

❤️ Polyvagal theory: The biological fingerprint for compassion and empathy

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What happens in Vagus... may make or break compassion.



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Is there a biological fingerprint for compassion?

Two scientific teams, [one led by Zoe Taylor](#) at Purdue and the [other by Jenny Stellar](#) at UC Berkeley, have found that the answer may lie in the Vagus nerve. That's the cranial nerve in the body with the widest reach, influencing speech, head positioning, digestion, and—importantly for these two studies—the parasympathetic branch of the autonomic nervous system's influence on the heart.

Students typically memorize the parasympathetic branch (PNS) as the "rest and digest" branch of the autonomic nervous system (ANS), which controls bodily functions that we're not aware of when we're relaxed and feeling content. The PNS is also called the "feed and breed" branch—and recently, social psychologist [Barbara Fredrickson](#) added the label "tend and befriend" to the PNS, suggesting that it also supports functions that enable social engagement and nurturing behaviors.

These functionally descriptive labels for the PNS—"rest and digest," "feed and breed," and "tend and befriend"—directly relate to the Vagus nerve, which turns out to be something of an *enforcer* for the PNS when it comes to the heart and compassion.

Roughly 20 years ago, Steve Porges of the University of Chicago pioneered PolyVagal theory, which suggested that the Vagus nerve fundamentally **drives human social affiliation—the motivations and behaviors involved in approaching others in trusting, affectionate, and cooperative ways**. Since then, social science researchers have measured Vagal activity to examine how it relates to social affiliation, particularly related states like empathy, sympathy, and compassion.

Here's how we can take measurements of Vagal activity, using an electrocardiogram: A person's average resting heart rate is kept relatively low because the Vagus exerts constant slowing

influence on it; without this, our hearts would beat fatally fast. The Vagus nerve applies this heart-rate brake in a dynamic cyclic manner, slowing things down while we exhale, allowing it to beat faster when we inhale. The strength of a person's overall Vagal activity can be indexed as the difference in heart rate during inhalation (faster; less Vagal brake) and exhalation (slower; more Vagal brake)—this measure is called respiratory sinus arrhythmia, and is the most common way to measure overall Vagal tone.

The two new studies extend Porges's work by suggesting that the Vagus may be key to the emergence of compassionate behavior during development as well as day-to-day experiences of compassion.

Zoe Taylor's Purdue team invited families into the lab and videotaped three-and-a-half year old kids doing puzzles and playing with their parent for six minutes. Researchers watched the videos and systematically noted the parents' expressions of warmth, sensitivity, and ability to direct and monitor the kids without getting angry. During this visit researchers also outfitted the children with electrocardiogram electrodes to record Vagal tone while the kids watched two short films: one neutral, the other showing crying babies, which was intended to elicit sympathy.

After a year, the researchers brought the same children back to the lab to observe their capacity for "effortful control"—that is, their ability to stay on task during a series of exercises that assessed problem solving, fine motor coordination, and expressive and receptive vocabulary skills, which they could compare to answers on a questionnaire about the kids given to parents and teachers. Finally, when these same kids were six and seven years old, the team collected survey responses from parents and teachers about the children's levels of sympathy.

After analyzing the data, here's what they found: **warm, sensitive parenting for three year olds predicts greater focused concentration in the children one year later—which in turn predicts greater sympathy at ages six and seven. Vagal tone in the kids at three years also predicts sympathy three and four years later. As was the case for parenting style, the Vagal tone effect was largely related to the children's concentration skills as four years olds.**

Together, these data suggest that warm, sensitive, authoritative parenting may support skills like managing emotions and focusing attention, and that children with higher Vagal tone are more likely to have these skills, which in turn paves the way for sympathy for other peoples' suffering.

Jenny Stellar's team at UC Berkeley took a slightly different tact: They measured Vagal tone while grown-up people were in the midst of feeling compassion. In particular, the Berkeley team wanted to know whether Vagal tone increases—in other words, if the Vagus exerts more influence on the nervous system during an actual experience of compassion.

In a series of four studies, researchers invited college students come into the lab, outfitted them with electrocardiogram sensors, and then had them watch a video of a peer describing her feelings about a death in the family, a sequence of photographs of suffering people (such as starving children), or videos of children being treated for cancer at St. Jude's hospital. Another control group of students watched an uninteresting video (of a guy building a fence), slides evocative of pride, or an inspiring video. After the videos, the students picked a single number on a scale to indicate the level of compassion they felt.

In comparing these different groups, researchers found that eliciting feelings of compassion always increased Vagal tone. But the Berkeley team made one disconcerting observation from

their first three studies—the magnitude of self-reported feelings of compassion did not correlate with greater Vagal tone.

So does Vagal tone really correspond to levels of felt compassion? To answer this, they tried a more nuanced experiment where students indicated their levels of *felt* compassion in real time using a continuous dial (rather than filling out a scale after the fact, as in the first three experiments). This more visceral method showed that indeed, feelings of compassion were associated with increased Vagal tone.

In sum, the Vagus nerve appears to be intimately tied to experiencing compassion towards other people's suffering, providing more evidence for Porges's PolyVagal theory. More specifically, these studies show that **what happens in your Vagus affects whether or not you can handle the feelings provoked by another person's suffering—and whether or not you'll feel concerned and motivated to help.**

There are also practical implications for childrearing. Warm, sympathetic, and authoritative parents are like co-pilots for the Vagus nerve in helping children to develop their ability to feel sympathy and compassion—and then to act on that impulse.



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See also:

- [Polyvagal Theory, Sensory Challenge and Gut Emotions](#)
- [Stephen Porges - The Polyvagal Theory explained](#)

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