LET’S TALK ABOUT . . .

MOTION AND CYBER SICKNESS

Key points

• Motion sickness is nausea or discomfort caused by being in a moving vehicle.
• Cyber sickness is nausea or discomfort caused by using virtual reality (VR).
• Usually the symptoms go away within hours after the motion or use of VR stops.
• You can do things to prevent or relieve the symptoms of motion sickness.
• Cyber sickness is best treated by stopping use of VR if you start to feel symptoms.

What is motion sickness?

Motion sickness is nausea or discomfort that happens when you are exposed to certain types of motion, such as riding in a boat, car or airplane. Motion sickness is also very common during space travel. The nausea and discomfort may last for several hours after the motion stops.

Some people have only mild symptoms, but other people have severe symptoms that can severely interfere with their lives. Rarely, motion sickness can cause so much vomiting that it causes dehydration.

Not everyone gets motion sickness, although nearly anyone can get it if the motion is severe enough. But some people are more likely to get motion-sick, including women and children under 12. There is some evidence that motion sickness is more common in the middle of the menstrual cycle. People with other conditions that cause nausea, including early pregnancy, migraine and vestibular disorders, are likely to get motion sickness as well. Motion sickness is less common in children younger than 2 and people older than 50. People who do not have a functioning vestibular system do not get motion sickness.

Some people have symptoms of rocking or swaying for a month or more after being exposed to motion. They have a rare condition called mal de débarquement syndrome (MdDS). Its key feature is the opposite of motion sickness: the symptoms often get better while the person is experiencing passive motion, for instance being in a moving car or boat.

What is cyber sickness?

Cyber sickness is nausea or discomfort that is caused by using virtual reality (VR) technology. It is similar to motion sickness, except that the “motion” that causes it is virtual, not real. As with motion sickness, the symptoms of cyber sickness can last for several hours after the VR session ends.

As many as 40% to 70% of people experience some cyber sickness when using VR, and the number is even higher for some programs. People who are more sensitive to visual motion signals are more likely to get cyber sickness. If someone tends to get motion sickness, they are also likely to get cyber sickness.

What causes motion and cyber sickness?

The brain’s balance system combines information from many sources, including:

• the vestibular system (the semicircular canals and otoliths in the inner ear), which senses when your head tilts, turns or changes speed
• the visual system, which lets you see
• the proprioceptive system, which sends signals about position, pressure, movement and vibration from the legs and feet and the rest of the body

The most popular theory is that motion and cyber sickness are both caused by a sensory mismatch or conflict between the signals the balance system is sending to the brain. These signals may also clash with the brain’s expectations (known as your
internal model of motion). For example, when you are riding in a car:

- your vestibular system says that you are moving
- your proprioceptive system says that you are sitting still
- your visual system may be getting different signals depending on what you are looking at; for example, if you are trying to read or look at your phone, your visual system will say you are not moving
- unless you are the driver, you do not know exactly when you are going to slow down, speed up or turn; motion sickness may become even more of a problem in self-driving cars

Similarly, if you are watching movement on a VR headset, your visual system detects movement but your vestibular and proprioceptive systems do not. This can create a mismatch or conflict between the different parts of the brain’s balance system, similar to visually induced dizziness. It is caused by a mismatch or conflict between the different parts of the brain’s balance system, similar to motion sickness.

Some VR simulations are more likely to cause cyber sickness than others because the amount of simulated movement is more extreme.

Symptoms of motion and cyber sickness

The main symptom of motion and cyber sickness is nausea. Before nausea appears, though, many people feel other symptoms, including:

- a feeling of stomach fullness or awareness
- heartburn
- headache
- salivation (mouth watering)
- needing to urinate (pee) more often
- malaise (generally feeling unwell)
- sleepiness or fatigue (tiredness)
- irritability or restlessness
- belching
- yawning
- cold sweat
- turning pale
- flushing
- feeling warm
- dizziness without spinning
- feeling wobbly, imbalanced or unstable

In the most severe cases, people with motion sickness can be completely unable to function, although this is rare.

How motion and cyber sickness is diagnosed

Usually the symptoms of motion and cyber sickness go away within hours after the motion stops. If the symptoms continue for days or are really severe, visit a primary care physician to rule out other conditions.

Prevention and treatment of motion sickness

It is better and easier to prevent motion sickness than to treat it after it has started. For this reason, it is important to learn what situations are likely to give you motion sickness and avoid them if possible. If you cannot avoid them, there are other things you can do that may help to prevent or reduce the symptoms.

Many things can make motion sickness worse, including:

- more severe and unpredictable motion: riding in a car on a bumpy, twisty road is usually worse than riding on a train, and being on a boat is worse in rough weather
- reading, looking at your phone, and other tasks that involve focusing your gaze on something close to you
- not being able to see the horizon, for example if there is fog or if you are not near a window
- an empty stomach
- unpleasant smells

Reduce the motion as much as possible

Avoid unpleasant types of motion as much as you can. For example:

- Do not fly if storms or turbulence are likely
- Try not to take routes with many turns and ups and downs
Do not travel on water during storms or if there are large waves

Sit where the movement is smallest

Try to sit in the place that has the least vertical (up-and-down) and rotational (twisting or swaying) motion:
- In a car, drive or sit in the front passenger seat; if you need to be in the back seat, lie down
- In an airplane, sit over the wing
- In a boat, sit near the surface of the water and face toward the waves; do not sit at the front (bow) of the boat, which is often the bumpiest part
- In a bus, sit near the front, facing forward, on the lowest level
- In a train, sit facing forward, on the lowest level

Get used to the motion gradually

If you are going on a long trip, it may help to take shorter trips with breaks to help you get adjusted. For example, you could spend a few hours on board a boat and see how you feel before you set off on a cruise.

Move in sync with the motion

Moving your body actively can help with motion sickness. If possible, try the following:
- Tilt your head into turns
- Drive or imitate the driver’s actions
- Stand with your legs bent and move with the action of the vehicle or boat; do not try to stand too stiffly
- If possible, walk around

If it is not possible to move around, brace your body and head to avoid extra movement. If you can, lie as flat as possible.

Make sure you have a view

Watching the horizon can help with motion sickness:
- Avoid spaces without windows or where you cannot see the horizon
- Do not read, look at your phone or do anything else that keeps your eyes focused close to you
- Look forward, towards the direction you are travelling

Focus on a distant point on the horizon and keep a wide view

If you cannot see the horizon, close your eyes or wear sunglasses.

Make yourself as comfortable as possible

Physical, mental and emotional discomfort can make motion sickness worse. Do everything you can to get as comfortable as possible and have a positive attitude:
- Do not drink alcohol
- Drink enough water to stay hydrated
- Eat frequent light, bland meals and snacks that are low in fat and acid, such as bananas, crackers, applesauce or toast
- If you have gastritis or stomach problems, get treatment for them if you can
- Try to be well rested before you start your trip
- Try to sleep
- Stay dry
- Make sure the space you are in is well ventilated and does not smell bad
- Try not to think or talk about motion sickness
- Distract yourself with music, breathing exercises or other relaxation techniques
- Cognitive behavioural therapy can also be helpful

Vestibular rehabilitation

Vestibular rehabilitation is a type of exercise-based therapy. It can be helpful for people with vestibular disorders who have motion sickness. Its goal is to help your brain get used to signals that trigger motion sickness. This is done through repeated, controlled exercises to reduce visual dependency for balance (sensory reweighting). A vestibular therapist can help you set treatment goals and design an appropriate program.

Vestibular rehabilitation for motion sickness may include:
- Habituation training
- Optokinetic exercises

Medication and other treatments

Some medications can help prevent or treat motion sickness. They work best if you take them before
you start to have symptoms. The most common medications for motion sickness are:

- Transdermal scopolamine patches (Transderm-S): Apply the patch behind one ear at least 4 hours before you are going to travel. Each patch lasts for 72 hours (3 days). This medication is available from pharmacists in Canada. It can cause drowsiness in some people.

- Over-the-counter anti-nausea medications such as dimenhydrinate (Gravol®): These are available in various forms, including capsules, chewable tablets and suppositories. Check the dosage instructions for the product you are taking. These medications can cause drowsiness, so you should not drive or operate heavy machinery if you take them.

If these products do not help your symptoms, talk to your doctor. Certain prescription medications may help with severe motion sickness.

Read the label of any medication you take, and check with your pharmacist if you are taking any other medications or if you have any health conditions, especially glaucoma. If you have not used a motion sickness medication before, it is a good idea to try taking it at home so that you can see how it affects you before you need to travel. If you smoke, temporarily stopping may reduce motion sickness.

Some people find that alternative therapies such as acupressure wristbands are helpful, although the evidence is limited. Anti-motion sickness glasses® are now sold in Canada, however no research has been done to test their effectiveness.

### Prevention and treatment of cyber sickness

Less is known about how to prevent cyber sickness, but this is an area of active research. At present, the best way to treat cyber sickness is to stop using the VR system if you start to feel symptoms.

Some studies have found that cyber sickness may be worse if the VR headset does not fit well, so that the distance between the lenses is too wide for the person’s eyes. This is more often a problem for women, who tend to be smaller than men. Making sure that the lenses are properly adjusted may help to reduce cyber sickness.

### What to expect in the future

Motion sickness and especially cyber sickness are active areas of research. Software developers are working on ways to eliminate or reduce the effects of cyber sickness. Scientists are looking into what causes them and how to predict who will be affected, as well as whether better treatments are possible.

### Sources


Handout updated December 2019.