

'GAME-CHANGER'

FAMILIES AT MAYO CLINIC EXPLORE HOW A SMARTWATCH CAN GIVE EARLY WARNINGS OF SEVERE TANTRUMS

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Evenings in the Staal household often carried a delicate unpredictability. After a full school day — and as Ethan's medication began to wear off — the shift from playful to overwhelmed could happen in seconds. Ethan has attention-deficit/hyperactivity disorder, a condition that can make emotional regulation especially challenging.

Ethan's feelings sometimes escalated faster than he could manage. In those difficult moments, his parents say, he became "not accessible" — often needing close to an hour before they could help guide him back to calm.

Their search for specialized care led them to Mayo Clinic, where child and adolescent psychiatrist Magdalena Romanowicz, M.D., introduced the family to Parent-Child Interaction Therapy. She also invited them to participate in a first-of-its-kind study powered by a smartwatch and artificial intelligence.

The smartwatch technology was designed to help anticipate when a child was nearing emotional overload, giving parents a chance to step in and defuse the situation before it escalated. For the Staals, the technology offered a clear sense of what was happening inside Ethan just early enough to help him through it.

"It was a game-changer," Jared Staal says. "We still have challenges, but now we see them coming and we see them through a whole different lens — we didn't always know how to support him in those moments, and now we do."

MOMENTS BEFORE ESCALATION

During the four-month study, Ethan wore a smartwatch that tracked his heart rate, movement and sleep. When the system detected patterns that suggested his stress was building, it sent an alert to Sarah or Jared's phone.

"It gave us a warning that something was coming," Sarah says. Instead of reacting at the peak of Ethan's distress, they could intervene earlier with calm reassurance, redirection and other techniques they learned in their 12 Parent-Child Interaction Therapy sessions.

"We could help him recover in 5 to 10 minutes," she says. "And we could have our evenings again as a family."

WHAT THE STUDY REVEALED

The Staals' experience reflects the study's overall findings. In the clinical trial, smartwatch alerts prompted parents to respond within four seconds on average to early signs of escalating



stress. Their children's severe tantrums were shortened by about 11 minutes — roughly half the duration seen with standard therapy alone.

The broader context underscores the need for new approaches. Nearly 1 in 5 U.S. children lives with a mental, behavioral or emotional health disorder, yet the number of pediatric mental health specialists has not kept pace with demand. Smartwatch technology represents one possible way to extend support into the home by helping families recognize early changes in a child's stress levels.

ACROSS A SHARED WALL

The technology behind the alerts emerged from an unexpected spark.

Electrical and computer engineer Arjun Athreya, Ph.D., worked just steps from the Children's Hospital Psychiatry Unit at Mayo Clinic — a single shared wall separating his world of algorithms and data from the clinical rooms where children and their families experienced some of their hardest moments.

Passing conversations with the psychiatrists next door became more formal collaborations as the team began to ask: What happens inside a child's body in the minutes before an outburst? And could those invisible shifts be measured?

With support from Julia Shekunov, M.D., Medical Director of the inpatient unit, and help from the nursing staff, the team launched a small pilot to explore those questions.

From that work, Dr. Athreya and his team developed an AI model designed to recognize the earliest physiological changes that precede escalating behavior. That work became the foundation for the smartwatch system now being explored with families.

A FAMILY'S EARLY RESEARCH ROLE

One of the first families to try out the smartwatch system was Sawra and Matthew Maurer and their son, Theo.

For the Maurers, the challenges with Theo were mounting. Calls from

kindergarten had become a near-weekly routine: "Theo is having a hard time. Could you come get him?" Around that same time, Theo was diagnosed with ADHD, which helped explain the emotional dysregulation and sudden behavioral shifts they were seeing.

Theo could slide from being engaged in an activity to overwhelmed in an instant — sweeping crayons off tables or having severe tantrums that sometimes required teachers to guide classmates out of the room. "It was a very difficult year," Sawra recalls.

Enrolling in the early smartwatch feasibility study gave her new insight.

During the study, Theo wore a watch each day that collected his physiological data — heart rate, movement, sleep patterns — while the family logged episodes in an AI-powered app.

That data helped researchers understand what Theo's body was doing in the moments before he became dysregulated. By matching those physiological signals with what was happening behaviorally, the team could begin identifying the subtle shifts that happen as a child moves from calm toward distress and then back to calm.

Theo's data helped teach the system what those early changes look like in real-world settings.

Sawra didn't receive alerts in that early phase, but she could see the information the watch recorded. "The idea is wonderful," she says. "Being able to detect when a child is heading toward a severe tantrum would be a phenomenal thing for a parent."

MOVING THE RESEARCH FORWARD

Future studies will focus on improving the model, testing the system in larger groups and examining how real-time physiological data can inform care outside the clinic.

As that work continues, the experiences of families like the Staals and the Maurers will help guide how the technology evolves and how it can support children in everyday life.

HEALTH CHECK



Ask the Pediatrician: Dealing with warts

CAROLENA STEINBERG AND DIANA H. LEE

American Academy of Pediatrics (TNS)

Warts are small, firm bumps on the skin caused by viruses from the human papillomavirus (HPV) family. Warts are common among school-aged children but can affect people of any age.

The good news is, many kinds of warts often go away on their own without treatment. But they can become painful if they are bumped, and some children are embarrassed by them. Your pediatrician can give you advice on treatment, such as applying an over-the-counter medicine containing salicylic acid to the warts.

There are a variety of warts that a child can come into contact with and they are contracted through different methods. Human papillomaviruses are spread by close contact through direct touch or sharing objects. The virus often gets into the body through breaks in the skin.

Common skin warts are bumps with a rough surface and a yellow, tan, black, brown or gray color. They can appear anywhere on the body. However, they are most often found on the hands, including near or under the fingernails, toes, face and around the knees.

When warts are on the bottom of the feet, doctors call them plantar warts. Plantar warts are often flat and painful. Your child may say it feels like they are walking on a pebble. The warts may have tiny red or black dots on them, which are actually tiny, swollen or dead blood vessels. Warts on the bottom of the feet may happen from walking barefoot in locker rooms or around pools.

Warts on the genitals, also called condyloma, are usually spread sexually during genital, oral and anal sex with a partner who is infected. However, skin warts can also be spread to genital areas from warts on the hands or by caregivers who have warts on their hands.

Genital warts that are spread sexually are a risk for certain types of cancer and require long-term follow-up monitoring. These situations should be discussed with your health care provider.

Your doctor may refer you to a dermatologist if your child has multiple warts in many places, a wart on the face or genital area, reoccurring warts, or large, deep, or painful plantar warts. Warts can be treated at home with over-the-counter topical products such as salicylic acid solutions or pads, imiquimod cream, or 5-fluorouracil cream. Duct tape can also be used to remove some warts and can be used alone or alongside salicylic acid.

In-office procedures are also an option. These include freezing treatments with a liquid nitrogen-based solution, surgical scraping or cauterization, laser treatments and local injection of certain medications.

Many warts last for months or years and then go away on their own. Warts often will go away with the treatments above, but sometimes a treated wart will come back.

Washing hands after being in public places and wearing shoes when outdoors and in public places will make it less likely to get a wart. Everyone in the family should also use their own towel. To limit warts from spreading, it is best to avoid touching the wart to other parts of the body or picking the warts. HPV vaccination prevents genital warts and might also help to prevent common warts. The HPV vaccine is recommended for children 11 years old and older, but it can be administered as early as 9 years old.

Carolena Steinberg, MD, is a transitional year resident in the University of Miami Health System who will attend dermatology residency at UC San Diego.

Diana H. Lee, MD, PhD, FAAP, a member of the American Academy of Pediatrics Section on Dermatology, is a board-certified pediatric dermatologist and is Associate Professor of Dermatology and Pediatrics at Weill Cornell Medicine.