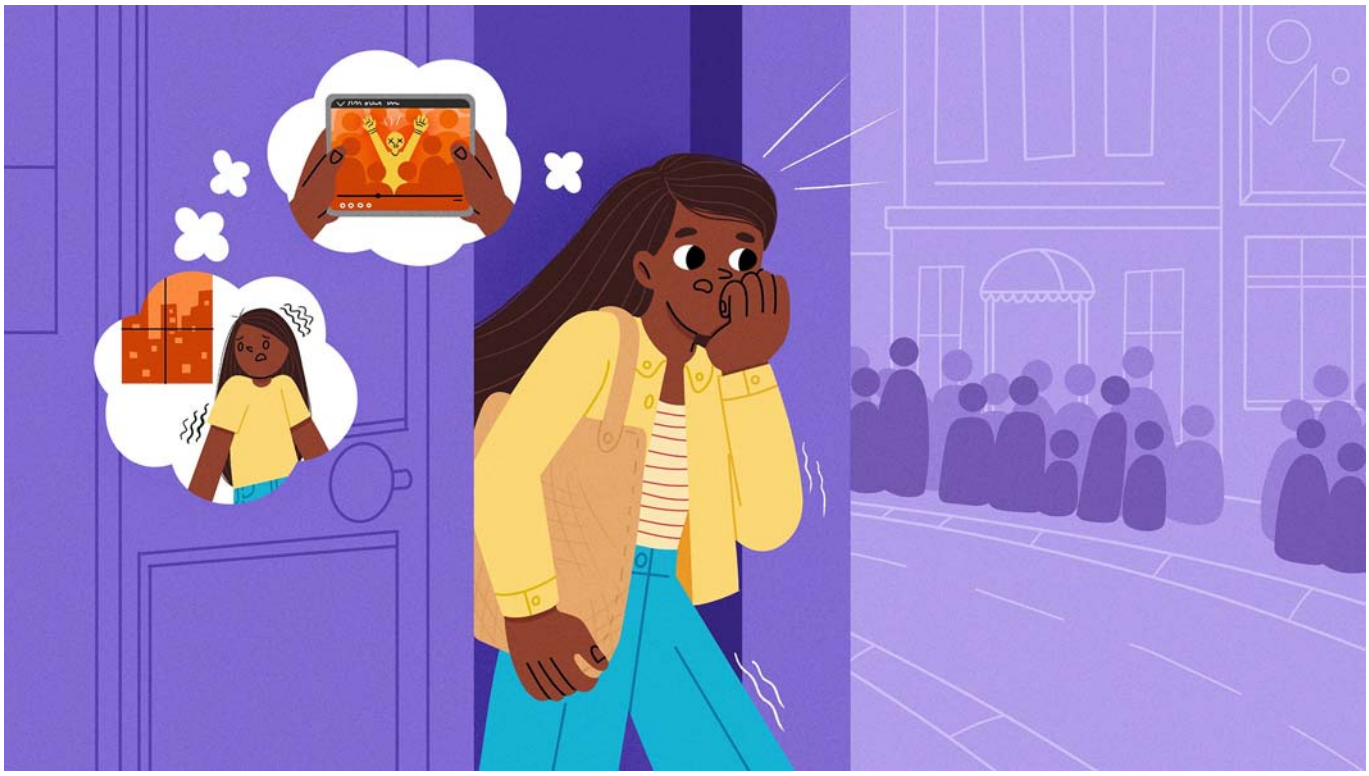
frontiers for Young Minds

NEUROSCIENCE AND PSYCHOLOGY
Published: 18 February 2026
doi: 10.3389/frym.2026.1559505



FACING FEAR: THE SCIENCE BEHIND THE DEVELOPMENT OF PHOBIAS

Virginia Millsap[1], *Michael C. Hout*[1,2,3*] *and Andras N. Zsido*[4]

[1]*Department of Psychology, New Mexico State University, Las Cruces, NM, United States*
[2]*Department of Kinesiology, New Mexico State University, Las Cruces, NM, United States*
[3]*STEM+ Education Research Institute, New Mexico State University, Las Cruces, NM, United States*
[4]*Institute of Psychology, University of Pécs, Pécs, Hungary*

YOUNG REVIEWERS:

FITZGERALD ELEMENTARY SCHOOL

AGES: 9–10

Everyone feels scared sometimes, but when a fear becomes so strong that it stops us from doing things we want or need to do and interferes with our daily lives, it could be considered a phobia. Being fearful of scary things, like heights, the ocean, or rats, is good and important for survival, but too much fear can be harmful and cause mental or physical distress. Phobias develop due to many factors. One factor is genetics, which means that phobias may be passed down through families. Phobias can also result from environmental influences, like particularly scary experiences. Additionally, phobias can arise due to something called fear conditioning, where the brain learns to associate something harmless with a sense of danger. Phobias can even develop from watching someone else be scared of something.

In this article, we discuss some of the ways a phobia can develop and how they can be treated.

WHAT ARE PHOBIAS?

PHOBIA

An irrational, uncontrollable, and persistent fear of an object or situation that can interfere with everyday life.

A **phobia** is not the same as a simple fear. Everyone feels scared sometimes, like when watching a scary movie or encountering something unexpected. However, a phobia is much stronger and lasts much longer than a fear, and phobias can make people panic even when the object or situation they fear is not actually dangerous. For example, someone with a phobia of spiders might be terrified of even a harmless spider that is far away. This fear can feel so overwhelming that it affects a person's ability to enjoy everyday activities. Phobias can also cause physical reactions like sweating, a racing heart, or difficulty breathing, which make the fear seem like a true threat. Unlike ordinary fears, which tend to pass quickly, phobias can last for months or years and, without treatment, may even get worse over time. Understanding what makes a fear become a phobia is an important step in finding ways to manage and overcome phobias.

Phobias come in many forms and affect people in different ways. Some people have specific phobias, which are fears of certain objects or situations, like rats, thunderstorms, or flying in an airplane. These phobias can make people avoid everyday activities, like walking in the park or traveling by plane. Specific phobias may also cause people to avoid things they need to do; for example, someone may avoid going to the doctor if they have a phobia of needles. People with severe agoraphobia can even refuse to leave their houses at all because they are too scared of being in situations where it might be hard to escape, such as crowded places. People with social anxiety disorder experience similar symptoms to those with phobias, though this specific disorder has its own classification. People with social anxiety disorder feel very nervous about social interactions, such as talking in front of a group, meeting new people, or attending parties. People can also have more than one phobia, which can make life even more challenging. Each type of phobia has its own difficulties, but they all have one thing in common: they cause intense fear and anxiety that can interfere with normal activities.

ARE PEOPLE BORN WITH PHOBIAS OR ARE THEY LEARNED?

GENES

Biological information encoded in your cells, which is inherited from your parents and carries information that determines your traits.

Some people are more likely to develop phobias because of their **genes**. Studies show that if a close family member (like a parent or sibling) has a phobia, it increases the chances that someone else in the family might develop one too [1]. For example, if a parent is very afraid of heights, their child might develop the same fear, even if they have never had a bad experience with heights themselves. Because

some phobias can develop without a specific negative experience, it suggests the presence of a genetic component because the fear arises from inherited traits rather than experiences or learning. Scientists also believe that some types of phobias are more likely to be passed down through genetics than others. It has been found that animal phobias and blood-injury-injection phobias are the most likely to be inherited [1]. However, it is important to know that having a family history of phobias does not guarantee that someone will develop a phobia of their own. Genes only increase the possibility, and other factors such as experiences and learning also play an important role. The combination of genes and environmental factors can help us understand why some people are more vulnerable to phobias than others.

SOCIAL LEARNING

When we learn by watching other people instead of figuring things out through direct experience.

People can also develop phobias by observing the behavior of others. Watching how others react to certain things can teach us to feel the same way. This is called **social learning**. For example, if you see someone else being afraid of spiders, you might start to feel scared of spiders too, because you assume there is a rational reason that the other person is afraid of them. Social learning is especially common in young children, who often look to adults or older kids to understand what is safe or dangerous. For instance, if a parent reacts fearfully to snakes or heights, their child might learn to have the same reaction. This is especially true if the child already inherited a genetic vulnerability to developing a phobia. Social learning highlights the importance of our relationships and environments in shaping our fears. It also reminds us that phobias are not always based on personal experiences—sometimes they come from watching and learning from others.

FEAR CONDITIONING

When your brain learns to be scared of something because it has been linked to a bad or scary experience.

Our brains are extremely good at learning, and sometimes they learn to be afraid of certain things through a process called **fear conditioning** (Figure 1). This happens when the brain associates a specific object or situation with a scary event. For example, if you hear a loud, frightening noise every time you see a rat, your brain might start to associate rats with feelings of fear. Even when the noise stops, you may then still feel fear when you see a rat [2]. Over time, this process can lead to a phobia that feels automatic and difficult to control. Fear conditioning helps explain why some people develop fears even when the object or situation is not dangerous. It also shows how our brains can create strong emotional connections between our experiences and our surroundings, sometimes leading to fear responses that feel uncontrollable [2]. By recognizing how fear conditioning works, therapists can help people unlearn these automatic fear responses and develop healthier reactions to the things they fear.

Sometimes people develop phobias after having a severely frightening experience. For example, if someone is bitten by a dog, they might develop a strong fear of dogs, even if they meet friendly dogs later in life. These experiences can leave lasting impressions on the brain,

Figure 1

Fear conditioning occurs when a very unpleasant stimulus, like a loud noise, is experienced at the same time as something harmless (like a rat). If this happens repeatedly, a person can learn to associate the harmless stimulus with a negative feeling, so much so that, in the future, the presence of the harmless stimulus alone is enough to cause fear.

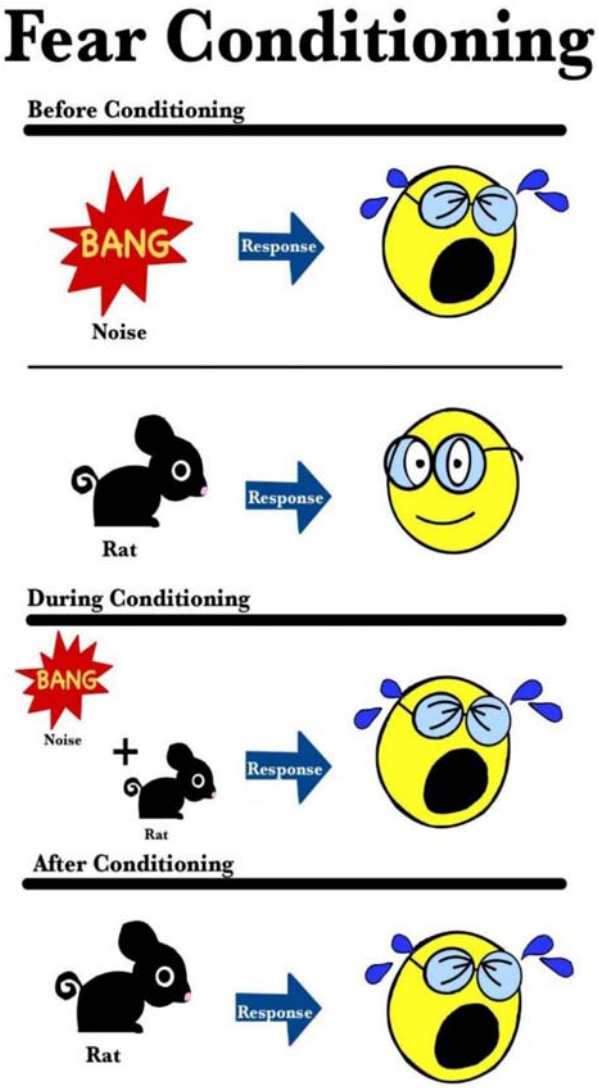


Figure 1

making it hard to feel safe in similar situations. Sometimes, even one scary event is enough to trigger a lifelong fear. For others, repeated smaller events—like encountering a barking dog while walking home, or seeing an aggressive dog in the park—can slowly develop into a phobia. Environmental factors often work alongside genetics to shape how a person responds to fear. While not everyone who has a scary experience develops a phobia, those who do may find that the fear feels uncontrollable and continues long after the event has passed. Learning about the role of the environment in phobias helps us understand that these fears are often responses to real and impactful events.

THE FEAR CENTER OF THE BRAIN

A number of brain areas play a role in how people experience fear (Figure 2). When you first see something scary, your eyes send the

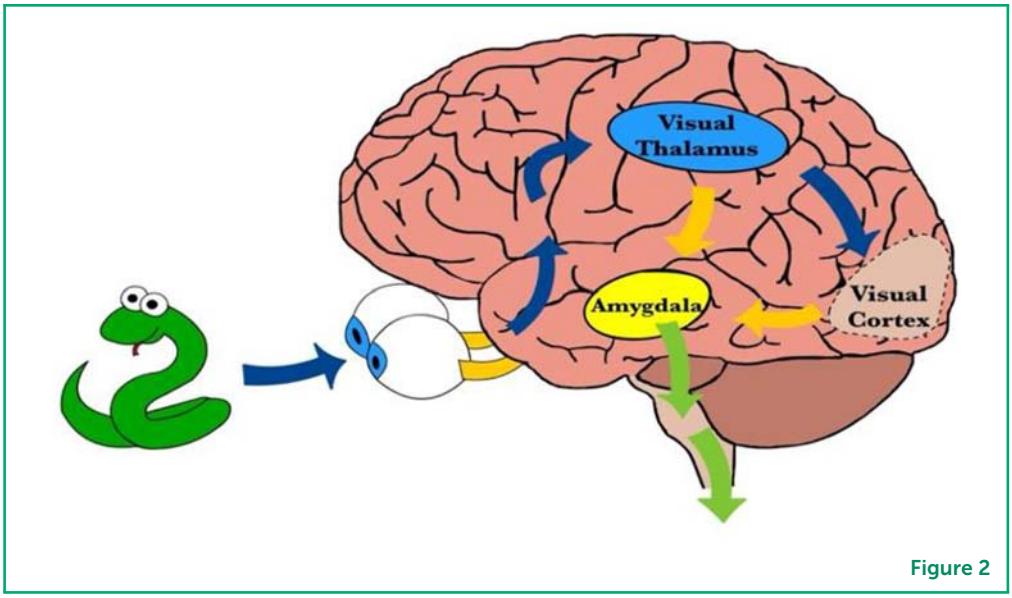


Figure 2

When you see something in the world, that information is passed from your eyes to your thalamus, where it is then sent to the visual cortex to be identified. From there, the information is sent to the amygdala, so you can decide how you feel about what you are seeing. If it is something scary, the amygdala then sends signals to the rest of the body to prepare you to act.

image to a part of the brain called the thalamus, which acts like a mailroom (or relay center) that quickly passes the information to other areas of the brain for specialized processing. When the image gets sent to the visual cortex (a large section in the back of the brain dedicated to processing visual information obtained by the eyes) you can then identify what you are looking at. Once you have identified *what* you are looking at, the next step is to determine *how you feel about* the item. The information is therefore next passed from the visual cortex to the amygdala, a small structure located deeper within the brain, and sometimes referred to as the "fear center". The amygdala acts like an alarm system or a security guard (see this article, which describes what happens in the brain when you spot something scary). The amygdala decides if what you are seeing is dangerous and prepares you to react by sending signals to your body.

This reaction, called the fight-or-flight response, helps people stay safe in dangerous situations. The "fight-or-flight" response gets the body ready to fight, run away, or freeze, which is why your heart might beat fast, or your palms start to sweat when you are scared. However, the amygdala can sometimes overreact, like a false alarm, making you feel afraid even when there is no real danger [3]. For example, someone with a fear of snakes might panic at the sight of a harmless garden snake that poses no threat. This fear might feel out of place today, but it comes from our ancestors' need to do things that increased their chances of survival. A long time ago, being scared of snakes or other dangerous animals likely helped our ancestors avoid getting hurt. Being afraid of threats like snakes was an advantage for survival because that behavior (avoiding snakes) meant they were less likely to be bitten. These fears that were once an advantage can still affect people today, even if they are no longer important to our survival. Understanding how the brain works and how evolution shaped our fears can help us see phobias as natural

responses activated in situations where the thing we fear is no longer an actual threat.

TREATING PHOBIAS

The good news is that phobias can be treated effectively. One of the most common and effective ways to treat phobias is **exposure therapy**, which involves gradually confronting the fear in a safe and controlled environment. For example, someone with a fear of flying might start by looking at pictures of airplanes, then move on to visiting an airport, and eventually take a short flight. This gradual exposure helps the brain "unlearn" the fear and realize that the situation is not as scary as it seemed [4]. Another effective method is **cognitive-behavioral therapy (CBT)**, where people work with a therapist to change the negative thoughts and beliefs that fuel their phobia [5]. During CBT, people learn to retrain their brains to respond differently to fear by challenging negative thinking patterns. A therapist can help you find evidence that disproves your fears and helps you realize the fears are based on unlikely outcomes. By successfully using CBT, you can replace panic and avoidance with calm and confidence. Techniques like mindfulness and deep breathing can also reduce physical symptoms of fear (such as a racing heart) and help people feel more in control. In severe cases, medication may be used alongside therapy to reduce anxiety.

EXPOSURE THERAPY

A type of therapy that helps people face their fears gradually, in a safe environment and with the help of a trained therapist.

COGNITIVE BEHAVIORAL THERAPY (CBT)

A type of talk therapy that helps people identify and change their unhelpful thinking patterns and behaviors.

Fear is a natural part of life, but phobias reveal what happens when that fear becomes overwhelming. Phobias can develop from genetics, environmental influences, learned behaviors, or the brain's natural responses, but phobias most likely develop from a combination of these factors. Understanding phobias can help therapists and medical professionals better support those who experience them. Phobias are not a choice, but it is important to remember that they are treatable! Whether through exposure therapy, CBT, or relaxation techniques, people can learn to manage their fears and regain control over their lives. There is a lot of hope for people overcoming phobias because the brain has the incredible ability to learn, adapt, and change for the better. By practicing effective strategies and having support, people can overcome their fears and phobias. As the brain adapts, people find themselves feeling less scared and panicked, and instead they start to feel stronger and more confident when encountering situations they were once afraid of. In short, learning about phobias can give people insights into human behavior, emotions, and the tools we have available to help us face our fears.

AI TOOL STATEMENT

The author(s) declared that generative AI was not used in the creation of this manuscript.

Any alternative text (alt text) provided alongside figures in this article has been generated by Frontiers with the support of artificial intelligence and reasonable efforts have been made to ensure accuracy, including review by the authors wherever possible. If you identify any issues, please contact us.

REFERENCES

1. Van Houtem, C. M. H. H., Laine, M. L., Boomsma, D. I., Ligthart, L., van Wijk, A. J., and De Jongh, A. 2013. A review and meta-analysis of the heritability of specific phobia subtypes and corresponding fears. *J. Anxiety Disord.* 27:379–88, doi: 10.1016/j.janxdis.2013.04.007
2. Maren, S., and Fanselow, M. S. 1996. The amygdala and fear conditioning: has the nut been cracked? *Neuron* 16:237–40. doi: 10.1016/s0896-6273(00) 80041-0
3. Winerman, L. 2005. Figuring out phobia. *Monit. Psychol.* 36.
4. Guo, R. 2021. Exposure therapy for phobia treatment. *Adv. Econ. Bus. Manag. Res*. 203. doi: 10.2991/assehr.k.211209.253
5. Varadhila Peristianto, S., and Astuti, K. 2022. Decreasing symptoms of specific phobias with cognitive behavior therapy. *Malays. Ment. Health J*. 1:12–4. doi: 10.26480/mmhj.01.2022.12.14

SUBMITTED: 12 January 2025; **ACCEPTED:** 26 January 2026;
REVISED: 25 October 2025; **PUBLISHED ONLINE:** 18 February 2026.

EDITOR: Pablo Cruz Gonzalez, Nanyang Technological University, Singapore

SCIENCE MENTORS: Hengameh M. Taraz

CITATION: Millsap V, Hout MC and Zsido AN (2026) Facing Fear: The Science Behind the Development of Phobias. Front. Young Minds 14:1559505. doi: 10.3389/frym.2026.1559505

CONFLICT OF INTEREST: The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

COPYRIGHT © 2026 Millsap, Hout and Zsido. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

YOUNG REVIEWERS

FITZGERALD ELEMENTARY SCHOOL, AGES: 9–10

We are a selected group of seven enthusiastic, creative, and positive students in the 4th grade at FitzGerald Elementary School, ages 9–10. We are dedicated to learning and super excited about the new discoveries in science.

AUTHORS

VIRGINIA MILLSAP

Virginia Millsap recently earned her Bachelor of Arts in psychology with a minor in counseling and educational psychology from New Mexico State University. She is now pursuing a Doctor of Psychology (Psy.D.) in clinical psychology at Nova Southeastern University. Virginia intends to specialize in working with children and hopes to establish her own private practice in the future. Outside of academics, she enjoys spending time with her cat, Gus, and her friends. Her hobbies include hiking, cooking, and reading.

MICHAEL C. HOUT

Michael C. Hout is a Professor in the Departments of Psychology and Kinesiology at New Mexico State University, where he is also the Associate Dean for Research in the College of Health, Education, and Social Transformation. Additionally, he serves as the Interim Director of the STEM+ Education Research Institute at NMSU, and is the incoming Editor in Chief at the journal *Attention, Perception, & Psychophysics*. His research focuses primarily on visual cognition (including search, attention, eye movements, and memory) and the development of new methods, tools, and stimuli to be used in experimental research. He has won several awards for research and teaching, including the Rising Star award from the Association for Psychological Science. In his limited free time, he enjoys walking his dog, reading, running, hiking, and going on road trips with his wife. *mhout@nmsu.edu

ANDRAS N. ZSIDO

Andras N. Zsido is a senior research fellow and head of the Cognitive and Evolutionary Department in the Institute of Psychology at the University of Pécs (Hungary). He is also the director of the Visual Cognition and Emotion Lab. He studies specific fears and phobias and how emotions affect visual attention and memory-related processes. He is the recipient of numerous scholarships and research grants. He spends his spare time with his kids and wife, playing and hiking. He also loves to run, read novels, and listen to music.