

NIH News in Health

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Personalized Exercise? How Biology Influences Fitness

Getting enough physical activity can make both your body and mind feel better. It can also help prevent or delay health problems. Now, researchers are looking for ways to find out which exercises may best suit your body.

Different types of exercise can bring different health benefits. You can strengthen your bones with weights. Increase your flexibility with stretching. Or, improve your heart health with aerobic activity.

But people's bodies are built differently. Some people have more of the type of muscle that provides strength. Others have more of the type that provides endurance, which keeps you moving for a long period of time. This is one reason why people may be naturally suited to different sports.

But this idea doesn't just apply to athletes. It affects people getting physical activity for fitness, too.

"There are a variety of reasons why different people might adapt better to different types of exercise training," says Dr. Marcos



Bamman, an exercise researcher at the University of Alabama at Birmingham. "And an important factor that we're starting to learn more about is our **genes**."

Researchers are studying how genes influence our bodies' responses to physical activity. They're also looking at how exercise affects people's bodies differently. They're even exploring how it affects your **microbes**.

"The end goal is to be able to provide an exercise "prescription" that is optimal for each person, so they can gain the most benefit," Bamman says.

Influenced by Genes • Scientists know that different types of exercise have different effects on health, explains Dr. William Kraus, who studies heart disease prevention at Duke University. "The benefits vary by type, intensity, and amount of

exercise," he says.

For example, his lab has observed that long bouts of moderate-intensity exercise, like brisk walking, may be especially good at lowering blood sugar levels. This can be important for people trying to prevent diabetes.

But maybe you want to reduce the levels of "bad" cholesterol in your blood to help prevent a heart attack. For that, a lot of high-intensity exercise to get your heart pounding may help the most, Kraus adds.

His team has observed these effects across ages and for both men and women. But when you look at individuals within those groups, he says, not

everyone gets the same benefit from the same workout.

"We want to understand how your genetic background determines your response to exercise," he says. His research team has identified a set of genes that predict who will get the biggest improvements in heart health from aerobic exercise, like jogging or cycling.

Bamman's team has found a set of genes that may help predict who would gain the most muscle from a strength training program. But, he explains, just because you may not

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Definitions

Genes

Stretches of DNA you inherit from your parents that define features, like your risk for certain diseases.

Microbes

The microscopic creatures like bacteria, fungi, and viruses that live in and on your body.

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get the same benefits as someone else from one type of exercise doesn't mean you don't get any.

"Everybody responds to exercise in a positive way," Bamman says. "For example, people who couldn't gain muscle as well as other people still gained strength in our study. They still improved walking ability and a lot of other important aspects of health."

Researchers are looking for other genes that may predict how exercise affects different aspects of health, like blood sugar control. In one study, Kraus and his team tested an exercise program to reduce the risk of diabetes in a large group of people.

"Some people got a great improvement controlling their blood sugar, and some people got none, even though they did all the exercise," he says.

Knowing who's most likely to benefit from specific exercises may help health care providers better tailor their recommendations for people, says Kraus.

But these studies are still in the early stages. If you have a health condition, talk with your provider about the types and amounts of physical

activity that are safe for you.

Learning From Athletes • "There really is almost no health intervention as potent and as broad in its benefit as physical activity," says Dr. Euan Ashley, who studies exercise and the heart at Stanford University.

Ashley, Bamman, and Kraus are involved in a large NIH-funded program looking at how exercise affects different molecules in the body. They're also exploring how this differs between people. The team is studying both people who have previously not exercised regularly and active athletes.

Studying the abilities of elite athletes has the potential to help us understand the upper limits of the human body, Ashley explains.

"For an athlete to perform at the absolutely highest level, everything has to work perfectly," he says. This includes the muscles, heart, blood cells, and more. Studies of athletes, such as runners and skiers, have found genetic differences that have positive effects on their bodies' performance, Ashley says.

"By studying athletes, we can learn more about the extremes of each of these body systems. And by understanding the extremes, we can understand fundamental aspects of those systems. That could help us treat people with diseases in those systems," explains Ashley.

The Role of Microbes • It's not only your biology that can influence how exercise affects your body. Scientists are discovering more and more about the role of your microbiome. That's the collection of microbes that live in and on your body.

In a recent study, researchers found changes in a certain type of gut bacteria in marathon runners. They transferred those bacteria into mice. The mice given the bacteria were able to run longer.



Wise Choices Personalize Your Workout

- **Know your goals.** Try to set specific short- and long-term goals. Then talk with your health care provider about the types and amount of exercise you can safely do.
- **Do what you enjoy.** Don't struggle with a workout you hate. Build in activities that make both your body and brain feel good.
- **Find a partner.** Ask a family member or friend to be active with you. Activity may be more fun with someone.
- **Track your progress.** You might not feel as though you're making progress, but you may be pleasantly surprised if you look back at where you started.
- **Review your goals.** Did you meet your goals? If not, why? Are they doable? Brainstorm some options of what to do differently.

Scientists are only beginning to study the microbiome's role in fitness. Such studies are difficult, because things like diet, sleep, and even the people you live with can affect your microbiome, Kraus says.

Researchers continue to learn more about biology and physical activity. But no matter who you are, how much activity you get can make a difference for your health. Experts recommend getting at least 150 minutes of moderate to vigorous physical activity a week. And at least two days a week, do strength training exercises.

"There are huge benefits from exercise for both mental and physical health," says Ashley. For ideas on how to get started, visit health.gov/moveyourway. ■

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Web
Links

For more about biology and fitness, see "Links" in the online article: newsinhealth.nih.gov/2020/07/personalized-exercise

Relieving Rosacea

Treating Face Redness

We all get red in the face sometimes. It might be from blushing, an allergic reaction, or a sunburn. But if face redness lasts for a long time it could be a skin condition called rosacea (pronounced ro-ZAY-shah). Rosacea often starts as redness or flushing on the cheeks, nose, chin, and forehead.

“There is extraordinary redness in the central part of the face,” says Dr. Richard Gallo, professor and skin expert at the University of California, San Diego. “And then over time, many people with rosacea also develop many small blood vessels on the skin of their face.”

Rosacea can also cause red bumps that look like acne. It most often affects women ages 30 to 60. It’s more common among people who are fair-skinned. And it can be uncomfortable.

“Sometimes the skin feels like it’s hot, it can be burning, and sometimes a little bit itchy,” Gallo says.

In an extreme form, skin can thicken and enlarge the nose. This is much more common in men. Some-

times, rosacea can also affect the eyes. They can look bloodshot and feel dry or itchy. It can cause blurred vision and other vision problems.

Rosacea often comes and goes in cycles. Symptoms can flare up and then diminish, only to return later. Rosacea can be quite disfiguring and cause a lot of psychological distress, Gallo says.

It’s important to pay attention to the things that trigger rosacea. “Rosacea is a very individual disease,” Gallo says. Sunlight, stress, alcohol, spicy foods, and hormonal fluctuations are common triggers.

The causes of rosacea aren’t completely understood, but genes probably play a role. Studies show that rosacea involves issues with the body’s **immune system**.

“We’ve learned that rosacea is a problem with how the skin senses the outside environment,” says Gallo. “The immune sensing system in their skin is too sensitive. So many different things can trigger it, like eating spicy foods, microbes, or too much sunlight. And that causes the skin to become red and have flushing reactions.”

Gallo and his team are studying the role of molecules called antimicrobial peptides. These work like natural antibiotics in the skin, killing some bacteria. But they also trigger the body’s immune system, Gallo explains. He and his team discovered that some people with rosacea make too many antimicrobial peptides. This discovery could



eventually lead to new treatments.

Right now, there are several medications doctors can prescribe to treat rosacea. Some work by affecting the microbes that live on the skin. Others help reduce redness by constricting blood vessels in the face.

Laser treatments can also help with redness and improve skin’s appearance. They destroy extra blood vessels in the face. However, laser treatment only addresses the symptoms of rosacea and not the causes.

If you have symptoms of rosacea, a doctor who treats skin disorders, called a dermatologist, can help. For tips on living with rosacea, see the Wise Choices box. ■

Definitions

Immune System

The system that protects your body from invading viruses, bacteria, and other microscopic threats.



Wise Choices

Living With Rosacea

- To figure out triggers, keep a written record of what seems to make your rosacea worse.
- Use sunscreen (SPF 15 or higher) every day.
- Use a moisturizer on your face if it helps. But avoid products that irritate your skin.
- Consider trying a green-tinted makeup to make your skin look less red.
- Talk with your health care provider if you feel sad or have other signs of depression. This may happen to some people with rosacea because of how they feel about their skin.



Web Links

For more about rosacea, see “Links” in the online article: newsinhealth.nih.gov/2020/07/relieving-rosacea



Health Capsules

For links to more information, please visit our website and see these stories online.

Poor Sleep Linked With Higher Blood Sugar

People with diabetes have high levels of blood sugar (or blood glucose). When blood sugar builds up too high, it causes harmful effects.

A study found that African Americans with disrupted sleep have higher blood sugar levels. Previous studies have also found this link in European and Asian populations.

Researchers looked at data from about 800 African American men and women who had home sleep apnea testing. Sleep apnea is a condition where breathing stops or

gets very shallow for periods during sleep. The people in the study wore a device that measured when they were awake or asleep for a week. They also kept a sleep diary.

The researchers examined how long people slept, how often they woke up during the night, and changes in their sleep patterns. They compared these findings with blood glucose levels taken in a clinic.

About a third of participants had sleep apnea. Most were not receiving treatment for the condition.

Those with either sleep apnea or disrupted sleep patterns had higher blood glucose levels. People with the most severe sleep apnea had 14% higher blood glucose levels than those without it.

Many people with sleep apnea don't know they have the condition. "Our results reaffirm the need to improve the screening and diagnosis of sleep apnea, both in African Americans and other groups," explains Dr. Yuichiro Yano from Duke University, who led the study. ■

Coping With Traumatic Events

Traumatic events can be scary or dangerous. These include natural disasters, accidents, or violent events. Experiencing one can affect both your body and mind.

It's common to have an intense reaction after a traumatic event. You may feel anxious, sad, or angry. Trauma can also cause trouble with sleep or concentration. You might find yourself thinking about what happened over and over. It can also cause physical symptoms—like headaches, feeling tired, and being easily startled.

For most people, these problems lessen with time. But for some people, the effects of trauma last longer. If they interfere with everyday life, it's important to seek professional help.

Signs that it's time for help include having frightening flashbacks, feeling out of control, avoiding people or places, and having trouble thinking clearly. If you've become disconnected from family and friends, it's important to get help so you can recover.

A mental health professional can talk with you, give you tools to

manage the effects of trauma, and help you develop healthy coping strategies. Experts recommend connecting with trusted friends and loved ones who are supportive. Try to stick with normal routines for meals, exercise, and sleep. Staying active is also a good way to cope with stressful feelings.

Talk with your health care provider if you need help. If you're in distress, call the Disaster Distress Helpline at 1-800-985-5990. For more resources, go to: www.nimh.nih.gov/copingwithtrauma. ■



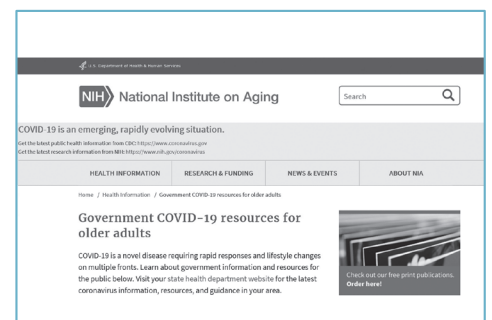
Featured Website

COVID-19 Resources for Older Adults

www.nia.nih.gov/health/government-covid-19-resources-older-adults

COVID-19 has changed our everyday lives. Find government resources for older adults during the pandemic. Learn about financial and housing resources.

Find tips on staying healthy and safe. Caregivers can also find resources for managing the daily care of a loved one.



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