“If you know one person with autism, you know one person with autism,” said Rebecca Lundwall, a BYU psychology professor, quoting a well-known axiom. “Each person’s symptoms are different.” Most researchers, however, continue to look at autism as a whole, rather than a collection of disorders, limiting new developments in symptom-specific treatments. Researchers at BYU aim to dig deeper. “In order to make progress, we need to break the autism down,” Lundwall said.
Leading Edge Research on Autism/Brain Connections

This progress is accomplished, in part, through research focused on particular symptoms within the spectrum of autism. Lundwall, along with psychology professor Mikle South, is part of a research group called Autism Connect, a multi-disciplinary group composed of researchers “committed to improving the lives of individuals and families with autism spectrum disorders through scientific research.” The team includes other professors from BYU, the University of Utah, and several BYU graduate students. Its fMRI study of atypical fear learning in autism was recently accepted for publication. This groundbreaking research project aimed to predict aggression in autism based on MRI findings of brain structures. The foundation of this project came from the findings of South’s ongoing research on anxiety in people with Autism Spectrum Disorder (ASD).

South studies the overlap between autism and anxiety. He has used different techniques to conduct extensive research on the relationship, including MRI and EEG brain imaging. He measured the heart patterns and sweat responses of study subjects in response to certain stimuli, and had them fill out questionnaires. He recently teamed up with graduate students to research the reasons behind increased anxiety rates in autistic people. The study sample was children ages three to fourteen.

South’s various research projects have shown that people with ASD can have great difficulty labeling their emotions and understanding what they’re feeling. Aggression is a particularly distressing symptom of autism that exists in approximately fifty percent of children with ASD. Lundwall explained that “most parents report that an aggressive child is more distressing to them than a cognitively-impaired child. It’s more disruptive to family life and produces more anxiety in parents.” This anxiety may stem from the relatively high level of unpredictability. Parents who have an autistic-aggressive child must be constantly alert.

Dave Eaton, CEO of Eaton Alliance, a company that offers support and services for people with autism and other developmental disabilities, has worked with many of these parents. He has seen that, in an effort to maintain control, families or individuals in these circumstances often end up in isolated situations. Typical family functions and activities are avoided—and the distress is only magnified as the child grows. “Once [an autistic child] hits the pubescent years,” Eaton says, “muscles and hormones kick in, then they are able to overpower mom and it becomes this huge family issue.” It is usually at that point that families often seek outside help. Eaton believes that Lundwall and South’s research could result in families getting assistance sooner rather than later. He hopes that the research will also be used to help educate the general public. “More awareness would lead to less isolation,” he said.

Small Brain Stem Equals Greater Irritability

Indeed, the implications of Lundwall and South’s research for such families are exciting to consider. While quite a bit of research has been done showing the prevalence and correlates of aggressive behavior amongst people with autism, predicting that aggression based on MRI findings of brain structures is much less explored.

South and Lundwall theorized that the size of
certain brain regions could predict aggression. South produced a data set from research he did while at the University of Utah that looked at associations of brain volumes in different regions of the brain with aggression.

Lundwall and others studied this set. They were trying to determine if children with ASD and aggression had different brain volumes in certain regions of the brain compared to children with ASD and no aggression. They found a correlation between the size of the tissue of the brain stem and irritability. "The smaller the volume of the brain stem, the greater the irritability," said Lundwall. The brain stem controls some very basic functions like arousal and alertness. Other studies have shown that autism affects the growth rate of the brain stem. It is common for a child with autism to have a significantly smaller brain stem than a child without autism. "This finding is important because it indicates that the brain stem is associated with aggression in ASD specifically, and not ASD generally."

**Real-Life Implications**

Eaton believes that this research could improve treatment of autistic people within their communities. He spoke specifically of public schools and first responders:

"I would love for this kind of research to result in school districts being held a little more accountable to help families with individuals who are aggressive and...on the spectrum," he said. "Families have to fight like crazy and most of the time they are told 'we don't have the money. The school district doesn't have the money to pay for a full-time aid for your child.' There's got to be an answer for that. That's one area where I think this kind of research would help enormously."

In addition, it may help first response community members, such as police officers and paramedics, to understand best practices. Often, Eaton says, members of the community who are not accustomed to interacting with autistic people may struggle with knowing how to do so. "It seems like this kind of research applied would help to educate the first responder community. But I do have to give them credit. A lot of them are trying really hard to keep up with the trend of autism, but still there is a lot of room for them to improve."

**So, the Treatment Options Are...**

Another research project that Lundwall is involved in seeks to determine the best available treatment options for people with autism and aggression. While treatment options do exist, it is hard to know which are the most effective. This project is being led by another member of Autism Connect, Terisa Gabrielsen, who is directing a group of students as they review published literature to look for effect sizes of aggression treatments. "Ultimately, we want to be able to find ways to teach families more effective,
earlier interventions so that the families are not so distressed,” said Lundwall.

Eaton has seen the distress of many families first-hand. Lundwall’s research almost seems to be in perfect response to his request: “I would like to see someone come up with a way to teach families, in the event that they can’t get services or they’re going to have to wait, how to effectively cope with their child on the autism spectrum. To me, it’s just such a pervasive issue.” There is a waiting list in Utah for people with disabilities hoping to receive services, making education for families indeed quite important.

As in any field, groundbreaking discoveries cannot lead to solutions unless they are understood and accepted by those who can implement them. BYU has helped bridge the gap between the lab and real-world applications by hosting an annual Autism Translational Research Workshop. Their most recent workshop, held in January of 2016, was an opportunity for researchers from a number of universities to present evidence-based interventions to practitioners, parents, and teachers. “Sometimes researchers do not present their findings in understandable terms. Sometimes, those on the front lines of treatment do not have time to follow important new findings,” said South. He presented at the conference, introducing a list of interventions to ease anxiety, and thus hopefully aggression as well, in autistic persons. These interventions included:

• Reduce sensory exposure
• Increase structure
• Simplify expectations
• Facilitate emotional awareness

So, while some questions remain to be answered, the possibilities for decreasing the anxiety of both the autistic person and his or her family through sharper diagnostic tools and more finely-honed interventions can provide hope.

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- Dave Eaton