

NEWS

Men with autism may misread social cues in body odors

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Men with autism respond differently to human odors — and the social signals that they contain — than do their neurotypical peers, according to a new study¹.

The results suggest that men with autism misread social signals present in human odors — causing them to misinterpret others' emotions.

Human sweat contains chemicals believed to convey social and emotional information. For instance, when women smell sweat collected from men watching scary movies, they are more likely to describe faces with ambiguous expressions as fearful².

In the new study, researchers exposed men to sweat collected from people who were skydiving. Unlike controls, men with autism do not show increased skin conductance, a measure of physiological arousal, to this 'fear sweat.' They are also more likely than controls to trust a mannequin that emits this scent.

"I think this could be a meaningful aspect of impaired social interaction," says lead investigator **Noam Sobel**, professor of neurobiology at the Weizmann Institute of Science in Rehovot, Israel. "Humans constantly engage in social chemo-signaling; we do this all the time, and it shapes our interactions," he says. "And somehow these mechanisms work differently in autism."

Several studies have examined olfaction in people with autism. Researchers have found, for example, that children with autism **inhale odors differently** than their typical peers do, and some children with the condition may be **particularly sensitive to smells**.

But there has been little work on how people with autism process the social information contained in body odors.

The new paper is provocative because it suggests that the communication problems that accompany autism may extend to chemical forms, says **Johannes Frasnelli**, professor of anatomy at the University of Quebec at Trois-Rivières in Canada, who was not involved in the research.

However, little is known about how people communicate through odors. “I think what this paper does is it generates hypotheses; it looks at the problem from a very interesting angle,” Frasnelli says. The topic “definitely deserves more research,” he says.

The smell of fear:

Sobel and his colleagues began by assessing the basic olfactory skills of 16 men with autism and 18 controls. They asked the participants to sniff three samples of body odor, two of which were from the same person, and pick out the one that did not belong.

The participants with autism performed just as well on this task as their peers did, suggesting that they are not impaired in their ability to detect and distinguish among odors.

The researchers then asked 15 men with autism and 15 controls to rate sweat samples collected from skydivers. Both groups reported that the smell of this perspiration was more intense, less pleasant and connoted higher levels of fear than sweat collected from men who had been walking calmly.

Despite the similarity of these ratings, however, the fear sweat prompted markedly different bodily reactions in the two groups of men. The controls showed a significant increase in skin conductance while smelling the fear sweat, but not the walking sweat. Men with autism, however, did not show an elevation in arousal.

To assess how the chemical signals in fear sweat might influence the men’s behavior, Sobel’s team built two robotic mannequins, one that gave off fear sweat and another that emitted a control odor (sports sweat). The mannequins were also programmed to help the participants in a cognitive test, providing them with spoken hints to help them quickly locate and click on a target on a computer screen.

Both mannequins gave advice that was correct 70 percent of the time. Still, the controls put more trust in the hints provided by the mannequin that emitted sports sweat than in those provided by the one that gave off the fear sweat; the opposite was true of the men with autism.

The results were published in *Nature Neuroscience* on 27 November.

Mixed signals:

The results suggest that although men with autism can detect the chemical signals in fear sweat,

they interpret and react to these signals differently than controls do.

The study “really shed light on the fact that it’s not the explicit processing of odors that are impaired in autism, but the implicit processing of the social cues in odors,” says **Bruno Wicker**, a neuroscience researcher at the French National Center for Scientific Research and Aix-Marseille University in Marseille, France, who was not involved in the study.

This distorted signal processing may be particularly problematic because it occurs largely without conscious awareness.

“You can’t do anything to mitigate this wrong message,” Sobel says. “You’re unaware of getting a message at all, let alone that it’s wrong. So this obviously would pose a major obstacle and barrier to social interaction.”

The underlying reason for these differences is unclear, but it may be that olfactory receptors in people with autism go awry. Because these receptors are located throughout the brain, the problem could derail multiple aspects of brain development, the researchers say.

REFERENCES:

1. Endevelt-Shapira Y. *et al. Nat. Neurosci.* Epub ahead of print (2017) [PubMed](#)
2. Zhou M. and D. Chen *Psychol. Sci.* **20**, 177-183 (2009) [PubMed](#)