



Navigating Puberty

A Time of Changes and Challenges

Puberty is a normal, natural part of growing up. It's also a time of huge change, when children's bodies mature. With **hormones** surging, early adolescents may have mood, energy, and sleep changes. They may feel self-conscious about how they look.

Everyone matures physically at their own pace. While there is a normal age range of 8 to 13 for girls and 9 to 14 for boys, some children may start developing earlier or later.

Parents can help their children navigate puberty by being available and supportive, says Dr. Jennifer Pfeifer, a developmental psychologist at the University of Oregon.

"Talking positively about how our bodies and minds change during puberty can reassure young people that this is normal," Pfeifer says. "It can also open the lines of communication."

Children who go through puberty early may develop health problems. NIH researchers are looking into what contributes to early-onset puberty, so they can better understand how to prevent it.



their testicles and penises get bigger. They may also start to have wet dreams at night. This is when they release semen while they are asleep. Boys also begin to develop muscle mass, their shoulders broaden, and their voices deepen.

Growth spurts are a typical part of puberty. Girls tend to reach their full height by their early teens. Boys reach that milestone a few years later.

The brain develops rapidly during puberty. Changes to brain regions

that handle social behavior can lead teens to focus more on peer relationships and social experiences.

How adolescents view themselves during puberty also matters, says Pfeifer. "Girls, especially, see that their bodies are changing and are aware that others see that too. That affects how they feel about themselves," she explains.

Pfeifer has been studying how puberty affects mental health. She's found that depressive symptoms increase in teenage girls. These symptoms include

How Puberty Starts • Puberty kicks off in the brain. A small part of the brain called the hypothalamus releases a hormone that tells the pituitary gland (a tiny organ connected to the hypothalamus) to release other hormones.

These hormones signal the ovaries to release estrogen in females and the testicles to release testosterone in males. Together, this reproductive network is called the hypothalamic-pituitary-gonadal (HPG) axis.

Meanwhile, the small organs that lie above the kidneys, called adrenal glands, also release steroid hormones that trigger physical changes.

Parents can usually tell when their children are starting puberty. Both girls and boys will develop pubic and armpit hair and sweat more, which can create acne and body odor.

Girls start to develop breasts, which can happen a few years before their period begins. In boys, their genitals start to grow, and

continued on page 2



Definitions

Hormones

Substances produced in one part of the body to signal another part to react a certain way.

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continued from page 1

feeling less happy and more lonely, being easily irritated, not eating as much, and showing signs of social withdrawal. Signs of social withdrawal can include pulling away from friends and family due to loss of interest or energy to connect.

Puberty Timing • In some children, puberty starts earlier than others. This is called early (or precocious) puberty. The signs of early puberty are that girls' breasts may start to develop before age 8, and their periods may begin before age 10. Boys' genitals may start to grow before age 9.

Early puberty can increase the risk of type 2 diabetes and heart disease. Girls are more likely to develop depression and anxiety when they start puberty early. They also have increased chances of developing breast cancer later in life.

Some studies suggest that boys may also be at increased risk for anxiety and depression when they start puberty early. But, more research is still needed to understand how early puberty affects boys' mental health.

Children who start and finish puberty earlier than normal may also not reach their full height potential.

Given the risks related to early puberty, especially in girls, their doctor may recommend medications that can stop the release of sex hormones until the normal age.

What Influences Puberty • The timing of puberty is influenced by many things, including your genetic make-up and your environment.

NIH-funded researchers have been identifying specific gene changes, called mutations, that can trigger early puberty.

MKRN3 mutations are considered the most common known genetic cause of early puberty. The mutations tend to run in families.

The *MKRN3* gene provides instructions for making the MKRN3 protein. This protein plays a role in directing the onset of puberty. Normally, the MKRN3 protein puts the brake on activating puberty until the normal age range. But when the gene is mutated, the protein stops working normally. That causes the brake to be released and puberty to start earlier.

"We're trying to understand how the MKRN3 protein works, so we can better prevent early puberty," says Dr. Ursula Kaiser, who specializes in treating hormone disorders at Brigham and Women's Hospital. "If we can identify people with a higher risk of early puberty through genetic screening of *MKRN3* mutations, we can start treatment earlier."

Environmental factors can also affect the timing of puberty. "Stress can speed up or delay puberty depending on the type, severity, and timing," says Dr. Natalie Shaw, an NIH expert on hormones in children and adolescents.

Being overweight or obese in childhood can contribute to

early puberty. Extra body fat can cause hormonal changes that can prompt puberty to start earlier.

Certain chemicals may interfere with the body's hormones and lead to early puberty. Shaw and other researchers searched through thousands of chemicals for ones that might activate hormones. They found that a fragrance ingredient called musk ambrette had noticeable effects on zebrafish. Musk ambrette is commonly used in perfumes, lotions, soap, and detergent.

"More research is needed to confirm our findings," says Shaw. "But this raises the possibility that exposure could activate the reproductive axis early in children."

Researchers are continuing to search for ways to identify and prevent early puberty. If you think your child is starting puberty earlier than normal, talk with your child's doctor about the options.

Puberty is an exciting and often challenging time for teens and their parents. There are many ways parents can support their child during this period. See the Wise Choices box for tips. ■

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Wise Choices

Helping Teens Through Puberty

- Prepare your child for puberty by talking about it beforehand.
- Assure them that everyone develops at their own pace.
- Encourage them to view their bodies positively.
- Ensure they eat regular meals and get enough sleep. Experts recommend teens get 8 to 10 hours of sleep each night.
- Support their positive emotional development. Model healthy communication and behaviors.



Web Links

For more about navigating puberty, see "Find More Information" in the online article: newsinhealth.nih.gov/2026/08/navigating-puberty

Built to Move

The Benefits of Walkable Communities

Physical activity is one of the best things you can do for your health, but getting enough of it might not be just about willpower. Your neighborhood can play a bigger role than you might think. The streets, sidewalks, and nearby destinations around you can affect how much you move each day. Researchers are looking at what elements in neighborhoods encourage more activity.

“A person’s surrounding physical and social environment plays a major role in shaping their behaviors,” says Dr. Abby King, a clinical psychologist and professor at Stanford University. She has spent the last decade studying how our surroundings affect how active we are.

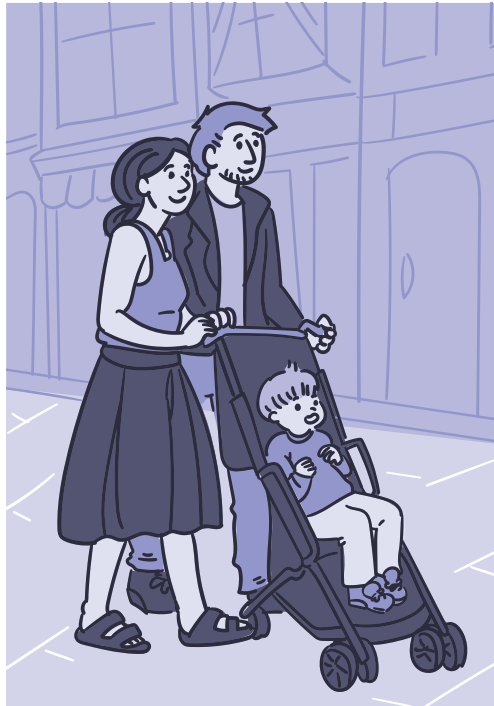
Many people want to live healthier lives. But if their neighborhood makes it hard to walk or find healthy food, it can make it tougher to do so every day.

“Our goal is to make the healthy choice an easy choice. An important way to do that is to make our communities more walkable,” King says.

Walkability describes how easy it is to walk or be active in a given area. That depends on things like how streets connect and whether places like cafes, shops, or libraries are close enough to reach on foot, by bike, or by wheelchair.

The biggest factors include city block length, how often streets cross, and whether parks and shops are nearby. But smaller features like sidewalks, benches, lighting, and crosswalks are also important for walkability.

“Multiple studies have shown, adding ‘walkability’ features to an area can have positive effects on people’s activity levels regardless



of age, gender, weight, and initial activity levels,” says King.

King and her colleagues’ recent study showed that people who moved to more walkable cities walked about 1,100 more steps each day. Over a week, that adds up to almost an hour of extra activity. More activity means a lower risk of serious conditions like heart disease, diabetes, high blood pressure, and depression.

But moving to a more walkable city is not an option for most people. That is why King and her team have created tools to help everyday residents make changes in their neighborhoods. They created a program called “Our Voice.” This is a research initiative that captures walkability using a simple app. Local residents record what helps or hurts walkability in their area. The residents can share what they find with local leaders. Then they can partner with them to make real

changes in their neighborhoods. The program has been used in over 30 U.S. states and more than 30 countries across six continents.

Making a neighborhood more walkable does not always mean big, costly projects. Simple upgrades like crosswalks, better lighting, and green spaces can help. If your neighborhood needs work, local community groups are a great place to start. Programs like Our Voice show that people can make real change happen when they work together.

But you don’t have to wait for your neighborhood to change to add more steps to your day. See the Wise Choices box for simple ways to get more activity in your day. ■



Wise Choices

Take Steps to Get More Active

- Park farther away and walk briskly to your destination when running errands.
- Take the stairs whenever possible.
- Make a walking date with a friend or family member.
- Walk your dog a little farther than you normally do.
- Find and use convenient paths near your home or work.
- Walk to nearby shops when possible.
- Find and visit local parks.
- Take a walk on your lunch break, or schedule a walking meeting. Keep your walking shoes nearby.
- If you normally go outside to be active but the weather is bad, head to a local mall or shopping area for a climate-controlled environment.



For more about walkability, see “Find More Information” in the online article: newsinhealth.nih.gov/2026/08/built-move





Health Capsules

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Skin Cancer Genes May Raise Risk for Other Cancers

Melanoma is the deadliest form of skin cancer. A recent study found that some people diagnosed with melanoma were more likely to have mutations (or changes) in certain genes. The changes they found were also linked to a higher risk for other types of cancer.

An NIH-funded research team looked at data from two large studies. One took place in the U.S. and the other in the United Kingdom. Both studies included healthy people and those with melanoma.

The team analyzed the health records of nearly 700,000 people.

The researchers focused on eight genes known to increase the risk of melanoma. Mutations in these genes weren't common in healthy participants. They appeared more often in those with melanoma. People younger than age 40 with a single melanoma were more likely to have one of the gene mutations. So were those with multiple melanomas.

The team found some genes were also linked to other types of cancer.

People with certain gene changes showed an increased risk for prostate cancer, breast cancer, or myeloma.

"If someone with melanoma has one of these mutations, other tissues may face an elevated cancer risk," says NIH's Dr. Michael Sargen, who led the study.

More research is needed to verify that gene changes are linked to other types of cancer. If they are, gene testing may help some patients and their family members better understand their risk for other cancers. ■

Video Games May Help Doctors Screen for Depression

Depression causes long-lasting feelings of sadness and loss of interest. A new study suggests that simple, game-like tests may help doctors identify patients with depression more quickly.

NIH-funded researchers tested two video games as screening tools for depression. The study enrolled healthy people and ones with moderate to severe depression. Participants were asked to play two video games.

One game was designed to test when a person no longer found playing the game rewarding. It had

participants collect apples from trees. Each time they harvested a tree, the tree produced fewer apples. They could choose to stay at the same tree or move to a new one. Those with depression moved on to harvest new trees sooner than those without it. How soon the participants moved on was tightly linked to the severity of their depression symptoms.

The second game tested how people adjusted their decisions when a situation changed. Participants ranked snack food items based on how much they would pay for them. The snack

items were then presented with different combinations to see how participants' rankings changed. Healthy participants changed how they rated the items depending on what other choices they had. But participants with depression did not.

"Our behavioral game gives us clues to what is happening in the brains of patients with depression," says Dr. Paul Glimcher of New York University, who co-led the study. With more research, these simple tests might help doctors quickly screen for and track depression in the clinic. ■



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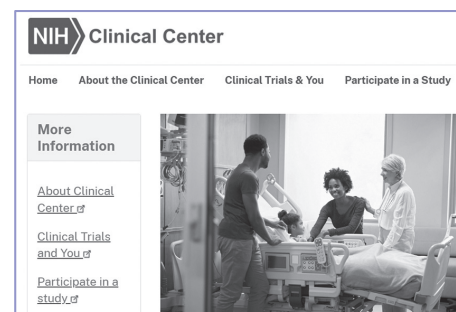
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