Using the Nature of Science and Common Core Math Practices to analyze the article "Scientists Move Closer to Understanding Schizophrenia's Cause"

Evil spirits, demonic possessions, exorcisms, "drilling holes in the patient's skull, (Schizophrenia.com)": This was the only scientific (sic) diagnosis and treatment available for a large variety of mental illnesses that we now know of as schizophrenia. Until a German physician named Emil Kraepelinin 1891 "proposed to integrate those varied clinical pictures into a single nosological entity under the name of "dementia praecox," (Jablensky, 2010). His findings were based on the work of other scientists, namely Clouston, Kahlbaum and Hecker. After further research and in a paper written in 1920 "he conceded that our formulation of the problem may be incorrect" (ibid).

It may have been Eugen Bleuler in 1911, that began to change his mind, but in that year Bleuler coined the term Schizophrenia. He believed that "schizophrenia is not a disease in the strict sense, but appears to be a group of diseases" (ibid), and as such should be treated and researched as such. As per Dictionary.com, the word schizophrenia is a contraction of two words, a split-mind.

Research continued well into the 90's when the magic word genome came into use. The Human Genome Project (HGP) was to be the answer to all of our maladies. Yet finding an underlying physiological cause for schizophrenia seemed elusive. Until a series of studies, some unrelated to one another, began to see some connections between certain genes and schizophrenia.

Dr Eric Lander, director of the Broad Institute and a lead researcher in the HGP for MIT, coined the term the Manhattan plot referring to a cluster of genes that seemed to be associated with schizophrenia the MHC. It was "called a Manhattan plot because it looks like a cluster of skyscrapers" (Carey, 2016) from NYC. The MHC genes seemed responsible for "pruning" (ibid) away areas of the prefrontal cortex thereby causing the effects of schizophrenia.

Steven McCarroll and Aswin Sekar of Harvard used statistical analysis to uncover four variants of a particular gene, labeled C-4. Research into the C-4 gene showed that "more than 64,000 people" (Ibid) who had one particular variant were more likely to have schizophrenia.
The article by Carey in the NY Times touted *"Scientists Move Closer to Understanding Schizophrenia's Cause"* was well researched and asked the right question from the right people. Looking at the aspects that make good science, we see from NGSS Public Release II that the researchers followed the correct path starting with Kraepelin.
Two of the tenets of science is that science is a human endeavor and that it is open to revision. We see through the abbreviated history above that the researchers allowed their ideas to change

in the face of better research, Kraepelin conceded to Bleuler. Yet Kraepelin is not forgotten, and is still quoted often. Through the HGP, researchers like Dr. Lander et al, kept trying to find the underlying causes of many diseases, for the good of humanity. "Any step forward is not only rare and unusual, it's just one step in a journey of a thousand miles to improved treatments" (ibid).

Several of the tenets of the Common Core Mathematics Practices (CCMP) were employed into the research of schizophrenia. Specifically, the use of appropriate statistical tools and attending to precision in math. Two of the tenets of the CCMP are almost direct quotes of NOS. Looking for structures in the CCMP is comparable to assuming an order in NOS. Secondly, the NOS tenet of using various methods is similar persevering in solving problems. Both of the above were used in the search for schizophrnia's causes. It took over a hundred years to see a possible genetic cause to this bewildering disease. And once scientists found the locus of the MHC, they persevered even harder.

I believe that this article and the 125 plus years of research into schizophrenia is an example of good science. I tell my students all the time, "science is a verb". It is a human endeavor that helps us answer our questions about our universe. We like to think that the universe is orderly and consistent, and that we can explain, or at least attempt to explain everything. Those science concepts that we cannot, are still up for revision.

Carey, B. (January 28, 2016) Scientists Move Closer to Understanding Schizophrenia's Cause. *The New York Times,* pp. A4. Retrieved from http://nyti.ms/1SbqRGE

Jablensky A. (2010). The diagnostic concept of schizophrenia: its history, evolution, and future prospects. *Dialogues in clinical neuroscience*, *12*(3), 271–287.

NGSS Public Release II; The Nature of Science

Schizophrenia.com