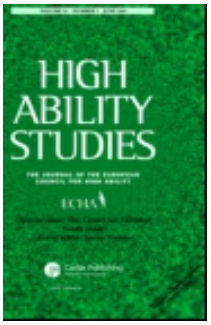

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Talent search research: what have we learned?

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This chapter summarizes the lessons learned from the over 25 years of research conducted by the Center for Talented Youth, as well as the prior 10 years of research conducted by Dr Julian Stanley and his graduate students. This summary also includes work done by the several other talent searches (Duke, Northwestern and Rocky Mountain), although a complete description of their work can be found in the individual articles written by each. The findings from the hundreds of research studies conducted validate the talent search identification model and process, as well as the programs developed to meet the needs of identified students. In addition, the authors have condensed the findings from numerous research projects examining the cognitive, social, personality and academic development of the students CTY serves.

Introduction

When Julian Stanley established the 'Study of Mathematically Precocious Youth' (SMPY) in 1971 to find and serve students with advanced mathematical and scientific abilities his work was heavily research based from the very beginning. Although the first talent search was only held in March 1972, an article reporting on this project appeared just months later in the *Educational Researcher*; a truly impressive feat (Keating & Stanley, 1972). The next year Stanley (1973) had a long article in the *Educational Psychologist* and the first full-length book was published a year after that, describing SMPY's pioneering efforts to investigate the cognitive and affective characteristics and needs of precocious students (Stanley *et al.*, 1974). Additional volumes (Keating, 1976; Stanley *et al.*, 1977; George *et al.*, 1979; Fox *et al.*, 1980; Benbow & Stanley, 1983a; Benbow & Lubinski, 1996) and a huge number of articles (see, for example, Stanley, 1976a,b,c,d, 1977/1978, 1978, 1979, 1996; Stanley & George, 1978, 1980; Stanley & Benbow, 1982) followed, summarizing SMPY's research.

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As other university-based talent searches were established, including the Center for Talented Youth (CTY) at Johns Hopkins University, the Talent Identification Program (TIP) at Duke University, the Center for Talent Development (CTD) at Northwestern University and the Rocky Mountain Talent Search (RMTS) at the University of Denver, the legacy of SMPY, that their efforts to serve gifted students should be research based, was passed on. As a result, literally hundreds of articles, books chapters and books have been published by educators and researchers associated with the talent search centers. This article will summarize some of what we have learned about talent development from this research.

Predictive validity of talent search scores

Using a college admissions test designed for high-school seniors to identify academic talent among Grade 7 and 8 students was quite a radical idea when the first talent search was held. Parents and educators alike feared that it would be much too difficult for middle-school students, even those with advanced academic abilities. However, research strongly supports the use of above-level aptitude tests for talent identification.

The talent searches assess students who hit the ceiling on in-grade tests and give them a test designed for older students, a more difficult test that spreads their performance into a new distribution of scores. Students' performance in the talent searches confirms that the above-level tests are not too difficult for gifted middle-school students because many Grade 7 and 8 talent search participants score above the mean of college-bound high-school seniors (Benbow, 1992; Olszewski-Kubilius, 1998; Wendler *et al.*, 2001). Yet the process also discriminates well within the group tested so that students with exceptionally advanced reasoning abilities can be identified and their educational programs adjusted to include more advanced content (Stanley, 1976b; Stanley & Benbow, 1981; Lupkowski-Shoplik *et al.*, 2003; Olszewski-Kubilius, 2004).

In 1977 Julian Stanley published an article entitled 'The predictive value of the SAT for brilliant 7th and 8th graders' in which he documented the range of scores obtained on the SAT during the first four talent searches at Johns Hopkins University (Stanley, 1977/1978). Numerous studies since then have shown the pattern continuing (see, for example, Olszewski-Kubilius, 1998; Barnett & Juhasz, 2001). The two-tier process whereby in-level tests are first utilized to identify students who would benefit from participating in the above level assessment has also been validated (Ebmeier & Schmulbach, 1989).

In recommending program options for talent search students scores used for entrance into fast paced classes have been shown to be valid predictors of success (see, for example, Bartkovich & Mezynski, 1981; Olszewski-Kubilius *et al.*, 1989; Gustin & Corazza, 1994). Other research has linked high performance in the talent searches to a pattern of taking more advanced courses in high-school, to more honors and awards in high-school and to higher educational aspirations (Burton, 1988; Wilder & Casserly, 1988; Barnett & Durden, 1993; Mills &

Ablard, 1993; Brody, 1998; Olszewski-Kubilius, 1998; Lupkowski-Shoplik *et al.*, 2003).

Research has also shown scores on the SAT to be predictive of achievement 10 years after talent search, with top talent search scorers outperforming low talent search scorers on numerous important variables (Benbow, 1992). Other studies of top talent search scorers have shown that they achieve at high levels in accelerated programs (Kolitch & Brody, 1992; Brody & Blackburn, 1996) and are 50 times more likely to pursue doctoral degrees than the general population (Lubinski *et al.*, 2001b). So, the validity of the talent search assessment has been well established.

Effectiveness of talent search programs

The talent searches have also evaluated their own educational programs. SMPY's initial experiments with speeding up the pace of instruction in mathematics, for example, were all systematically evaluated by researchers (see, for example, Fox, 1974). It has been clearly documented that mathematically precocious students can learn a great deal of mathematics in a much shorter period of time than is typically required in school (Kolitch & Brody, 1992; Mills *et al.*, 1994; Stanley, 2000).

As science and humanities courses were introduced by the talent searches and residential and distance education programs were added, evaluation continued. A large body of evidence now exists that demonstrates high achievement by students who participate in the programs offered by the talent searches (see, for example, Durden, 1980; Stanley & Stanley, 1986; Barnett & Durden, 1993; Mills *et al.*, 1994).

In addition, it has been shown that students who participate in these classes go on to excel in subsequent coursework, thus refuting a common belief that accelerated classes must produce gaps in knowledge (Lynch, 1990; Mills *et al.*, 1992a). In fact, studies demonstrate that summer program participants successfully take more advanced courses throughout high-school following their summer experience than comparison groups (see, for example, Barnett & Durden, 1993).

With regard to the residential summer programs in particular, studies have also documented their social benefits. Students report on the value of being able to interact with their intellectual peers, and these enhanced peer relationships have been shown to impact on self-concept and social skills development (Hoffmann & Mills, 1998).

Acceleration

In addition to studying their own accelerated classes, talent search researchers have investigated a variety of ways, both in-school and out-of-school, to accelerate students' educational programs. Talent search students who moved ahead in subject and/or grade placement have been found to benefit academically from utilizing accelerative strategies without exhibiting concomitant social and emotional

difficulties (Brody & Benbow, 1987; Swiatek & Benbow, 1991; Kolitch & Brody, 1992).

An important area of investigation has been early college entrance. When SMPY was established few opportunities existed to serve gifted students. As a result, Stanley's first interventions involved students who entered Johns Hopkins University at exceptionally young ages (i.e. 13–14 years of age). These early entrants were followed up and were found to be highly successful in college and afterwards. Subsequently, other cohorts of young college students were studied, leading to a general conclusion that groups of early college entrants fare well academically without having social and emotional problems (see, for example, Stanley, 1985; Brody *et al.*, 1988, 2004; Brody & Stanley, 1991).

Inevitably, there were individuals within these groups who did less well, so the talent searches have worked to develop less radical accelerative strategies to serve certain students, including establishing academic summer and distance education programs and advocating curricular flexibility in schools (Stanley & Benbow, 1983). There were also interventions to develop state-supported residential high-schools (Stanley, 1991) and early college entrance programs (Boothe *et al.*, 1999; Brody *et al.*, 2004) as alternatives to full-time early entrance into college without special academic and social support. Stanley and his colleagues now recommend considering a *smorgasbord* of accelerative options to select those most appropriate to help individual students achieve an optimal educational program (see, for example, Stanley, 1979; Robinson & Robinson, 1982; Stanley & Benbow, 1983; Durden & Tangherlini, 1993; Benbow & Stanley, 1996; Lupkowski-Shoplik *et al.*, 2003; Brody, 2004b).

Ability grouping

The question of whether it is appropriate or equitable to group students together on the basis of ability and/or achievement for educational purposes has engendered discussion for many years. The need to offer appropriate accelerated instruction to advanced learners has been well documented by the talent searches and this can be done more effectively when students with the same academic needs are grouped together (Ablard *et al.*, 1998; Mills & Durden, 1992; Mills & Tangherlini, 1992).

In the ability grouping versus cooperative learning debate that gained much attention in the early 1990s the talent searches came down strongly on the side of ability grouping, noting that grouping is effective only if the curriculum is adjusted to the level of the students. With regard to cooperative learning it was noted that it can be utilized as a strategy within a learning environment where students are grouped together on the basis of educational level and need, but not as an alternative to advanced instruction for advanced students (Mills & Durden, 1992). The debate surrounding ability grouping has been examined and written about extensively within the talent searches (Mills & Durden, 1992; Mills & Tangerlini, 1992; Durden & Mills, 1993; Brody, 2004a).

Social and emotional adjustment

The social and emotional adjustment of gifted students generally, and accelerated students in particular, has always been a concern in our field. Certainly there is much evidence, dating back to Terman (1925), that gifted students are well adjusted overall. Studies of talent search students have also confirmed that, as a group, these students are socially well adjusted, report having friends and have positive self-concepts (see, for example, Brody & Benbow, 1986; Parker, 1996; Ablard, 1997b, 2004).

There are some indications, however, that students with extremely high talent search scores may have more difficulty fitting in socially than students with more moderate scores. Also, students with exceptional verbal talents may have more difficulty than those with exceptional mathematical talents (Brody & Benbow, 1986; Ablard, 1997b). The value of programs where students can interact with their intellectual peers for the enhancement of social development has been demonstrated, particularly for students who have difficulty relating to agemates in school (Hoffmann & Mills, 1998).

Finally, two concerns that the gifted literature points to as possible problems among gifted students, perfectionism and multi-potentiality, were not found to be especially prevalent among talent search participants. In these studies talent search students were found to resemble a national sample comparison group with regard to perfectionism (Parker & Mills, 1996) and to be quite goal oriented by age 13 (Achter *et al.*, 1996).

Gender differences

Gender differences favoring males in performance on the mathematical portion of the SAT were observed on the first talent searches. An article in *Science* in 1980 stirred a great deal of controversy when a large difference between the top scoring talent search boys and girls was reported (Benbow & Stanley, 1980).

Concern about these gender differences led to considerable additional work by talent search researchers (see, for example, Brody *et al.*, 1994). Studies found gender differences on the SAT to extend to other aptitude and achievement tests, including 'Advanced Placement', SAT subject tests and graduate admissions tests (Stanley *et al.*, 1992; Stumpf & Stanley, 1996, 1997), as well as among younger students (Mills *et al.*, 1993; Stanley, 1994; see also Robinson *et al.*, 1996). Other research studies linked interests, personality traits and parental influences, as well as ability, to gender differences in achievement in particular disciplines (Lubinski & Benbow, 1992; Mills, 1992, 1997; Olszewski-Kubilius & Yasumoto, 1995).

The good news is that gender differences at the highest levels of SAT-M performance have diminished. While Benbow and Stanley (1983b) reported a ratio of about 12 males scoring 700 or above for every female, the ratio is now about 3 to 1. Also, while follow-up studies of top talent search students show fewer females than males pursuing doctorates in science, there are still many examples of female talent search participants who have become medical doctors, research scientists or

mathematics or science professors (Lubinski *et al.*, 2001). Our research has shown that recognition of mathematical and scientific talent by the talent searches, as well as intervention programs aimed at females (see, for example, Fox *et al.*, 1979, 1985; Brody & Fox, 1980; Stocking & Goldstein, 1992; Olszewski-Kubilius & Grant, 1996), have contributed to increasing participation and achievement by females in these fields.

Spatial aptitude

While the talent searches have focused primarily on identifying students with verbal and mathematical talents, there has also been recognition of the importance of spatial aptitude in predicting achievement in certain fields. Researchers studied spatial aptitude in talent search students for 5 years before launching the 'Spatial Test Battery' (STB), which is now offered as an optional assessment in some of the talent searches. This research showed that spatial aptitude is not a unidimensional trait, but rather that there are different spatial skills that should be assessed, and the STB reflects this by including a number of subtests.

Validation studies related to developing the STB found it to be effective, as a complement to measures of mathematical and verbal reasoning ability, in predicting the achievement of talent search students in accelerated mathematics and science classes (Stumpf, 1993). Follow-up studies of talent search students have also demonstrated the value of assessing spatial ability to predict achievement over time (Shea *et al.*, 2001).

Personality and learning styles

Since the mid-1980s researchers have looked at the personality and learning style differences among talent search students, and distinctive patterns have emerged from this work. For example, when compared with normative groups of adolescents talent search students (as a group) tend to be more open to new experiences and learning, tend to prefer looking for patterns and possibilities rather than concentrating on facts and details in their academic studies and like to play with new ideas (Mills, 1993). Using the 'Myers–Briggs Type Indicator' (MBTI), Mills (1993) found that the talent search group expressed greater preferences for intuition. The personality trait introversion was also found to be more predominant in the talent search group than the general population, and this trait has been shown to be correlated with intelligence. Talent search students also tend to be higher on achievement motivation and lower on interpersonal and social concerns as measured with the 'Adjective Checklist'.

Among the talent search students a larger number of talent search females than expected preferred a thinking rather than a feeling mode of evaluating information and making decisions (Mills, 1993). Thinking types prefer making decisions through rational analysis and objective facts. Talent search females look more like young men, in this way, than do females in general.

Although clear differences between talent search students and normative groups of adolescents have been found, there are also strong within-group differences among the talent search population. While they exhibit all the possible types of cognitive styles measured by the MBTI, those gifted students who are high on both verbal and mathematical ability have the strongest preference for introversion and intuition. Introverts with an intuitive preference tend to use their minds in a way that is advantageous in dealing with the intricacies of thought and language. On the other hand, the mathematically talented students with the lowest verbal scores had the largest number of sensing types on the MBTI and almost 70% of them were thinking types. Sensing-thinking types tend to prefer impersonal, logical analysis with an emphasis on facts; they tend to be practical and matter-of-fact. Among students with mathematical talents, theoretical values and investigative interests were also found to predominate. It has been suggested that individual differences in personality and learning styles may be related to how an individual uses and develops his/her abilities (see Mills, 1993). Similar patterns with regard to personality and learning style, as well as gender differences, were found in a group of gifted Irish adolescents (Mills & Parker, 1998).

Research has suggested that gender differences in personality and learning style may be related to later achievement in the sciences and mathematics and follow-up studies of talent search students have linked personality traits and interests to the students' vocational choices and levels of achievement (Mills, 1997; Schmidt *et al.*, 1998; Achter *et al.*, 1999). Thus, research on talent search students has shown that exceptional aptitude, particularly in an area such as mathematics, mediated by particular personality traits and interests is predictive of ultimate attainment in related career fields.

Gifted students with learning disabilities

Today the population of students referred to as 'twice exceptional' is getting considerable much-needed attention from researchers and educators. However, researchers at Johns Hopkins University began studying this population in 1980 when they embarked on a 3 year study that helped validate the existence of these dual exceptionalities (Fox *et al.*, 1983). Before this study there was still considerable skepticism that advanced cognitive abilities and serious academic difficulties resulting from learning disabilities could coexist in individuals.

Research on this population continues at several of the talent centers, shedding light on their characteristics and needs (see, for example, Brody & Mills, 1997, 2004; Mills & Brody, 2002). Program recommendations and accommodations have been identified to help gifted students with learning disabilities achieve their full potential. For example, highly able students with a documented disability may be eligible for testing accommodations (e.g. extended time) and, although gifted students who have a learning disability have been shown to do fine in summer coursework, they may need reasonable accommodations to do so (e.g. oral rather than written exams). A greater understanding of this population has influenced all of the talent search

centers to respect the need for accommodations in their own classes for 'twice exceptional' students.

Under-represented minority students

The talent searches work hard on outreach efforts to attract traditionally under-represented minority students to their programs. Research and evaluation have accompanied these efforts and are ongoing.

In general under-represented minority students who qualify for and attend programs do well in them. Research has also shown that these students have academic aspirations and self-concepts similar to other program participants. As early as Grade 8 all of these outreach students plan to attend college. They also place great importance on getting good grades, going to a good college, understanding what they learn and enjoying learning (Center for Talented Youth, 2001, 2002a, 2003).

Similar to non-outreach students, under-represented students report that summer programs through talent search helped them to gain maturity and independence, improved their thinking skills, helped them to see more possibilities for their future, helped them to become more open minded and gave them the opportunity to meet other very bright students from diverse backgrounds.

When compared with a comparison group of students (from similar backgrounds and ethnic group, with similar financial status and ability levels) outreach students who entered talent search and went to programs took more advanced placement courses in high school, were more involved in Student Government or some other leadership role and received more academic awards or honors in high school.

Lessons learned from outreach efforts have suggested that students need more comprehensive and ongoing counseling/mentoring to keep them involved and motivated after learning about talent search and the summer programs and to achieve throughout high-school. Future efforts in this area are focused on such ongoing intervention. Extensive fund-raising efforts are needed to keep this type of intervention available for under-represented students.

Sometimes outreach students have been found to have deficits or gaps in skills or knowledge that can have a negative impact on their academic achievement. Research shows that these deficits can be addressed successfully through intervention programs consisting of targeted accelerated instruction (see, for example, Lynch & Mills, 1993).

In the late 1980s CTY received funding to develop an academic intervention program for bright disadvantaged and minority youth. This effort resulted in development of the 'Skills Reinforcement Project' (SRP). This project was based on the same model for instruction used by the CTY summer programs, namely that students should be instructed and accelerated in their area of strength using a Diagnostic Testing–Prescriptive Instruction (DT-PI) approach. Simply stated, the DT-PI approach assesses a student's strengths and weaknesses, identifying what the student already knows and what he/she does not already know. Instruction is then individually tailored to focus on the specific gaps in a students' learning so that he/she can rapidly move ahead.

Over the next 5 years the validity of this type of program was evaluated and confirmed (Mills *et al.*, 1992b; Lynch & Mills, 1993). Research repeatedly showed that this type of instructional intervention resulted in significant gains in students' achievements and aptitude test scores in reading and mathematics.

Parenting and family issues

In trying to evaluate the needs of gifted students it is important to also understand their home environments. Numerous studies show that the majority of talent search participants come from fairly advantaged homes, with well-educated parents (see, for example, VanTassel-Baska, 1989; Ablard *et al.*, 1996; Brody & Blackburn, 1996). In one study, for example, all but about 10% of talent search parents had some college experience and more than half the fathers had graduate degrees (Center for Talented Youth, 2002b).

Research has shown that talent search students have positive feelings about their families and feel supported in their goals (Ablard, 2004). Contrary to many perceptions, talent search students do not typically report that their parents are pressuring them to achieve at exceptionally high levels (Ablard, 1997a; Center for Talented Youth, 2002b). However, these parents do value education and provide educational opportunities for their children (Ablard & Parker, 1997).

Conclusion

The quantity and quality of research done by talent searches suggest that the talent search model is arguably the most extensively evaluated model in gifted education. Talent search researchers have validated the use of above level assessments to identify students ready for advanced coursework; demonstrated the positive effect of rigorous summer programs on academic achievement, social development and students' goals; proven the effectiveness of a variety of acceleration strategies, as well as ability grouping, in serving gifted learners; evaluated the social and emotional adjustment of talent search students in a variety of settings; shown the relevance of spatial aptitude, interests, personality traits and learning styles to academic and career success; and studied special populations of gifted learners, including 'twice exceptional' students, extremely gifted students, under-represented students and gifted girls.

These studies have contributed to our understanding of the characteristics and needs of gifted learners. Moreover, they have set a standard that all educational interventions should be defensible based on solid empirical evidence that they are effective for their stated goals. As talent searches continue to develop new ways to serve the needs of advanced learners, it is important that they continue to embrace the legacy that all of their efforts should be research based.

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