NEWS

Adulthood: Life lessons

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The first child ever diagnosed with autism, by child psychiatrist Leo Kanner in 1943, was five-year-old Donald Gray Triplett. Described by his father as living “within himself” with “no apparent affection” and a “mania for spinning blocks”, Donald would become the archetype for a developmental disorder that is now one of the most common in the United States — affecting an estimated 1 in 88 children, according to the US Centers for Disease Control and Prevention.

These days, though, Donald lives much like any other American retiree. A 2010 profile in *The Atlantic* magazine portrays him as a happy, independent, Cadillac-driving septuagenarian — albeit one with a few quirks, including a prodigious gift for numbers — who plays golf and travels the world.

The contrast between Donald as a young boy and an old man is striking. The question is, how did he get there?

We don't know, says Joseph Piven, a psychiatrist at the University of North Carolina at Chapel Hill, who in 2010 spearheaded a working group on adults older than 50 years of age with the disorder. Older adults with autism, he says, “are virtually unstudied”.

It is even unclear whether the disorder's core symptoms — social and communication deficits, repetitive behaviours and restricted interests — persist during adulthood. Nor do we know much about the prevalence of autism among adults or about their mental state, brain activity or general health.

“Early in my career, if you said this is a lifelong condition, people would get upset. They didn't want to hear that,” says Piven. But that perception of autism as a childhood disorder has begun to change, largely due to shifting demographics. Autism prevalence has risen sharply since the 1990s, so much so that neuroscientist and psychiatrist Thomas Insel has likened it to a “huge wave moving through the system”. Insel is director of the US National Institute of Mental Health in Rockville, Maryland, and chairs the Interagency Autism Coordinating Committee (IACC), a group of scientists and advocates charged with guiding federal funding of autism research in the United States.

Starting in 2009, the IACC made research on adults with the disorder a strategic priority. That same year, Autism Speaks, a United States–based autism science and advocacy organization, launched a major initiative for adults with the disorder that calls for legislation to increase access to services for these adults.

A 2012 report funded by Autism Speaks estimates that the annual cost of caring for people with autism in the United States is US$137 billion, most of which is for adults. The organization is measuring the economic benefits of providing services to individuals with autism as they transition from adolescence to adulthood.

Individual researchers, too, are turning their attention to adults with autism. For example, Catherine Lord, who developed the gold-standard screening tests for autism, is refining the tools used to diagnose the disorder in adults. Lord is a psychologist who directs the Center for Autism and the Developing Brain, a subsidiary of Weill Cornell Medical College in New York and New York Presbyterian Hospital in White Plains. She has been following 200 young adults since they were diagnosed with autism at 2 years of age. “We have a very good sense of who these kids were when they were little and now what they're like at 20,” says Lord. “That's been a huge source of information for us.”

Another group, at the University of Wisconsin–Madison, is following more than 400 families with a

history of autism. Their study, which started 12 years ago, is focusing on how symptoms of autism change over time and how the changes affect parents and siblings. (A handful of long-term studies were conducted in past decades, but they are difficult to interpret because the diagnostic criteria and techniques for assessing autism have changed over time.)

In that context, Donald Triplett's case raises important questions that we're only beginning to answer. Can children diagnosed with autism expect to live a full life 30, 40 or 50 years from now? Can a subset of children with the disorder outgrow their symptoms, or at least learn to cope with them? And, perhaps most importantly, how can we improve the odds that they do?

Most studies show that autism's core deficits, including social and communication problems, persist into adulthood, and that most adults with the disorder remain dependent on family members for support and struggle to fulfil their basic needs such as housing and employment. But work over the past decade or so has offered a more hopeful scenario, partly because many of the children diagnosed today are less severely impaired than those in the past.

In some cases, autism's core symptoms do seem to diminish over time. And a 2009 study of 120 individuals first diagnosed with autism in adulthood found that one-quarter had a college or university degree, and more than 40% held a job or were studying[1]. About half of the participants aged over 23 were living independently.

But the researchers also found higher rates of anxiety and depression in these adults, all of whom had average IQ scores.

According to Julie Taylor, a developmental psychologist at the Vanderbilt Kennedy Center in Nashville, Tennessee, who studies the transition to adulthood for people with autism, only about 10% have independent employment in the community. (The numbers are slightly better — ranging from about 25% to 45% — if they include community-based jobs with support from someone like a job coach or jobs in sheltered workshops.)

The crucial question arises because of this 10%: what determines whether a child with autism is able to graduate from college, hold down a job and live independently?

Some trends are emerging. Faring best are children who score well on standardized intelligence tests, have early verbal skills and display fewer disruptive behaviours such as aggression and hyperactivity. These factors are hard to change, so the challenge to researchers is to find others that can be influenced more readily.

“Knowing about IQ and early language as predictors of better outcomes is all fine and good, but when you have a 12-, 18- or 30-year-old, there's just not a whole lot you can do,” says Taylor. So she is beginning to study societal and family-related factors, such as how connected families are, to better design interventions.

Edwards, T. L. Res. Aut. Spect. Dis. 6, 996–999 (2012). Graphic: Out of sightAdults are rarely included in behavioural interventions for individuals with autism.Click to view larger image »

The late teen years seem to be particularly critical. One recent study, for example, showed that although autism symptoms generally improve during high school, this improvement slows or ceases after graduation[2]. This is the time when access to specialized services through the school system dries up. A survey of nearly 1,000 young adults (aged 19–23) with autism published in 2011 found that nearly 40% receive no services after graduation[3]. “Parents of kids with autism often liken it to falling off a cliff,” says Geraldine Dawson, chief science officer at Autism Speaks.

This abrupt loss of services is particularly true for individuals with average or above-average IQ scores, Dawson says, because they don't qualify for services intended for adults with intellectual disabilities. Higher-functioning adults are three times more likely to have no regular vocational or educational activities than those with lower cognitive function[4]. That the adults who are best equipped to succeed are the ones slipping through the cracks was a real wake-up call, says Taylor.

Whether therapies — vocational, educational, behavioural or drug-based — can help adults with autism meet those expectations is still unclear. Only 32 studies conducted so far of therapies for autism are aimed at adolescents or adults with the disorder (aged 13–30 years), most of which were of poor quality, according to a report published in August 2012 by the US Agency for Healthcare Research and Quality[5]. Compare that with a previous report of 159 studies of treatments that enrolled children 12 years old and under with autism.

Another 2012 review, by psychologist Al Poling of Western Michigan University in Kalamazoo and his colleagues, found that fewer than 2% of participants in studies of behavioural interventions are aged 20 or older[6].

That's likely to change over the next ten years or so, says Taylor. And that's important because therapies may affect adults and children differently. For example, a small placebo-controlled trial published in 2011 found that adults who take the antidepressant fluoxetine (marketed as Prozac) show improvements in the repetitive behaviours typical of autism. Neither fluoxetine nor other antidepressants have had much success in children with the disorder.

Research on therapies for autism has focused on children because their brains are still developing (see 'In the waiting room', **page S14**). But there is reason to believe that adult brains also respond

to treatment. A mouse study published in 2012 showed that a compound called CTEP reverses many of the neurochemical and behavioural symptoms of fragile X syndrome, an inherited form of intellectual disability that produces an autism-related disorder[7]. The mice were given CTEP at 4–5 weeks of age — the mouse equivalent of human adolescence — suggesting that it may offer benefits after the so-called 'critical window' of brain development has passed.

Another drug, arbaclofen, has undergone phase II clinical testing for fragile X syndrome in children and adults, and is being tested on adults with autism. A new study shows that it alleviates some of the social impairments and behavioural problems that are characteristic of the syndrome.

A third drug, GRN-529, may help people with autism[8]. It significantly improves social behaviour in a mouse model of the disorder compared with controls. “I think the outlook is extremely positive, even for adults,” says Randi Hagerman, who led the arbaclofen trial, at the University of California, Davis. “We are pushing the companies hard to do trials for autism with these drugs and they say they will.”

Although research on adults with autism is still lagging behind their need for treatment, the fact that autism is now being viewed — and studied — as a lifelong disorder is encouraging.

The 200 children with autism that Lord has followed for the past 20 years are a constant reminder that neural development doesn't cease. “What's been so striking is that young adults with autism can make enormous progress as they grow up,” she says. “It's imperative that we look at adult development and how we can support it — from a humanitarian and an economic point of view.”

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