More About "Young Entrants to College: How Did They Fare?"

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Abstract

This study reports on a group of 25 educationally accelerated entrants to Johns Hopkins University. It supports the ability of students who enter a highly selective college two to five years early to make good grades, win honors, and graduate promptly.

Introduction

Do students who enter college two or more years younger than the typical age develop well academically, socially, and emotionally? Do persons who graduate from college three or more years younger than the typical age prosper thereafter? Evidence concerning the latter group was presented by Stanley and Benbow (1983). A more recent study of 25 persons bears on the former issue (Stanley, 1985a).

Generally, results were quite favorable for both groups, perhaps somewhat more for the young graduates. For example, most of the 36 persons who received their bachelor's degree before age 19 from The Johns Hopkins University during its entire history (1876-1985) have performed splendidly in later life (Stanley and Benbow, 1983). None thus far has "failed" vocationally. Also, see Stanley (1985b).

The present report focuses on the young-*entry* group, augmenting results presented in Stanley (1985a). It is meant to call the reader's attention to research published in *College and University*, the official journal of the American Association of Collegiate Registrars and Admission Officers, and to supplement those reports about early entrance to college and early graduation from it. An important finding of the study was that 24 of the 25 educationally accelerated entrants to Johns Hopkins in the fall of 1980, who started 2-5 years earlier than is usual, received a bachelor's degree there by May of 1984 (22) or from another university (2). The other one left Johns Hopkins because of illness after five semesters, with excellent academic standing and only one semester short of graduation.

Correlation of Entry and Exit Variables

Table 1 shows the intercorrelations of 12 of the characteristics of the 25: number of honors received at graduation, weighted for their importance;[2] cumulative GPA at graduation; percentage of semesters attended during which the student was on the Dean's List (GPA $\geq$ 3.50 on a $\geq$ 14 credit load, where 4.00 = A); whether (1) or not (0) the student earned a master's degree along with his or her baccalaureate (4 did, each at age 19); total number of credits earned; of Oriental parentage (1) or not (0); graduated from private secondary school (1) or not (0); number of college credits at entrance; whether (1) or not (0) the student had been identified by SMPY before entering Johns Hopkins; sex (1 = female, 0 = male); age at entrance, as of 1 September 1980; and date bachelor's degree was completed.[3]

Five of the 12 (Nos. 4, 6, 7, 9, and 10) are dichotomous "dummy variables," taking only the values 0 and 1. Therefore, many of the *r*s in Table 1 are point-biserial or phi coefficients. The former cannot attain magnitudes greater than .80 if the scores in the continuous distribution are normally distributed. The maximum possible size of the latter, like that of all *r*s, depends on the shape of the two distributions.[4]

What does Table 1 show? Despite the small number of individuals (25) involved, the *r*s seem about what one would expect. The largest relationship (.88) is between total honors received at graduation and the percent of the time the student had made the Dean's List. Next most potent (.82) is the correlation of cumulative GPA with Dean's List. Not far behind (.77) is the correlation of honors with cumulative GPA. Next (.66) is the *r* between master's degree obtained and a total number of credits earned. Graduating from a private secondary school correlated .56 with being of Oriental background. Number of credits at entrance predicted early graduation (−.56): the more credits, the earlier the graduation.

Canonical Correlation

Other interesting relationships are shown in Table 1. For example, no *r* involving sex was larger than .16. Generally, the pattern of the 66 *r*s confirms evidence reported in the first article (Stanley, 1985) that some of the six antecedent variables (6, 7, 8, 9, 10, 11) were fairly good predictors of some of the six at-graduation variables (1, 2, 3, 4, 5, and 12). This partitioning of the 12 variables suggests performing a canonical correlational analysis and also multiple correlational analyses. The first canonical *r* is .87, but of course considerably inflated because of over-fitting of idiosyncrasies of the small sample (12 variables on 25 cases). It would cross-validate to a lower value on an independent sample. The best contributing predictors were attending a private secondary school, SMPY affiliation, and number of entering credits. The most strongly weighted criterial variables were degree date, honors at graduation, credits earned, and cumulative GPA.

These 12 variables are so heterogenous, however, that the first canonical *r* does not account for nearly all of the 66

Table 1
Intercorrelation of the 12 Variables*

	Honors at Graduation 1	Cumulative GPA 2	Dean's List 3	Master's Degree 4	Credits Earned 5	Oriental 6	Private High School 7	Credits at Entrance 8	SMPY 9	Sex 10	Age on 9/1/80 11	Degree Date 12
1		.77[1]	.88[1]	.54[1]	.34	.45[2]	.26	.07	.12	.15	.05	-.21
2			.82[1]	.39	.36	.32	.40[2]	.14	.12	.07	-.10	-.03
3				.45[2]	.27	.31	.19	.18	.13	.02	.12	-.12
4					.66[1]	.01	.01	.18	.24	-.10	.14	-.15
5						.16	.33	.15	.17	-.10	-.24	.15
6							.56[1]	.01	.02	.16	-.10	-.16
7								.12	-.16	-.03	-.40[2]	-.16
8									.39	-.12	-.10	-.56[1]
9										-.05	-.46[2]	-.46[2]
10											-.08	-.01
11												.17
Mean	1.6	3.33	39%	.16	134	.24	.24	18	.48	.36	16.14	1984.14
S.d.	2.0	0.41	33%	.37	13	.44	.44	14	.51	.49	0.81	0.73

[1] $p < .01$ [2] $.01 < p < .05$

*According to the overall tests of statistical significance proposed by Collins & Rosenblood (1985), the matrix of 66 *rs* is non-null. By that rigorous experiment-wide control of significance level for this type of exploratory study, however, only the 4 largest *rs* have *ps* less than .05.

relationships among them. The second canonical *r* is .73. One can formulate some tentative hypotheses from this welter of intercorrelations and test them further in subsequent studies, but of course should not overgeneralize from the present analysis.

Multiple *R*s

A multiple regression analysis was performed on the 6 predictor variables for each of the 6 at-graduation criterial variables. Using a stepwise method, we could compute equations for only 3 of the criterial variables. For each of these equations only one predictor variable had the statistical significance necessary to be included. For determining degree date the best predictor was the number of credits the student had when entering college ($r = -.56$)—i.e., the more credits, the lesser number of semesters needed to secure the bachelor's degree. The best predictor of number of honors received was whether or not the student was Oriental ($r = .45$). For GPA the best predictor was whether or not the student had attended private school ($r = .40$).

Regression equations were not computed for Total Credits Earned, Dean's List, or Master's Degree, as none of the 6 predictor variables was statistically significant enough to be included.

Only limited predictions can be made from the three equations, as they are based on a small sample (N = 25). Also, the particular variables used did not predict the criterial variables well. Even $(-.56)^2$ is only 31 percent "variance in common," but in terms of the usual validity of predictors of college success over a four-year interval it is impressive.

Other antecedent variables such as SAT scores and rank in high-school graduating class (but a number of the students had not bothered to graduate from high school) that could have been included might have been good predictors. For example, in a study of chemistry majors at Johns Hopkins (Zak, Benbow, & Stanley, 1983) the mathematics portion of the SAT was shown to be a better predictor of cumulative GPA at graduation ($r = .43$) than the verbal portion ($r = .24$). Zak et al. also found that the verbal score was the best predictor of number of credits earned ($r = .37$). While our study involves a far more heterogenous group in terms of college major, factors such as SAT scores and high-school grades might have appreciable value for predicting several of the criterial variables, such as GPA, Dean's List, and Total Credits Earned. They might also have added to the predictive ability of some of the variables included in this study. We were more interested, however, in studying certain variables than in maximizing multiple *R*s.

Further Results

Overall, the majority of the members of this young-entry group could be described as highly successful academically. Twenty-three of the twenty-five were graduated on time or earlier from two academically excellent universities, and another only one semester late. The group had a mean GPA of 3.33, one-third of the way between straight-B and straight-A, on an average of 134 credits earned (the B.A. requires at least 120). They averaged 1.6 honors at graduation and made the Dean's List 39 percent of the time. Four of the 22 Johns Hopkins graduates received a master's degree along with their baccalaureate or shortly thereafter,

each at age 19. One of these was, at age 18, probably the youngest female ever awarded a Rhodes Scholarship.

Most members of the group are now in graduate or professional schools, working for Ph.D. and/or M.D. degrees—e.g., Cornell (computer science), Cornell and Rockefeller (medicine and molecular biology), MIT (electrical engineering), North Carolina (computer science), Oxford (mathematics), Stanford (computer science), U.C.-Berkeley (statistics), and UCLA (biology).

Several factors were implicated in their success. Statistically significant correlations existed between several antecedent variables and several at-graduation variables. However, most of the antecedent variables did not predict the criterial variables well. The results are based on a rather small cohort, so not many strong generalizations can be made. The study demonstrates well, however, the ability of students who entered an academically difficult college two to five years early to make good grades, win honors, and graduate promptly. Few other predesignated groups of 25 students would produce better achievement than this one.

The Classes of 1985 and Beyond

Twelve of the 25 who began in 1980 had been associated with SMPY to some extent before becoming full-time students at Johns Hopkins. These tended to enter somewhat younger ($r = -.46$) than students not identified by SMPY, and to graduate earlier ($r = -.46$). All 12 graduated from Johns Hopkins in eight semesters or less, with cumulative GPAs ranging from 3.8_1 to 2.89. SMPY association correlated only .12 with GPA. Many of these 12 had more contacts with us during college than most of the 13 non-SMPY students did.

For the above reasons, and because the sample size of 25 is rather small, it seems desirable to study subsequent classes and determine how their young entrants achieved as undergraduates. Most results are already known for the Class of 1985, whose members began in the fall of 1981. Thirteen students accelerated at least two years in grade placement. As of 1 September 1981 they ranged in birthdate from 10-17-64 (with sophomore-class standing) to 11-29-65. Two were female. Ten of the 13 graduated from Johns Hopkins by 31 May 1985. Their cumulative gradepoint averages and (in parentheses) total number of semester-hour credits earned were as follows: 3.97 (120), 3.93 (155), 3.86 (148), 3.73 (147), 3.28 (122), 3.26 (176), 3.14 (127), 3.10 (121), 3.07 (122), and 2.58 (122). Thus, the mean GPA was 3.39, and the median was 3.27.

Four of the 10 were elected to membership in Phi Beta Kappa. One was appointed the Young University Trustee of Johns Hopkins from the Class of 1985. Only one of the 10 had been well known by SMPY before the fall of 1981, and only this one was contacted by the SMPY staff several times during the four years. Thus, this small additional sample reinforces our long-term observation that most young entrants do rather well at Johns Hopkins on their own. The break between the fourth and fifth GPA, above (i.e., from 3.73 to 3.28), is noticeable, however. Four of the 10 did much better academically than the other 6, but only one was below 3.07.

What happened to the 3 who did not graduate from Johns Hopkins during the four-year period? One, with a 3.34 GPA and 128 credits by the end of calendar 1985, is still working toward his B.S. degree in electrical engineering and computer science. He had transferred to the Johns Hopkins' adjunct engineering program after the second semester, presumably for financial reasons. He had taken a leave of absence during the academic year 1983-84.

One had taken a year's leave of absence after the first two semesters and then withdrawn. His GPA was 3.23, and he had earned 43 credits. His program was premedical. It seems likely that he transferred to some other college or university, but this has not been confirmed because he does not respond to inquiries.

The 13th enrollee was required to withdraw from Johns Hopkins on 1-9-85 because of poor grades: GPA of 1.87 on 78 credits. He had made 8 *F*s, three of them the final semester, but also two *A*s his penultimate semester. He started as a natural sciences premedical student, but was not successful in that major and shifted to an area of the social sciences. He has not responded to our inquiries.

We of SMPY plan to report on the Classes of 1986-89 as they graduate.

The message we glean from these results from the two classes is one of cautious optimism. Students who enter college full-time at an early age well prepared academically and well oriented by experience and planning can get an excellent undergraduate education. On the SAT-V and SAT-M they should score higher than does the average freshman in the college or university in which they plan to enroll—e.g., at least 625 on V and also at least 675 on M if that school is Johns Hopkins. Being strong on SAT-V, which measures reading comprehension and verbal reasoning ability, seems especially crucial even for mathematics or science majors. Given these conditions, there appears to be no valid reason to fear becoming academically accelerated a year or two or three—or, in a few cases, even more than that.

Terman and Oden (1947) knew this long ago: "It is our opinion that children of 135 IQ or higher should be promoted sufficiently to permit college entrance by the age of seventeen at latest, and that a majority in this group would be better off to enter at sixteen" (p. 281). Pressey (1949) also urged acceleration. Quite a few students nowadays are heeding their advice, and that of others such as Daurio (1979) and Robinson (1983).

Footnotes

1. We thank Lola L. Minor for statistical assistance, Camilla P. Benbow, Linda E. Brody, and Barbara S. K. Stanley for editorial suggestions, and

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2. E.g., winning a Rhodes Scholarship was counted as 3 points, whereas election to membership in Phi Beta Kappa or Tau Beta Pi (National Engineering Honor Society) was given 2 points.
3. To conserve sample size, small even at 25, we filled in the missing values for two dropouts by extrapolation, assuming that these persons (one male, one female) would continue their present records to graduation somewhere in May of 1985. (Later we discovered that the male dropout graduated from another university, having majored in chemistry, on 21 December 1984—i.e., one semester "late.") This assumption affects cumulative GPA, total credits earned, degree date, dean's list, number of other honors, and master's degree. Because these two individuals are rather "middle of the road" for this group, however, neither the *r*s nor the means and standard deviations of these variables (except for degree date) are likely to be affected much by these assumptions. Stanley (1985a) provides means and standard deviations with the two non-graduates excluded.
4. *r*s of +1.00 cannot occur unless p_U', the percentage of 1's for one variable, equals p_U', the percentage for the other. For *r*s of -1.00 to be possible, either p_U must equal p_U' or p_U must equal $-p_U'$—i.e., one distribution must be the mirror image of the other.

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