Why do many exceptionally gifted 'prodigies' rarely maintain their success in adulthood?

Research published in Science suggests that early specialization isn't the optimal path. World-class individuals often develop multidisciplinary skills from a young age.

High-achieving individuals play a crucial role in advancing knowledge and solving humanity's major challenges. Therefore, society is always interested in understanding the formation and development of exceptional talent. A new review published in the journal *Science* suggests that many current approaches to gifted education and talent development are based on inaccurate assumptions. For the first time, an international, interdisciplinary research team has compiled evidence on how world-class individuals emerge in very different fields such as science, classical music, chess, and sports.

Long-held assumptions about talent development

For decades, research on talent and specialization has relied on a familiar theoretical framework. Excellence was thought to stem from early signs of exceptional ability, such as academic excellence, outstanding athletic performance, or impressive musical talent, combined with specific abilities like high intelligence, motor skills, or musical aptitude. These initial advantages were believed to require years of intensive training, focusing on a single area, to reach peak performance.

From that perspective, most talent development programs strive to identify gifted children as early as possible, then accelerate their training through highly specialized coaching pathways. However, new findings from a research group led by Arne Güllich, professor of sports science at RPTU Kaiserslautern-Landau, suggest that this strategy may not be the optimal path to creating sustainable long-term excellence.

Until recently, much research on giftedness focused on teenagers and those nearing the elite level. Research subjects were typically high school students, young athletes, young chess players, or musicians studying at music academies. Over time, data collected from world-class athletes and professionals at their peak have begun to question the conclusions drawn from these limited research samples.

" *Traditional studies of talent and specialization haven't fully considered the question: how did world-class adults develop in their early years?* " Güllich explains. Therefore, the goal of this review is to directly examine the actual developmental paths of the most exceptional individuals during childhood and adolescence.

To achieve this, Güllich assembled an international research team including scientists Michael Barth (University of Innsbruck), D. Zach Hambrick (Michigan State University), and Brooke N. Macnamara (Purdue University).

The research team re-analyzed large datasets from numerous previous studies, including the developmental histories of a total of 34,839 elite individuals worldwide. This group spanned from Nobel Prize-winning scientists and Olympic medalists to top chess players and renowned classical composers.

Combining data from fields with vastly different skill requirements allows researchers, for the first time, to directly compare how world-class individuals thrive across multiple professions.

Children who show early talent rarely become superstars in adulthood.

One of the most important conclusions is that the career paths of elite individuals often differ significantly from traditional expectations. As Güllich observed, a common pattern emerges across all fields.

First, the children who achieve the highest academic success at a young age are often not the ones who reach the pinnacle in adulthood. Second, individuals who later achieve world-class status usually improve their abilities steadily and gradually in the early stages, and are not necessarily the best among their peers. Third, they rarely focus on a single field from a very young age, but rather experience a wide range of activities, from academic subjects and musical genres to sports and different career paths.

The research team put forward several hypotheses to explain these findings. Güllich said they proposed three main lines of explanation for discussion.

The 'search and match' hypothesis suggests that trying out multiple fields gives individuals more opportunities to find the field that truly suits them best. The 'capital enhancement' hypothesis suggests that learning in diverse fields enhances overall learning capacity, thereby helping individuals continue to progress to the highest level in their chosen field. Finally, the 'risk reduction' hypothesis suggests that pursuing more than one field reduces the risk of encountering career obstacles, such as work-life balance, burnout, loss of motivation, or injury in fields requiring fine motor skills like sports and music.

In summary, according to Güllich, those who find the right field, develop their long-term learning potential, and minimize career obstacles will have a higher chance of reaching world-class status.

We need to re-evaluate how we support young talent.

What do these findings mean for parents, educators, and policymakers? According to Güllich, the message drawn from the scientific evidence is quite clear.

It's not advisable to specialize too early in a single field. Instead, encourage and facilitate young people to pursue diverse interests, even supporting their development in two or three areas simultaneously. These fields don't necessarily have to be closely related; combinations like language and mathematics, or geography and philosophy, can all be valuable. A familiar example is Albert Einstein, one of history's greatest physicists, who also had a deep connection with the violin from a young age.

These findings should spur a shift toward evidence-based talent development policies. Programme designers and administrators have an opportunity to move away from early specialization models toward approaches that encourage discovery and long-term growth.

This could broaden opportunities to produce world-class individuals in science, sports, music, and many other fields.

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