For the study, the researchers recruited 50 participants ages 7-17. Families were randomly split into two groups: a “symptoms as side effects” mindset and a “symptoms as positive signals” mindset. Both groups received identical treatment instructions and were trained to use medications, such as antihistamines, for non-life-threatening symptoms, and had access to the same resources.

However, families assigned to the “symptoms as positive signals” group were encouraged to think of mild, non-life-threatening side effects, such as an itchy throat and congestion, as signs that their child was building tolerance to the allergen. This mindset was reinforced through direct communication between providers and families, written information and also activities. For example, children wrote letters to their “future selves” that included a reminder that these symptoms signaled that the treatment was working. The control group, or “symptoms as side effects” group, was not introduced to this framing during their treatment.

The researchers found that participants who were told that mild symptoms were positive were less anxious when they experienced these reactions during treatment compared with those in the “symptoms as side effects” group. During the first month of treatment, 21.4 percent of participants in the experimental group who had symptoms reported feeling either kind of worried or extremely worried, compared with 45.5 percent of participants in the control group.
Parents reacted in a similar fashion: At the end of treatment, 40 percent of parents in the control group reported still feeling kind of worried or extremely worried when their child had symptoms during treatment, compared with 23.1 percent in the “symptoms as positive signals” group. Families in the “symptoms as positive signals” group were also less likely to skip or reduce doses because of symptom-related anxiety: 4 percent missed a dose compared with 21 percent in the control group.

There were physiological benefits to focusing on a positive mindset as well. By the end of their six-month immunotherapy treatment, when doses increased, children in the “symptoms as positive signals” group experienced fewer non-life-threatening symptoms: 1.2 percent versus 3.5 percent. This finding is notable because symptom occurrence can prevent or delay patients from completing treatment, the researchers said.

“We have shown that a simple change in the way we frame and discuss side effects of a treatment can have a meaningful impact not only on anxiety and adherence but also on the physiological benefits of that treatment,” said Alia Crum, PhD, assistant professor of psychology and senior author of the study.

**Next steps**

The results from the study are promising for helping patients cope with symptoms from other medical procedures in which uncomfortable side effects indicate treatment effectiveness, such as flu vaccines or possibly chemotherapy.

“My hope is that this study sparks a wave of similar experiments designing and testing psychologically informed changes in the manner in which medical treatments are delivered,” Crum said.

Meanwhile, the researchers hope that medical providers can put
this mindset intervention into practice. “We hope that this intervention can be successfully adapted into clinical practice to help [oral immunotherapy] practitioners reduce anxiety among their patients and to make this very promising treatment even more effective and stress-free for patients and their families,” Howe said. “In the long term, we think that these findings have promise for improving other challenging courses of treatment.”

Stanford graduate student Kari Leibowitz is the study’s other lead author. Other Stanford co-authors are Nadeau; research coordinators Margaret Perry and Julie Bitler; and nurse practitioner Whitney Block.

A researcher at Harvard University also contributed to the work.

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