows exactly how the patient feels. Particularly with older kids, It's important that they know their voice is being heard.

Make Sure Your Household Is Aware of the Injury.

Keep everyone up to date on what the deal is. Rally other family members to be supportive. With siblings especially, you may need to explain what a concussion is and that their brother or sister will be ok. You can also discuss things such as being mindful of noise in order to create the optimal environment for recovery.

Recovery Tips

Think you or your child may have a concussion, now what?

Rest

If a concussion is suspected, the best thing to do until you are evaluated by a doctor is to rest both cognitively and physically.

Experts agree on this in the acute phase of concussion. It is noted in consensus statements published by the American Academy of Neurology, the American Academy of Pediatrics, the American Medical Society for Sports Medicine, the National Athletic Trainers' Association, and the 4th International Conference on Concussion in Sport (8).

If you suspect a head injury, do not finish the school day and do not finish the practice or game. **Immediately resting can help expedite recovery.** In a recent study, teenage athletes who continued to play with a concussion required nearly twice as long to recover than those who were immediately removed from play (13).

Not only does it delay your recovery, but it puts you at risk for another blow to the head, which can lead to a much more serious injury (*see "what is second impact syndrome"*).

See a doctor experienced with concussion

When looking for the right concussion clinic, it's important to ask these questions:

- What is the background of the doctors?
- Does the clinic offer a multidisciplinary team?
- How many concussion patients does the clinic see?
- Do they have "return to learn" and "return to play" protocols?
- Does the clinic have positive reviews from previous patients?
- Does the clinic recommend exercise therapy as part of recovery?
- Does the clinic have experience with Post Concussion Syndrome?
- Will the doctor assess the patient's ocular-motor system, vestibular system, and neuropsychology?

It's important to select a doctor and concussion clinic that is up to date with the latest findings, offers a rehabilitation plan, and has extensive experience in dealing with concussion. There are still many unanswered questions when it comes to concussion, but making sure your doctor is up to date with the latest findings is a good place to start.

Maintain a Healthy Diet

Most doctors encourage a *brain healthy, high protein* diet while recovering from concussion. It's important to give your brain the nutrients it needs to make a full recovery.

- **Eat plenty of fruits and vegetables** particularly those full of antioxidants and Vitamin E such as blueberries, spinach, and broccoli. This has been shown to help with memory and general neural function (24).
- **Consume protein.** A recent study showed that having certain Branch Chain Amino Acids, the building blocks of proteins, following a concussion can improve cognitive deficits created by the injury (25). Great high protein foods include: meat, fish, nuts, greek yogurt, and beans. You can also try animal based protein supplements like Whey or straight BCAAs that can be purchased at your local GNC.
- **Eat foods rich in Omega 3s.** Omega-3 fatty acids, specifically DHA, have been shown to improve cognition, plasticity, and recovery of neurons after traumatic brain injury (25, 26). The easiest source of Omega 3s is fish such as salmon but, they are also found in flaxseed, chia seeds, walnuts and soybeans (27).

Too nauseous to eat? Try smoothies! It is an easy way to get the required nutrients without having a full stomach. It might also help to have many small meals throughout the day instead of three large ones. Ginger gum, typically recommended to those suffering from morning sickness or side effects from chemo, can help curb nausea brought on by concussion. Ginger Ale and seltzer are also used to settle the stomach. You can find all of these at your local pharmacy.

Stay Hydrated

Dehydration can mimic many typical concussion symptoms such as headache. Give the brain the optimal environment to heal by staying hydrated. To see if you are properly hydrated, check the color of your urine. Light yellow or clear coloration is an indicator for adequate hydration.

Turn off Electronics

Screens put unnecessary strain on an injured brain. Did you know, LCD screens (TV, smart phone screens, computer screens, etc.) constantly flicker (28)? This allows the screen to update new information in order to scroll or show video. The flickering is invisible to the naked eye, but it strains our eye muscles as they attempt to keep up with the new information. This is why sitting in front of the computer too long can give the average user headaches, let alone someone who has sustained a concussion (28).

Instead, try listening to a book on tape, drawing, or taking a walk. If using a screen is necessary, try lowering the brightness, placing a blue tint over the screen or, changing the white background on your computer to one that is easier on the eyes.

Take Breaks

When a brain is injured, it is easily overwhelmed and overworked. After a concussion, there is a decrease in cerebral blood flow that creates an energy supply-demand imbalance (14). The brain is starved for energy to heal and function. This means it can use a break or two so it can rejuvenate! Here are some easy ways to ensure you rest enough during recovery:

- Take a few short 10-15 minute breaks throughout each day. Pace yourself. If you have symptoms, a step back is necessary or else you could potentially set your recovery back.
- Set a timer when doing physical or cognitive work. Depending on where you are in your recovery, set the timer for 15, 20, 30, 45, or 60 mins. When the timer goes off, take a break, rest. Then repeat. If you know how long it usually takes before your symptoms return, be sure to set the timer as a shorter interval. Plan ahead of time to have breaks in your school day.

Talk to your school.

The school will play an important role in helping you or your child recover.

1) Notify the school right after a concussion is diagnosed by a doctor.

Get a note from your doctor explaining the diagnosis and recommending accommodations. This way, teachers will be made aware of the situation before your child returns to school.

2) Make sure your or your child's teachers understand what a concussion is and its specific effects on you or your child.

Many schools are implementing their own concussion education programs, so the staff may already be familiar with concussion. Regardless, as concussion is an invisible injury and each one is unique, it is important that you share everything you or your child is experiencing so teachers will have a better understanding of the situation.

Emphasize the fact that even though you or your child may look fine and be in the classroom, it does not necessarily mean he or she is fully absorbing the information discussed.

3) Discuss Partial Days

Depending on how you or your child is feeling, it may be a good idea to ease back into school with partial days. You or your child should try and be in the classroom when you are at your best. For some, this might be in the morning. For others, it might be in the afternoon only. Experiment with different schedules and find which one works for you or your child.

Gradually increase to full days per your doctor's orders.

4) Explore accommodation options

Below are some suggested accommodations taken from doctors from Children’s Hospital of Philadelphia and University of Pittsburgh to take to your school. Keep in mind, your doctor may have specific accommodations that they recommend.

- Offer extended time for taking assessments and assignments (doctors note is usually required)
- Extend time once the student has returned to school to make up assessments and assignments
- Provide a copy of the class notes so the student does not have to multitask during a class and can focus on listening to the teacher
- Allow students to leave 5 mins early from class so that they can travel the halls without crowds if needed
- Have a “flash pass” that allows the injured student to leave class and go to the nurse or bathroom whenever they want during the day. Allows for frequent breaks throughout the day..
- Allow concussed student to write on and answer on their test
- Allow student to have food and drink with them throughout the day.
- Reduce class work and homework by 50% (ex: 50 math problems given to class, concussed student only has to do 25 for the same credit)
- Provide option to take tests in a separate environment (empty room, darker room, lying down, etc.)
- Increase font size for tests
- Provide option to have tests administered orally if the student requests

If you are having a tough time working with your school, consider creating a 504 plan.

A **504 plan** is an official agreement of accommodations with the school system, which can be utilized to manage the long term effects of concussion or to simply enforce the doctor’s recommendations if certain teachers are unwilling to cooperate. Talk to your doctor and your school guidance counselor to see if this is the right next step for you.

Prioritize Sleep

Our brains rely on a good night’s sleep to recover from the day’s activities. When recovering from a concussion, the brain needs to rest even more, and it rests best when sleeping (29). According to the CDC, school aged children and teens should be getting at least 9 hours of sleep for optimal function (30).

Make sleep your top priority by following these tips:

- Stick to a routine: Go to bed and get up at the same time every day.
- Minimize distractions (TV, phones, computers) in your bedroom.
- Wind down at least forty-five minutes before going to bed. Do this by limiting screen use, closing up your textbooks, and getting ready for bed.
- Experiment with breathing exercises and meditation before bed.
- Heat up some milk as a natural way for your body to get melatonin, which makes people feel sleepy.

Take short naps during the day as needed. Naps can be effective at “refreshing” the brain, but should be kept short so as not to disrupt the ability to fall asleep for a full night’s rest (29).

Stay Positive. Stay Patient.

This is the hardest part of concussion recovery and perhaps the most important. When you have a concussion it is easy to become frustrated and feel overwhelmed. Maybe you have a lot of make up work to complete or you are worried about your position in your team’s lineup. Maybe your brain isn’t working the way you want it.

Anxiety and depression are often linked to concussion (8). Stress can have a negative impact on concussion recovery.

Below are some helpful tips to relieve stress and improve your quality of life when recovering. Keep in mind, these are only suggestions! Whether or not you can do each option is dependent on the person and where he or she is at in recovery.

Practice Meditation and Deep Breathing Exercises - A study designed to evaluate the effects mindfulness based stress reduction for concussion and PCS had very positive results. It found that patients who practiced mindfulness had an increased quality of life and smaller but significant improvements in their working memory and regulation of attention (64).

- Download an app - there are so many great mindfulness apps available for free.
- Count 25 deep breaths - inhale for 3 seconds through your nose exhale for 6 through your mouth; breathe with your stomach. Pay attention to how your body feels while breathing.

Practice Yoga - Yoga combines meditation with controlled movements and balance exercises. Though there is limited scientific evidence, yoga is frequently recommended by doctors for stress relief.

- Find a studio near you that offers rehabilitative yoga, flow yoga, and/or yoga for stress relief. Make sure you only do what feels good for you.
- Look for videos on Youtube.
- Order a yoga dvd on amazon.

Go outside - Walking outside has been shown to have a positive effect on mood and even cognition (23). Go for a leisurely walk, get the blood flowing, and enjoy the outdoors! Remember to not push yourself past your own limits though!

Listen to an audiobook - Headway's personal favorite is the Harry Potter series, but any book will do. Books on tape are entertaining, engaging, and can be listened to on a low volume. Borrow some from your local library!

Cook or order in your favorite meal for dinner - Our favorite foods always have a way of cheering people up. Cooking or baking can also be a great way to pass the time if symptoms are not triggered. There are tons of recipes available online so, put your chef's hat on and have some fun!

Do Art - Doing art and exploring your creative side is a fun way to relieve stress. Find some crayons or colored pencils and go to town!

- Doodle.
- Buy a coloring book to fill in.
- Sign up for an art class.

DISCLAIMER: Headway is not a medical provider and does not provide medical advice. Any medical information included on this website is provided for informational purposes only. Always seek the advice of your physician or other qualified health care provider with any questions you may have regarding a medical condition or treatment.

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