

CROSS TALK

Sibling bonds inspire next generation of autism researchers

BY KATIE MOISSE

12 MAY 2016

You don't need to know someone with autism to become a successful autism researcher, but it can certainly serve as a powerful motivator.

Having a personal connection to autism can stoke a lifelong curiosity about the condition, as well as a determination to uncover its roots or develop new treatments. It can also make scientists more aware of the challenges that autism families face, and more mindful of the indispensable role families play in research.

We asked four early-career autism researchers, from a high school student to an assistant professor, how having siblings on the spectrum has shaped their professional aspirations.

Lauren Singer

Third-year student, Scarsdale High School

Seeing autism firsthand can help frame research goals.

Where research meets reality

My interest in autism research started early — toddler-early. I remember watching my older sister, Jodie, and knowing she was different from other kids. She rarely talked to me. She would often hit and bite me, or herself. And she almost never slept. At night, she sang the same Sesame Street songs loudly, over and over, keeping everyone in the house awake.

Lauren Singer (R) and her sister, Jodie

I wouldn't learn the word 'autism' until years later, but my interest in my sister's condition only grew. In sixth grade, I began volunteering at a local enrichment program for children and teens with autism. There, I realized that no two people with autism are alike.

I remember a boy who became extremely anxious and would hurt himself when he had to transition between activities, and a girl who made incredible artwork but would punch other children who tried to share her supplies. Some people talked incessantly throughout the program, and others never uttered a word.

Three years later, I founded a social group for teenagers and adults with autism. I planned weekend outings for dinner, bowling and other activities. The people who participated were so different from one another that it was hard to believe they all shared the same diagnosis.

Last summer, before my third year of high school, I started assisting in a lab at the Icahn School of Medicine at Mount Sinai's **Seaver Autism Center**. We were studying a potential treatment for autism using rats missing the autism-linked gene **SHANK3**. By then, I think I had met more people with autism than most scientists have. In fact, a surprising number of autism scientists say they've never met anyone with autism.

Growing up with Jodie and working with other people who have autism helped me prepare for my work at the Seaver Autism Center. It has also helped me to contextualize the studies I read in my high school science research class.

For instance, I understand why researchers studying the effects of drug treatments such as oxytocin or antidepressants focus on traits such as anxiety and social withdrawal, which limit children's ability to interact with their peers. And I was not at all surprised by reports of behavioral **differences between boys and girls** with autism, as I've seen evidence of these differences firsthand.

Getting to know people with autism can — and should — also help to frame research goals. It is by interacting directly with people on the spectrum that I have learned about their challenges and strengths. I have also seen how certain interventions designed to help individuals with autism can have the opposite effect by targeting surface behaviors rather than the cause of their symptoms. In a year, I will head to college, where I plan to major in neuroscience. I hope to make working in an autism research lab an integral part of my undergraduate experience. There is so much I want to learn about autism science, but I also think I can add value by reminding researchers about the actual experiences of people with autism and their families.

My advice to scientists, especially those who have never met a person with autism, is to talk to people on the spectrum and their families. If there's a clinic near your lab, visit it. Read online articles by people with autism to understand their biggest concerns. As I move forward in my career, I will always keep in mind that research should improve the lives of real people with autism.

Dylan Ritter

Third-year college student, University of Mississippi

Watching my brother have a seizure fueled my drive to develop treatments.

From fear comes determination

My youngest brother, Travis, was 2 years old when he was diagnosed with 15q duplication syndrome, or dup15q, an autism-linked genetic condition. I was only two years older than he was, but I was keenly aware that our family was different from a lot of others.

Dylan Ritter and his brother Travis

This wasn't necessarily a bad thing. True, Travis couldn't speak, needed help with basic tasks such as brushing his teeth, and somehow enjoyed the credits of a movie more than the movie itself. But he was there for all my soccer and basketball games, and my friends always made an effort to say 'hi' to him. Travis went about his days with a smile on his face.

I vividly remember the day that my family's biggest fear became a reality. We had gone 14 years without seeing one particular hallmark feature of dup15q — seizures — but that suddenly changed one day when I was 16. I was getting into the shower when I heard my mother frantically screaming for help downstairs. Travis was convulsing on the floor.

If you were to ask me how I reacted that morning, I wouldn't be able to say. I remember hoping that I would wake up from a bad dream and find that my brother was okay. The next thing I knew, paramedics were checking his vital signs. He would be okay, they said. But I was forever shaken, and this new reality inspired my interest in research.

When I was in my first year of college at the University of Mississippi, I heard about **Scott Dindot**, a scientist studying dup15q at Texas A&M in College Station. I went out on a limb and sent Dr. Dindot an email describing my brother and explaining that I was interested in doing research myself. Dr. Dindot offered me the chance to work in his lab for the summer, an opportunity that I happily accepted.

During that summer, I worked hands-on with flies and mice, learning the ins and outs of genetic research. I woke up every morning excited to go to work. So when Dr. Dindot asked me to return the following summer, I readily said yes.

I applied for, and received, a grant from the **Autism Science Foundation** to help cover some of the expense of living Texas for four months. Not only did the grant provide financial assistance, it also brought some media attention to dup15q research. After a television reporter heard about the grant, I spoke on a local news program about some of the work in Dr. Dindot's lab and how my little brother's condition has shaped my career ambitions.

After that summer, my family and I traveled from our home in Somerset, New Jersey, to the **Dup15q Alliance Scientific Meeting** in Orlando, Florida, to hear Dr. Dindot and other researchers

share their findings. Speaking with parents at that meeting helped me to realize that research improves the lives of so many more people than just my family.

I am optimistic about the future of autism research, given how much we have learned about the condition in just the past decade. I hope to be part of this progress and plan to apply to Ph.D. programs in biochemistry next year. I hope to study how to create drugs that can manage seizures in people like my brother.

Naseem Jamnia

Graduate student, University of Pennsylvania

Research is fulfilling, especially if it helps your family.

Love can pave a career path

When I was 12, I declared to anyone who would listen that I was going to do a Ph.D. in neuroscience and study autism. I also fantasized about writing for a living. My father told me that writing would be a better hobby than a career, but I thought studying autism was something I could do.

Naseem Jamnia and her brother, Seena

At that point, my mother was working on her Ph.D. in child development. Her focus was resilience in families affected by autism, and our family was something of a case study.

My younger brother Seena was diagnosed with autism in the mid-1990s, just before his 3rd birthday. My mom recalls the early signs that set us apart: I babbled nonstop, whereas he remained silent; I burst with physical affection for my parents, but he wouldn't even look them in the eye.

In a home video taken before his diagnosis, you can see Seena's unusual gait, hand-flapping and finger-twitching. Only 19 months older than Seena, I was too young to remember what he was like as a baby. Nor do I remember my parents' reaction when the pediatrician suggested they take him to a neurologist. My earliest memory of my brother is from when I was about 6: I watched him start to run in front of a moving car in a parking lot, and I grabbed him before he could be hit. From that point on, my childhood was colored by the realities of his diagnosis.

My career ambitions took a detour in high school when someone suggested I might make a good lawyer. I thought disability advocacy and constitutional law might be a way to help families like

mine. But part of me still needed to know: How is my brother's brain different from mine? My interest in neuroscience resurfaced in college. I quickly realized the questions I wanted to answer could not be answered in people. I couldn't prod a person's neurons and see the resulting behavior. I couldn't even scan the brain of someone like Seena, who is on the higher-needs end of the spectrum, because he wouldn't be able to understand simple instructions such as, "Lie still." So I learned to work with rodent models, probing everything from the effects of antidepressants to the impact of concussions. Now, following in my mother's footsteps, I study the neurobiology of stress and resilience. And in September, I will begin my Ph.D. in neuroscience, switching my focus back to human behavior. I hope I can focus at least partially on autism.

Seena doesn't know how central he has been to all of my life choices. He spends his days at **Career Industries**, an organization in Racine, Wisconsin, that teaches people with disabilities life skills and helps them to find work in the community. He spends his nights at home with my parents, watching YouTube videos. This past year, he has started to shower by himself, although my mother still helps him shave with an electric razor. When I come home, he answers my "Hi Seena!" by shouting out "Hi Nas-eem" from the basement, and that's usually the extent of our conversation.

I have no dreams of Seena being 'cured' by research, but I would love to see him be less anxious and more independent. Some people with autism see my desire for treatments as an attack on their identities, and I get it: These people are able to lead productive, amazing lives and advocate for themselves. I'm glad that they can do all these things. Seena, however, has difficulty communicating and will never live on his own.

Ultimately, I would like to help people with autism and families like mine. But I am not yet sure of the best way to do this. Is it through research that could answer key questions about the origins of autism and identify potential treatments? Is it through advocacy to improve access to services? Or should I use my personal experience with autism and my scientific training to write about research to make it more accessible to the general population?

No matter what career path I choose, listening to families affected by autism will be my top priority.

Brent Bill

Assistant professor of biology, University of Texas, Tyler

Understanding why someone has autism can give families peace of mind.

In search of a cause

Many factors have shaped my research into the role of autism-linked genes in the developing nervous system. These include fantastic mentors and faithful funding sources that have allowed me

to grow my laboratory at the University of Texas, Tyler. But the biggest influence on my work is my family.

Brent Bill and his brother, Brad

It's been 25 years since my younger brother, Brad, was diagnosed with pervasive developmental disorder-not otherwise specified, with autistic traits — a diagnosis that is now under the umbrella of autism spectrum disorder. I vividly remember our weekend trip from our home in Eureka, Illinois, to Barnes Hospital in St. Louis, Missouri, to get a definitive diagnosis. Doctors ran a genetic test for the autism-linked condition **fragile X syndrome** — one of the few genetic tests available at the time. This was a very anxious time for my parents. They worried that Brad's autism, should it turn out to be genetic, might affect my decision to have children. In the end, he did not have fragile X, and none of the many tests since have identified a genetic cause for his autism.

For many years, I wished that we could determine the cause of Brad's autism, if only to give my parents some peace of mind. Instead, my family received training on how to redirect his aggressive behaviors, provide appropriate play opportunities and use several types of devices to communicate with him.

There was a theory at the time that nonverbal children with autism have difficulties speaking because of the inability to integrate the large amounts of information required to form words. This made sense as I watched Brad struggle to say "Bah" — the only 'word' that he currently uses. But during one of the training sessions, I learned that approximately 70 muscles help to coordinate speech. Later, in college, I pondered the idea that Brad's language difficulties stemmed from glitches in brain development and connectivity. This inspired me to study the effects of autism-linked mutations using zebrafish.

Members of my lab are using fantastic new technologies, such as the gene-editing system CRISPR/CAS9, to develop zebrafish with mutations similar to those in people with autism. We have also begun to search for drugs that correct the neuronal changes we see in our mutant fish. My goal has never been to find a cure for my brother. He is amazing and I do not want to change the man that he has become. He has an unconditional love for my family — and pretty much everyone else. He lives a happy life at home. We know that he wants to contribute to society, as he claps and marches triumphantly every time he goes to 'work' at the Tazewell County Resource Center in Morton, Illinois, a support center where he engages in group activities, goes for walks and performs small tasks for 90 minutes twice a week.

That said, I believe there are tangible ways to make his life easier and to help families of other people on the spectrum through research. For example, Brad has never slept through the night. Frustration can lead him to hurt himself or others. Attempts to treat these behaviors with existing drugs have not gone as planned, often sedating him to the point that he loses his personality, gains weight or becomes more agitated.

If we can help to ease these behaviors in people like my brother, or reduce the anxiety of parents

by finding a genetic cause of, or contributor to, their child's autism, I think we will have done our job.