

OPINION, VIEWPOINT

Gauging intelligence in autism over time

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12 DECEMBER 2014





When studying autism, intelligence is a critical variable. It can affect the manifestation of certain symptoms, such as social impairments and restricted and **repetitive behaviors**, and it helps to predict an individual's response to treatment, as well as long-term outcome. This is well understood in the field.

Less well understood is the fact that, like all instruments, tests of intelligence are imperfect. In fact, these tests may be particularly problematic for individuals with autism — especially those who are nonverbal. The assumption that the intelligence quotient (IQ) is a valid and stable measure of an individual's cognitive ability is not always true.

A number of studies have detailed the relatively minor inconsistencies that emerge when different IQ tests are used. Researchers hope, however, that large study samples will drown out these discrepancies.

A bigger problem is the lack of intelligence tests for individuals with low cognitive abilities. This has been dealt with in various ways, from excluding participants who cannot achieve a minimum standard IQ score, to assigning all participants below a certain threshold the lowest possible score, to calculating a ratio IQ, which takes into account an individual's mental age.

All of these practices can be justified, but each of them carries significant limitations. In a study published earlier this fall in the *Journal of Autism and Developmental Disorders*, my colleagues and I highlighted **some of the issues with using ratio IQs**. Ratio IQs are calculated by dividing an individual's 'age equivalent' by the individual's chronological age and then multiplying by 100.

In young children who are capable of achieving a standard score, this score and the ratio IQ score seem to be highly convergent. But with age, the denominator keeps growing, artificially deflating

the ratio.

We studied this problem in a sample of people with autism who were assessed from roughly age 2 through 19. Toddlers and preschoolers with standard or ratio IQ scores of 70 or above tended to achieve similar scores as young adults. But children with intellectual disability — defined as having an IQ below 70 — had more variable ratio IQ scores over time.

Most of these children's scores drastically decreased as they got older. Modest gains in their mental age equivalents were offset by an ever-increasing denominator: their chronological age. A cross-sectional study comparing these individuals with others of different ages could further exaggerate the artificial drop in IQ introduced by using age ratios.

It is clear that we need tests that can more accurately reflect the abilities of individuals who have autism and a low IQ, particularly as they age into adolescence and adulthood. In the meantime, researchers must be aware of this problem when interpreting study results. For example, analyses that stratify individuals of different ages on the basis of cognitive ability rely on the assumption that IQ scores apply similarly across age (for example, having an IQ of 50 at age 4 should theoretically mean the same thing as having an IQ of 50 at age 14), but findings from our study suggest that is not the case.

Clinicians must also be cautious when discussing the meaning of these numbers, as it can be quite shocking for a parent to think that their child's IQ score has dropped by 3 or more standard deviations over the course of several years.

Researchers and clinicians should consider including other measures to approximate cognitive ability, such as adaptive functioning, which uses parent reports to assess an individual's ability to perform daily activities at home and in the community. Another approach may be to try to understand which mental age equivalents correspond to cognitive ability at a certain age. For instance, a nonverbal mental age of 4 or 5 after the chronological age of 12 might correspond to a moderate intellectual disability, whereas a nonverbal mental age of 2 might correspond to a severe intellectual disability.

Ultimately, however, we should aim to be less reliant on tests designed for young children, as the activities used to measure IQ in toddlers and preschoolers are less relevant for adolescents and adults, and may fail to capture their true cognitive abilities.

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