Intellectually Talented Students: Family Profiles

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Since 1971 the Study of Mathematically Precocious Youth (SMPY) has pioneered in the use of talent searches to identify mathematically apt youths (George & Solano, 1976). Students in the seventh and eighth grades (if underage) qualify to enter a SMPY talent search by scoring at or above the 97th percentile on the mathematics portion of a standardized achievement test. Entrants are required to take the College Board's Scholastic Aptitude Tests, Mathematics (SAT-M), Verbal (SAT-V), and, since 1978, the Test of Standard Written English (Angoff, 1971), and to complete a detailed questionnaire. In this paper family profiles compiled from analysis of the questionnaires completed by the SMPY December of 1976 Talent Search participants will be described. This talent search, geographically more diverse than the three previous searches, covered the mid-Atlantic region, including Maryland and surrounding areas in Pennsylvania, Delaware, Virginia, West Virginia, and the District of Columbia.

SAT-M and SAT-V

All requirements for the 1976 Talent Search were completed by 873 eligible youths (507 males, 366 females), most of whom were 11 or 12 years old. Their mean scores on SAT-M and SAT-V were high (Table 1) and were as good as or better than those of a random sample of 11th- and 12th-graders. The average age of the random sample was four to five years older than the Talent Search participants. On the SAT-V, boys and girls scored about equally well. On the SAT-M, however, a substantial sex difference was found. It was larger than that found for the general population of high school students, but less than for college-bound 12th graders. The boys' mean score was greater than the girls' mean by half of the girls' standard deviation. These and other cognitive abilities of this group have been discussed elsewhere (George & Cohn, 1977; Cohn, 1977).

Table 1
Mean Scores and Standard Deviations on SAT-M and SAT-V for Participants and a Random Sample*

		SAT-M		SAT-V	
		Mean Score	Standard Deviation	Mean Score	Standard Devision
Talent Search Participants	Boys (507)	459	88	373	76
	Girls (366)	422	65	368	69
	t of Mean Difference (Boys vs. Girls)	6.77, $p<.001$		n.s.	
National Sample	Men	416	117	368	111
	Women	390	140	368	111

*From College Entrance Examination Board (1978)

Siblings

This group had between zero and nine siblings. The mean number of children (including the student) in a family was 3.01 for boys and 3.25 for girls (significantly different at the $p<.01$ level). Thus, the parents of at least these gifted children tend to have more children than the average family of 1.7 children, a number that has been stable since the early 1970's (*Dun's Review*, 1979). This occurred despite the fact that some of the families are not yet complete.

In sibling position, with first-borns assigned a value of 1, second-borns 2, and so on, boys had a mean ranking of 2.06, and girls 2.34 (difference significant at the $p<.003$ level). We conclude that, on the average, Talent Search girls came from slightly larger families, and their sibling position was somewhat lower than the boys. Astin (1974) has presented similar data for precocious sixth-graders.

In agreement with previous SMPY findings (Keating, 1974), no sizable correlations between SAT scores and sibling position or number of siblings in a family were seen. The Pearson correlation coefficients (r) ranged from $-.05$ to .16. These coefficients tended to be higher for SAT-V than for SAT-M, and for boys than for girls, but of course all differences were small.

Education of Parents

A surprisingly high number of the group (over 98%) had parents who were still living.[1] Table 2 shows the highest average level of education reached by the parents of the participants. The fathers' level was almost college graduate; the mothers had some college education. The mean difference between parents was significant at the $p<.001$ level. No statistically significant difference between educational level of the parents of boys versus the parents of girls was found. The parents' educational levels did, however, correlate rather highly: $r=.58$, $p<.001$, which is about the same degree of "assortative mating" as Peng and Jaffe (1979) found for a sample not selected for high intelligence.

Figure 1 illustrates the categories of educational level attained by the parents. Of the fathers, 45% were educated beyond college. Another 21% of the fathers were college graduates. Only 14% of the fathers had received

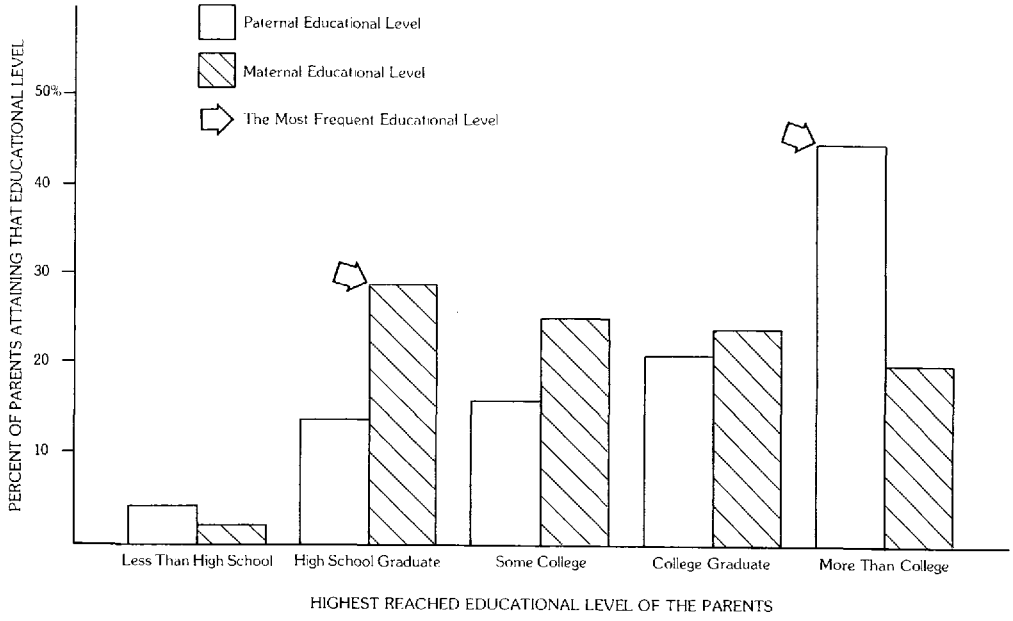

Figure 1. Frequencies of attained education levels for parents.

just a high school diploma, and about 4% had not graduated from high school. We conclude that the fathers of the Talent Search participants were highly educated.

The mothers, while not as well educated as the fathers, also reached a high level of formal instruction. The most frequently attained educational level was high school graduate (29%), but 24% were college graduates. About 45% of the mothers had graduated from or gone beyond college, and about 70% had completed some college. Only 2% of the mothers had not completed high school. Thus, as a group the mothers were also well educated.

Table 2
Means for Parents' Highest-Reached Educational Level[1]

	Fathers		Mothers		
	Mean	Standard Deviation	Mean	Standard Deviation	
Boys (507)	3.91	1.22	3.33	1.15	t=7.73, p<.001
Girls (366)	3.87	1.26	3.28	1.16	t=6.63, p<.001
t of Mean Difference (Boys vs. Girls)	n.s.		n.s.		

1. Educational level was coded as follows:
1=Less than high school graduate
2=High school graduate
3=Some college
4=Bachelor's degree
5=More than bachelor's degree

Correlations between parents' educational levels and their children's SAT scores are shown in Table 3. Although the r's are all positive and highly significant statistically, they are small (range .14-.34) and individually cannot account for much of the variance in SAT scores.[2] The small r's may be due partly to the restriction of range in parents' education and in the students' SAT scores,[3] and to the fact that every student entering the talent search is already known to be in the upper 3% of the nation's seventh-graders in mathematical ability. The means and frequencies of educational level do, however, support the findings of Keating (1974) and many others which show that children who score high on tests of intellectual ability such as the SAT tend to have well educated parents.

Interestingly, in every comparison of the relationship between SAT scores and parents' educational level by sex, boys' SAT scores correlate more highly with parents' education than girls' SAT scores do. Thus it seems that, for these students, the boys' ability on the SAT is slightly more related to parents' education (which is usually found to

Table 3
Correlations for Highest Level of Parents' Education and Fathers' Occupational Status with SAT-M and SAT-V Scores

		Fathers' Education	Mothers' Education	Fathers' Occupational Status
Boys (507)	SAT-M	0.34†	0.32†	0.27†
	SAT-V	0.30†	0.29*	0.25†
Girls (366)	SAT-M	0.25†	0.21†	0.22†
	SAT-V	0.20†	0.14*	0.17†

*$p<.01$
†$p<.001$

correlate highly with parents' measured intellectual level) than the girls' ability is.

To investigate these relationships further, we computed canonical correlation coefficients for these data. Canonical correlation takes as its basic input two sets of variables and from them derives a linear combination from each of the sets of variables in such a way that the zero-order *r* between the two linear composites is maximized (Kerlinger & Pedhazur, 1973). The two sets of variables used in this analysis were children's SAT-M and SAT-V scores and fathers' and mothers' educational level.

First, we computed the two independent canonical *r*'s for girls and, separately, the two for boys. The resulting principal canonical correlation showed that parents' education accounted for only 8% of the variance in SAT scores for the girls and 17% for the boys. Equivalently, the SAT scores "explained" only 8% of the variance of the girls' parents' educational level and 17% of the boys'.

Then another canonical correlational analysis was performed with the two above sets of variables but for the total group of 873 students not segregated by sex, which was used as a "dummy" variable.[4] The first canonical *r* accounted for 16% of the variance in SAT scores; the second canonical *r* accounted for 2% of the variance. The first loaded most on the SAT-M scores and then equally on the second variable set (parents' education and sex). The second *r* loaded most on sex and the SAT-M scores. Thus, sex probably served better as a moderator variable in the first analysis than as a dummy one in the second, although different results are obtained from the two analyses. In conclusion, it seems that after a certain point in intellectual ability (here, the top 3% mathematically) parents' educational level as measured in this study does not account for a great deal of the variance in SAT scores.[5]

Returning to the Pearson *r*'s in Table 3, it is also seen that in every comparison the youths' SAT scores correlate a little more strongly with their fathers' educational level than with their mothers'. In addition, SAT-M scores always correlated better than SAT-V scores with the parents' educational level, even though the scores on both subtests had similar variability (see Table 1). The first finding could be explained if mothers often failed to reach their educational potential because of extraneous variables such as early marriage.[6] The second finding is surprising, since children's verbal ability is usually considered more dependent on parents' education than mathematical aptitude is. This could result because participants were initially selected for high mathematical ability and desire to enter a mathematics "contest." That could make SAT-M scores more reliable than SAT-V scores and thereby increase the magnitude of correlation of SAT-M scores with other variables (Stanley, 1971, pp. 400-401).

Occupational Status of the Fathers

Fathers' occupational status was determined by using the scale of Hodge, Siegel, and Rossi (1964). This scale had shown great stability between 1925 and 1963, when it was updated. Some changes in status of the occupations have probably occurred since 1963, but it is likely these would not greatly affect the findings. The average status occupation on this scale is 70, which is the score assigned to a bookkeeper. On this scale, the highest scoring occupation was Supreme Court judge, with 94 points, and the lowest was shoe shiner, with 34 points. The average occupational status of the Talent Search participants' fathers was 80, the score on the scale given to a building contractor or the owner of a factory that employs about 100 people. Occupational status of the fathers in our group correlated 0.71 ($p<.001$) with their educational level.

Occupational status correlated almost as strongly with the SAT scores as parents' education did (Table 3). Moreover, occupational status showed the same relationships with the SAT scores as educational level did: the *r*'s for SAT-M scores and for boys were higher. Thus, the conclusions drawn for parents' educational level apply here also.

Summary

The highly able group of 873 participants in the 1976 Talent Search, most of whom were seventh-graders, came from families in which, on the average, the parents were living and well educated. The fathers' occupational status tended to be high. The families were relatively large (i.e., averaging more than three children, rather than the current national mean of 1.7). There were no strong correlations between family size or sibling position and ability of the students. Parents' educational level and paternal occupational status were related to measured aptitude; these relationships were stronger for boys. Fathers' educational level correlated more highly with their children's ability than did mothers' educational level. Finally, SAT-M scores for both sexes related more closely to parents' educational level and fathers' occupational status than did SAT-V scores.[7]

Footnotes

1. Perhaps there is a tendency for highly able students with dead parents not to enter a talent search such as SMPY's. In this context, Carlsmith (1964) might be appropriate.
2. For example, $(.34)^2$ is only 12%.
3. As judged by the standard deviation.
4. The sex with the higher means (boys) was arbitrarily assigned a 1, whereas each girl was assigned a 0.
5. Because, however, the upper educational levels (e.g., JD, MD, PhD, and even master's degrees) were not differentiated from the lesser "more than bachelor's degree" ones, and because quality of education was not considered, this conclusion must be tentative.
6. We also know from Table 2 that the variability of the mothers' education is slightly less than that of the fathers'. Such "restriction of range" tends to result in lower r's.
7. For further sex comparisons, see Fox, 1977; 1979; and Fox, Brody & Tobin, 1980.

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