

Five *on*
Friday

Musings on Mental Health

Putting our Heads Together

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The news comes at us rapid fire these days. And this week, I am sure I am not alone in my struggle to make sense of the tragedy of another school shooting, the embattled state of immigration policy for “the Dreamers,” the high level plea bargains and payments to sex workers, the Russia investigation, and a flu vaccine that has only been about 36% effective. Clearly, we have a lot of work to do as a scientific community - indeed as a global community - to better understand human behavior.



[Photo Credit](#)

It's bad. And even the inveterate optimist in me cannot deny the turmoil and trouble. At the same time, I cannot help but celebrate the hope that is contagious when people put their heads together for the good of humanity. That is how I feel about the [unprecedented study of adolescent brain development funded by the National Institute of Mental Health](#).

1. The Adolescent Brain Cognitive Development (ABCD) Study. Launched in 2015, the [ABCD Study](#) is the largest long-term study of brain development and child health in the United States. More than 7,500 children and their families have been recruited so far, and this week data from the first 4,500 participants were released to scientists worldwide. Approximately thirty terabytes of data (about three times the size of the entire Library of Congress collection) has been obtained from the first 4,500 participants. The ABCD Study aims to support ongoing research collaborations on the many factors that influence brain, cognitive, social, and emotional development.

2. Growth and Decline of the Brain. The ABCD Study analyses are helping us understand the relationship of brain development to brain degeneration. Analyses of structural brain images suggest that the sequence of neural development early in life might actually play in reverse during aging, [like a dance playing backwards](#). The human brain has about 100 billion nerve cells. Each can be connected to up to 10,000 other neurons and can pass signals through up to 1,000 trillion synaptic connections. It appears that this dense web of connections degenerates in a similar and opposite way compared to how it develops: a kind of last-in, first-out process.

3. Return to oneness. Cells are controlled by genes, and markers on these genes tell the cells how to behave. Over one's life, these markers accumulate, and a kidney cell becomes more different than a lung cell, for example. But new research shows that [after age 75, nerve cells in different parts of the brain actually start to become more similar to each other](#). The ABCD Study will advance our understanding of this process and has the potential to inform the development of therapies for when this "epigenetic assimilation" gets out of hand, for example, in Alzheimer's disease.

4. Precise glial gardeners. As a baby's brain is developing, neural connections are both forming and being broken at the same time, like a careful gardener cutting the encroaching honeysuckle vines while protecting the maturing daffodils. Over or under-pruning, though, has been associated with developmental and mental disorders, including autism spectrum disorders and schizophrenia. The ABCD Study will contribute to better understanding the role of glial cells as neural gardeners. [Once they are understood more fully, the hope is that out-of-control glial gardeners could actually become targets for intervention to treat or prevent such brain disorders.](#)

5. Teen brain training. Despite the popular myth that you can't grow new brain cells, neurogenesis in the brain actually occurs throughout life. Findings from the ABCD Study and others indicate that in adolescence the hippocampus produces thousands more neurons each day than in the adult brain. Although most of these new brain cells don't survive past a few weeks, research in rodents shows that the survival of these new cells in adolescence can be increased with physical training. Research now needs to show whether exercise can produce the same effect in humans - something that the ABCD Study may be able to answer.

So even amidst this chaotic and very disturbing constant newsfeed of negative upon negative - if we are ever to better understand human behavior, I am sure our best hope lies in studies like the ABCD Study that enable us to better understand the developing brain. Imagine what this can mean for our future, and the future of next generations. A large-scale study with big data sets might seem dry and even dull, but when I consider the good that can come when we put our heads together, I am reminded that there is great promise for the future. It's also a good reminder to look the teenagers in our lives in the eyes, and tell them how much we believe in them.