

Infant temperament predicts personality more than 20 years later

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Researchers investigating how temperament shapes adult life-course outcomes have found that behavioral inhibition in infancy predicts a reserved, introverted personality at age 26. For those individuals who

show sensitivity to making errors in adolescence, the findings indicated a higher risk for internalizing disorders (such as anxiety and depression) in adulthood. The study, funded by the National Institutes of Health and published in *Proceedings of the National Academy of Sciences*, provides robust evidence of the impact of infant temperament on adult outcomes.

"While many studies link early childhood behavior to risk for psychopathology, the findings in our study are unique," said Daniel Pine, M.D., a study author and chief of the NIMH Section on Development and Affective Neuroscience. "This is because our study assessed temperament very early in life, linking it with outcomes occurring more than 20 years later through [individual differences](#) in neural processes."

Temperament refers to biologically based individual differences in the way people emotionally and behaviorally respond to the world. During infancy, temperament serves as the foundation of later personality. One specific type of temperament, called behavioral inhibition (BI), is characterized by cautious, fearful, and avoidant behavior toward unfamiliar people, objects, and situations. BI has been found to be relatively stable across toddlerhood and childhood, and children with BI have been found to be at greater risk for developing social withdrawal and anxiety disorders than children without BI.

Although these findings hint at the long-term outcomes of inhibited childhood temperament, only two studies to date have followed inhibited children from early childhood to adulthood. The current study, conducted by researchers at the University of Maryland, College Park, the Catholic University of America, Washington, D.C., and the National Institute of Mental Health, recruited their participant sample at 4 months of age and characterized them for BI at 14 months (almost two years earlier than the previously published longitudinal studies). In addition, unlike the two previously published studies, the researchers included a neurophysiological measure to try to identify individual differences in

risk for later psychopathology.

The researchers assessed the infants for BI at 14 months of age. At age 15, these participants returned to the lab to provide neurophysiological data. These neurophysiological measures were used to assess error-related negativity (ERN), which is a negative dip in the electrical signal recorded from the brain that occurs following incorrect responses on computerized tasks. Error-related negativity reflects the degree to which people are sensitive to errors. A larger error-related negativity signal has been associated with internalizing conditions such as anxiety, and a smaller error-related negativity has been associated with externalizing conditions such as impulsivity and substance use. The participants returned at age 26 for assessments of psychopathology, personality, social functioning, and education and employment outcomes.

"It is amazing that we have been able to keep in touch with this group of people over so many years. First their parents, and now they, continue to be interested and involved in the work," said study author Nathan Fox, Ph.D., of the University of Maryland Department of Human Development and Quantitative Methodology.

The researchers found that BI at 14 months of age predicted, at age 26, a more reserved personality, fewer romantic relationships in the past 10 years, and lower social functioning with friends and family. BI at 14 months also predicted higher levels of internalizing psychopathology in adulthood, but only for those who also displayed larger error-related negativity signals at age 15. BI was not associated with externalizing general psychopathology or with education and employment outcomes.

This study highlights the enduring nature of early [temperament](#) on adult outcomes and suggests that neurophysiological markers such as error-related negativity may help identify individuals most at risk for developing internalizing psychopathology in adulthood.

"We have studied the biology of behavioral inhibition over time and it is clear that it has a profound effect influencing developmental outcome," concluded Dr. Fox.

Although this study replicates and extends past research in this area, future work with larger and more diverse samples are needed to understand the generalizability of these findings.

More information: Alva Tang et al., "Infant behavioral inhibition predicts personality and social outcomes three decades later," *PNAS* (2020). www.pnas.org/cgi/doi/10.1073/pnas.1917376117

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