

Why Do We Yawn?

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STORY AT-A-GLANCE

- › Yawning starts before you're born and continues throughout the rest of your life, often associated with being tired or bored
- › Research demonstrates that yawning may be the result of your body attempting to cool your brain, which gets overheated when you're sleep deprived or exhausted
- › Yawning may help you bond more closely with your dog, but you should not experience excessive yawning, which may indicate medical problems such as multiple sclerosis, heart attack or liver failure

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Yawning starts before you're born and has often been associated with boredom or being tired. But, research now suggests there is more to this simple behavior than you may have imagined. It is as involuntary as breathing in many cases and likely has more than one trigger.

Scientists are split into two camps – one believes [yawning](#) has a physiological cause and physical benefit, while the other believes yawning is psychologically triggered and once was used as means of [communication](#).¹ What we do know is that all humans and most animals yawn for one reason or another.

One popular theory behind yawning is related to the shallowness of your breathing. In other words, the more shallow your breathing, the less oxygen enters your blood. In

response, your body triggers a yawn that increases the amount of air you breathe in and increases your blood oxygen level.

However, a compelling theory explored by Princeton University researcher Andrew C. Gallup, Ph.D., and colleagues links yawning to [sleep deprivation](#), tiredness and cooling your brain.²

Why Do You Yawn?

In this short video you'll discover interesting facts about yawning, and why humans may be compelled to do it. Researchers have found that when you yawn, it actually may help to cool your brain. During a yawn, your mouth usually opens wide and your lungs drawn in a lot of air.

Your eardrums stretch and your eyes may close tight, triggering tearing.³ These movements activate an increase in your heart rate and the blood flow in your fascial muscles. Each of these factors are essential in the ability of your body to cool your brain.

However, cooling your brain is only one possible explanation. Scientists have not yet reached a definitive answer. One theory is that your body is in process of changing states. Yawning occurs more frequently when you're bored, sleepy⁴ or after an intense physical activity.⁵ Each of these represent a change in awareness your brain and body may be going through, and yawning may help to increase your awareness.

A change in altitude may also trigger yawning, as moving from high pressure to low pressure may cause air to build up behind the [eardrums](#). Yawning stretches the eardrum and expands the Eustachian tubes, helping to equalize the pressure behind your eardrums and relieve the pain or discomfort. This is also called ear barotrauma and may be relieved by chewing gum, sucking on candy or yawning to open the Eustachian tubes.⁶

You likely have found that when you're bored, you also yawn more frequently. The theory behind this is that when bored,⁷ you don't breathe as deeply as you usually do and your

breathing becomes slow and shallow. Your body takes in less oxygen, driving up your carbon dioxide levels in your blood. When you yawn, you draw in more oxygen and remove more of the carbon dioxide.⁸

Some researchers believe yawning was a form of communication before they were able to vocalize. However, at this time, researchers have not found any one definitive reason for yawning, and there may likely be more than one circumstance that triggers the behavior.

Unique Method of Temperature Regulation

In many instances, people who yawn may also be tired. The yawn may occur just before going to bed, or just after awakening in the morning. Sleep deprivation and exhaustion are factors that increase the temperature of your brain higher than optimal for ideal functioning. One function of sleeping is thermoregulation, or regulating heat distribution and release so your body may maintain a healthy core temperature.

Without **adequate sleep** your body may have more difficulty regulating your temperature, allowing your brain to get warmer and making you sleepy.⁹ The simple act of yawning may help compensate for a failure in your thermoregulation that was caused by a lack of sleep. This means that while you are yawning at a time you are tired or exhausted, the trigger may not be from a lack of oxygen to your brain, but rather from poor thermoregulation that allowed your brain to get warm.

An increase in brain temperature has been demonstrated in sleep deprived rats.¹⁰ When rats were sleep deprived, their brain temperature measured slightly higher than their core temperature, and they had reduced metabolism in the area of their brain that controlled temperature and endocrine regulation. Another study using an animal model found that yawning may serve as a mechanism to regulate body heat in response to either brain or body temperature.¹¹

In previous research, Gallup found the frequency of yawning in parakeets would more than double when the room temperature increased.¹² Moving forward, Gallup's research

on humans found people were more likely to yawn in the winter months when the cold air could cool their brain, than in the summer months when they would be inhaling warm air.¹³

Gallup believes this regulatory response helps your brain to function more efficiently, much like a computer functions better when not overheated.¹⁴

Yawning Is Contagious

If you've ever watched a loved one or good friend yawn, you'll likely have experienced contagious yawning. Also called empathetic yawning, research has found that how contagious the yawn is¹⁵ may be related to your social bond with the individual who initially yawns. The greatest response was found in family members, then friends and then acquaintances, with the lowest rate of contagious yawns in people watching strangers yawn.

The outcome of this study suggested there is a magnitude of activation to yawning that differs with the subject's familiarity with the person yawning. The researchers proposed the degree of contagion of a yawn is primarily driven by emotional closeness between individuals. Psychologists who studied more than 120 children found another factor involved in the contagious yawn – the ability to be empathetic.¹⁶

They discovered children younger than 4 and those with autism spectrum disorder were immune to the contagious yawn.¹⁷ Lead author Molly Helt, Ph.D., commented on the ability of young children to be sensitive to other people's expressions. Although they may recognize changes in expression, they may not yet be capable of unconsciously mirroring behavior or emotion. She said:¹⁸

"We know that the social brain develops over the first few years of life. At some point we sort of start to take on the emotions of other people without even thinking about it."

Gallup also experimented with contagious yawning and found how you breathe may impact whether or not you spontaneously yawn when you see others yawning.¹⁹ When

the participants were not given direction on how to breathe, or were asked to breathe only through their mouth, the incidence of yawning in response to watching others yawn was 48%.

However, when those same participants were instructed to breathe only through their nose, none of the participants exhibited contagious yawning. In another test of his theory of thermoregulation associated with yawning,²⁰ Gallup applied temperature packs to the foreheads of participants who then watched videos of other people yawning.

When the participants held a warm pack, or one that was room temperature, to their forehead while watching others yawn, contagious yawning happened 41% of the time. By comparison, that number dropped to 9% of the time when the participants held a cold pack to their head. This suggested there is a functional component to yawning.

What Does Age Have to Do With It?

In a study evaluating contagious yawning the researchers found young children, people with autism and people suffering from schizophrenia all lacked the ability to "catch" a yawn contagiously.²¹ Both autism and schizophrenia involve impaired social skills. However, in contrast to other studies, this sample of 322 participants did not yield an association between contagious yawning and empathy, intelligence or time of day.

The study pointed out the greatest variability in contagious yawning continues to remain unexplained, and researchers are now delving into whether there may be a contributing genetic factor. The long-term goal of studying the effect of contagious yawning is to gain a better understanding into conditions that trigger social impairment, such as schizophrenia and autism.

The only autonomous factor that meaningfully influenced yawning was the age of the participant. The researchers discovered that as the participant age increased, they were less likely to yawn. However, this explained only 8% of the variability in the results. Study author Elizabeth Cirulli, Ph.D., assistant professor of medicine at the Center for Human Genome Variation at Duke University School of Medicine commented:

"Age was the most important predictor of contagious yawning, and even age was not that important. The vast majority of variation in the contagious yawning response was just not explained. It is possible that if we find a genetic variant that makes people less likely to have contagious yawns, we might see that variant or variants of the same gene also associated with schizophrenia or autism.

Even if no association with a disease is found, a better understanding of the biology behind contagious yawning can inform us about the pathways involved in these conditions."

How You Can Use Yawning to Bond With Your Dog

Have you ever yawned and noticed your dog "caught" your yawn too? Chimpanzees, dogs, baboons and wolves²² are animals that have demonstrated contagious yawning with their pack. Dogs don't often "catch" a yawn from another dog – instead they mimic their master or family member.

In a study analyzing the behavior between dogs and humans,²³ the researchers placed 29 dogs in the position of observing a human yawning. A second group of human controls made other mouth movements.

The results showed nearly 73% of the **dogs** yawned when they saw a human yawn, while the control group had no influence on the dogs yawning. It is possible, that as yawning may heighten arousal or change the state in you or your dog, contagious yawning could facilitate a closer bond between you and your furry friend.

According to a study in *Biology Letters*:²⁴ "Since yawning is known to modulate the levels of arousal, yawn contagion may help coordinate dog-human interaction and communication."

Another study found dogs were more apt to "catch" a yawn from voices they were most familiar with, rather than from unfamiliar yawns.²⁵ The researchers wrote:²⁶ "Although not allowing for conclusive inferences about the mechanisms underlying contagious

yawning in dogs, this study provides first data that renders plausible empathy-based, emotionally connected, contagious yawning in these animals."

How Much Is Too Much?

Excessive yawning, more than once per minute, may be attributed to being exhausted or bored, but could potentially be a symptom of an underlying medical condition. Gallup suggests that excessive yawning may be a symptom of health conditions that increase brain and/or core temperature, such as central nervous system damage.

It may be time to have excessive yawning evaluated when you are unexplainably yawning more than one time a minute and/or it's associated with being very sleepy during daytime hours. Although not common, excessive yawning may be a symptom of:^{27,28}

- Vasovagal response, or stimulation of the vagal nerve, by a heart attack or aortic dissection
- Brain dysfunction such as epilepsy, tumor or multiple sclerosis
- Liver failure
- Failure to control body temperature
- Certain medications

Fun Facts About Yawning

- **Two medical terms for yawning distinguish two associated actions** – The term oscitation derived from the Latin verb oscitatio, meaning to open the mouth, refers to the action involved, while the term pandiculation is the act of yawning and stretching.²⁹
- **Even babies yawn before they're born** – Although previous imagery of open-mouthed babies in the uterus have not conclusively demonstrated that your unborn baby is yawning, in 2012 a review of four-dimensional scans was able to distinguish

between an open mouth and a yawn. Researchers found that the behavior peaked at 24 weeks and then disappeared by 36 weeks.³⁰

- **Guinea pigs yawn to communicate anger or aggression** – They bare their large incisor teeth and yawn to communicate to you or other pigs they are not happy.³¹
- **Yawning is more contagious between family and close friends** – You are also likely to yawn after reading or thinking about the activity. Most people will have yawned at least once or twice while reading this article!
- **Yawning may give you an indication of a person's empathy level** – While more work needs to be done to determine the extent that empathy plays in a contagious yawn, people with social impairments, such as autism and schizophrenia, and those who rank high on psychopathic personality trait measurements, often don't "catch" a contagious yawn.

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