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AUTHOR DeVito, Anthony J.; And Others
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ABSTRACT

The decade of the 1970's saw an alarming decline in the Scholastic Aptitude Test (SAT) scores of entering college freshmen, and it was theorized that this might be attributed to a corresponding decline in study attitudes. To test this hypothesis, math and verbal SAT scores, study habits, and attitudes of college freshmen in the classes of 1973 and 1983 were compared. Although a decline in SAT scores was found, there was a slight improvement in work methods, teacher acceptance, and educational approval. The results also showed that differences in verbal aptitude between men and women had narrowed, probably due to cultural influences; however, women maintained superior study habits and attitude scores. The findings suggest that a decrease in student activism may account for enhanced behavioral and attitudinal scores. (Author/JAC)

Scholastic Aptitude Decline and Changes in Study Habits and Attitudes

Anthony J. DeVito, Georgiana Shick Tryon, and Janet F. Carlson

Counseling Center, Fordham University

Address all correspondence to Anthony J. DeVito, Counseling Center, Fordham University, Bronx, New York 10458. Telephone: 212/579-2141.

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Scholastic Aptitude Decline and Changes in Study Habits and Attitudes

The decade of the 1970's saw an alarming decline in the Scholastic Aptitude Test (SAT) scores of entering freshmen (Maeroff, 1973; Tolman, 1976). A parallel decline has been shown for American College Test scores (Ferguson & Maxey, 1978). Numerous hypotheses were advanced to explain this decline; in fact, one source (Wharton, 1977) listed 79 different hypotheses grouping them into broad categories such as changes in curriculum, institutions, students, the family, and values.

Some of the changes in students mentioned by Wharton (1977) were decreased motivation of test takers, less competitiveness, decreased discipline, and less interest in school. Thus, the attitudes students have toward school and studies were felt to be related to SAT decline. Within our culture, achievement motivation was found to increase continuously from the 1920's into the 1960's (McClelland, 1975, p. 344). A sharp decline was found from 1960 to 1974 (Winter, McClelland, & Stewart, 1977). One of the explanations offered by Winter (1977) for the decline in academic test performance was the change in motivational factors such as achievement, affiliation, and power. Winter also hypothesized that the relationship between all motivational influences and academic performance may be expressed as an inverted U-curve, a relationship commonly referred to as the Yerkes-Dodson law.

Changes in curriculum and institutional policies mentioned by Wharton (1977), including decline in emphasis placed on basic academic skills, the rise of open classrooms, and the increased popularity of independent study, were seen as contributing factors in lessened student aptitude. Thus, the

students in the era of declining SAT's needed fewer traditional academic skills to negotiate the educational system than the students preceding the decline (Westoff, 1980). It would seem reasonable to assume that a decline in study attitudes would go hand in hand with a decline in academic emphasis.

One of the changes in the family that has been found to account for some portion of the SAT score decline was increased family size and the concommitant decline in birth order of those taking aptitude tests. According to the model of Zajonc and Bargh (1980), there is an association between SAT and birth order; children born in the post World War II era came from increasingly larger families, were correspondingly lower in birth order, and attained increasingly lower scores in SAT. In 1962, this trend was reversed and there has been a steady increase in average order of birth. Consonant with this model, there are now indications of a leveling off in SAT score decline and anticipation of an increase (Biemiller, 1981).

Brown and Holtzman (1967) reported data from freshmen at six different colleges to describe the relationship between scholastic aptitude and each of their measures in the Survey of Study Habits and Attitudes (SSHA). The weighted average correlation between scholastic aptitude and SSHA delay avoidance, work methods, teacher approval, and educational acceptance were .08, .30, .16, and .14, respectively. These data may support the notion of a relationship between motivation and performance since Brown and Holtzman refer to the SSHA as a measure of motivation to study.

This study compared math and verbal SAT scores as well as study habit and attitude scores obtained by freshmen in the classes of 1973 (C'73) and 1983 (C'83). We expected to replicate the well-documented decline in SAT between C'73 and C'83. Because of changes in motivation, because of the relationship between study habits and attitudes and scholastic aptitude, and because of the

decline in emphasis on basic academic skills, it was hypothesized that C'83 freshmen would have poorer study habits and attitudes than those in C'73.

METHOD

Procedure

Prior to the beginning of their freshman year, all incoming freshmen were invited to participate in a testing program sponsored by a counseling center. C'73 was tested during the Summer and early Fall of 1969, and C'83 was tested during the same period in 1979.

Students who decided to accept the invitation to participate in the freshman testing program were administered the SSHA (Brown & Holtzman, 1967), Form C, within a battery of psychological tests. The two study habits assessed by the SSHA are delay avoidance (lack of procrastination) and work methods; the teacher approval and educational acceptance scales of the SSHA are attitudinal in nature.

Both math and verbal SAT scores, obtained from admissions records, were the highest scores for each student. Data on rank in high school class were also collected from admissions files to help determine whether admissions procedures and populations from which students were drawn changed in any material way over the course of the decade. Percentile rank in high school class was obtained by dividing rank in class by the total number of students in the class. To normalize the resulting Poisson distribution, an appropriate square root transformation was performed ($X' = \sqrt{X} + \sqrt{X+1}$). According to convention, the larger the percentile, the more favorable the rank; therefore, each of the percentiles was subtracted from 100 in the tabular presentation of means.

Subjects

Since not all of the 2,054 students invited to participate in the testing program decided to do so, the students' decision to participate may have biased the representativeness of our sample. We used the data available to us, SAT scores and percentile rank in high school class, to determine whether our sample was biased. Three-way analyses of variance (ANOVA's) were performed in which participation was the factor of interest and class (C'73 or C'83) and sex were also included as factors to reduce error variance. The dependent variables were verbal SAT score, math SAT score, and transformed percentile rank in high school class. There was no significant difference between the participators and non-participators with regard to verbal SAT ($F(1, 2037) = 1.10$, $p = 0.294$), math SAT ($F(1, 2037) = 0.00$, $p = 0.970$), and transformed rank in high school class ($F(1, 1779) = 0.77$, $p = 0.379$). Consequently, at least with respect to these variables, we were unable to find a sampling bias which would prevent us from generalizing to the entire populations of the two Freshman classes at this institution.

Any subject missing data on any of the variables of interest was excluded to make more uniform the analyses and comparisons across the many analyses. Of the original 2,054 subjects, 9 were missing SAT scores and 267 were missing data for rank in high school class. (According to the admissions office of the institution, high school rank in class is not provided by the high schools attended by 15% to 25% of students admitted.)

The subjects whose data are referred to in the remainder of this paper were entering freshmen in liberal arts or business at a private, metropolitan college. In C'73, there were 167 female and 328 male subjects (C'73 Total = 495) and in C'83, there were 182 female and 230 male subjects (C'83 Total = 412).

RESULTS

Analyses of Variance

The principal analyses consisted of 2 x 2 ANOVA's in which class (C'73 or C'83) and sex were the main factors. Separate analyses were performed for each of the following dependent measures: Verbal and Math SAT; SSHA delay avoidance, work methods, teacher approval, and educational acceptance; and transformed percentile rank in high school class. The cell means and ANOVA results are presented in Tables 1 and 2, respectively.

Insert Tables 1 and 2 about here.

The anticipated decline in verbal SAT scores was found in the population under study when C'73 and C'83 were compared. There was no significant main effect for sex, but there was a significant interaction between sex and class which may be described as follows: women performed much better in verbal aptitude than men in C'73 while men performed slightly better than women in C'83.

Mathematical SAT also declined during the 10-year period as indicated by the significant class main effect. In addition, there was a significant sex main effect with men performing better than women in both classes.

There was no significant class main effect with regard to the percentile rank in high school class. A significant sex main effect in which women demonstrated a higher percentile rank in both years was found.

For the indices of study habits, women's delay avoidance score was significantly better than the men's. There was no significant class difference in delay avoidance. Both the class and sex main effects were significant for work methods with C'83 reporting better work methods than C'73

and women reporting better work methods than men.

The results of the analyses for the two SSHA attitudinal measures, teacher acceptance and educational approval, were very similar to those for work methods. Contrary to expectations, C'83 had more favorable study attitudes than C'73. Women had more favorable attitudes than men as indicated by the significant sex main effect.

To summarize the results regarding SSHA, women's scores were significantly higher than men's for each of the four SSHA variables. C'83 was superior to C'73 for each SSHA variable with the exception of delay avoidance for which there was no significant class difference.

Analyses of Covariance

If the two classes were equated for SAT scores, it was thought that the hypothesized changes in study habits and attitudes might emerge. Therefore, analyses of covariance, to parallel the ANOVA's for the SSHA variables, were performed in which math and verbal SAT's were the covariates. With sex and class as factors, separate analyses were performed for the four SSHA variables. The adjusted means were very similar to the unadjusted means and there was no change in the ANOVA results (conventional significance levels of F's) in sex or class main effects for any of the four analyses--one for each of the SSHA variables.

Graphs for Curvilinearity

Since analysis of covariance assumes rectilinearity of regression, the possibility of curvilinearity of the relationship, as suggested by Winter (1977), was also explored. Bivariate plots were constructed in which raw data for the individual SSHA measures were grouped into intervals of 5 scoring units, with extremes collapsed to attain a minimum frequency of ten. The SSHA measures were plotted along the horizontal axis; the vertical axis

consisted of average level of aptitude performance for each of the intervals on the horizontal axis. Graphs were constructed for each of the four SSHA variables, keeping sex, class, and aptitude (verbal and math) separate. No suggestion of curvilinearity emerged. Even when sex and aptitude (math and verbal) were collapsed for purposes of smoothing, there was no suggestion of curvilinearity in the four graphs, one for each of the SSHA variables.

Correlational Analysis

Since the bivariate plots suggested certain relationships, it was decided to examine correlationally the relation between SAT and each of the study habits and attitudes. For each class, sex, and aptitude (math or verbal), separate Pearson product-moment correlation coefficients were computed; in addition, correlation coefficients were obtained for the combined aptitudes and sexes. All correlation coefficients may be found in Table 3, and as can be seen, several of the groups and subgroups displayed (a) significant negative relationships between delay avoidance and SAT and (b) significant positive relationships between work methods and SAT performance.

Insert Table 3 about here

DISCUSSION

Many hypotheses have been advanced to account for the decline in SAT which was replicated in this population. Our data were collected during the period in which those taking the SAT and enrolling in college were from increasingly larger families and of increasing birth order, so the decline makes sense from the point of view of the Zajonc & Bargh (1980) findings. The interaction of class and sex for verbal SAT suggests that the differences in verbal aptitude between men and women may have narrowed, very likely due to

cultural influences.

While aptitude discrepancies may have narrowed during the decade under study, the same cannot be said for study habits and attitudes. The superior study habit and attitude scores of the women in the sample are consistent with the sex differences reported in the SSHA manual (Brown & Holtzman, 1967). The women in our sample also attained consistently higher percentile ranks in high school class than the men. This result is not surprising in that a number of studies (Alexander & Eckland, 1974; Garai & Scheinfeld, 1968; Grams & Waetjen, 1975) have shown that women earn higher grades throughout their schooling than men; women have also been shown to have more positive attitudes toward their education than men (Alexander & Eckland, 1974; Lueptow, 1975). As with SSHA, no evidence has emerged in this study to suggest that sex differences in percentile rank in high school class have narrowed over the ten-year span of the study.

The low, but significant, negative relationship between SSHA delay avoidance and SAT performance suggests that brighter students tend to procrastinate in doing their school work. Their higher aptitude may permit them to do their work satisfactorily even though they wait until the last minute. The significant relationship between work methods and SAT suggests that those with higher aptitudes have better work methods. Our results are not that dissimilar from those presented by Brown and Holtzman (1967, p. 18) in which the SSHA scales were correlated with scholastic aptitude. Careful examination of their data reveals that in only one of their six groups was the SAT used as the measure of scholastic aptitude; and for that group, the relationship between SAT and delay avoidance was -.10.

There was no suggestion of a curvilinear relationship between SAT performance and SSHA scales, contrary to what would be expected by the Yerkes-Dodson law (Winter, 1977). The following are possible reasons for our inability to demonstrate this relationship: (a) Despite allusions to the motivational nature of the SSHA (Brown & Holtzman, 1967), the SSHA scales do not reflect this construct; (b) The Yerkes-Dodson law usually refers to individuals--so when averages are used, curvilinearity may be blurred; and (c) Truncation of range within the sample prevents the emergence of curvilinearity.

The most remarkable finding was the unexpected increase from C'73 to C'83 in certain of the study habits and attitudes (work methods, teacher acceptance, and educational approval). This result is paradoxical in view of the positive relationship between SAT and SSHA work methods found within each class. The year in which C'73 was administered the SSHA--1969--occurred during an iconoclastic period in which institutions and authority figures were being questioned. A decrease in activism among college students may account for the enhanced scores on these behavioral and attitudinal measures. Today's students are more interested in career preparation, which can often be attained through college education, than students a decade ago (Borgstrom, Whiteley, & Rudolph, 1980; Palladino & Tryon, 1978), and this increased investment in the value of an education appears to be reflected in the higher attitudinal (teacher acceptance and educational approval) and behavioral (work methods) SSHA scores obtained by C'83 relative to C'73.

The decline in activism and increased conservatism of today's students implies increased compliance and greater social desirability. Like most other paper-and-pencil tests, the SSHA measures reported rather than actual behavior. The changes in SSHA scores between C'73 and C'83 may merely reflect

a greater tendency to respond in a socially desirable fashion. Thus, the enhanced study habits and attitudes found would be artifactual.

While within each class, we have found a relationship between SAT and certain of the study habits and attitudes and consequently have replicated the Brown and Holtzman findings in this respect, this relationship was not found between the cohorts of C'73 and C'83. The decline in SAT between C'73 and C'83 was not accompanied by a decline in study habits and attitudes. Quite the contrary, certain study habits and attitudes increased even though SAT declined. Explanations for the decline in SAT and for the enhanced study habits and attitudes have already been offered within this paper. It may be that the factors related to the decline in SAT are different from and unrelated to the factors associated with the increase in study habits and attitudes. Another possibility is that a variable may mediate, in whole or part, changes in SAT and SSHA. Speculatively speaking, birth order could influence both SAT and SSHA. Lower birth order seems to result in aptitude decrements. Lower birth order may also be associated with greater compliance and social desirability which, in turn, result in reports of enhanced study habits and attitudes. Data including birth order, SAT scores, study habits and attitudes, and social desirability obtained for a group of college students would enable an empirical test of the hypothesis that birth order mediates both SAT and SSHA changes.

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Footnotes

A version of this paper was presented at the 53rd Annual Meeting of the Eastern Psychological Association, April 15, 1982, Baltimore, Maryland.

Table 1

Means and Standard Deviations for Each Dependent Variable by Class and Sex

Class of 1973				Class of 1983			
Female		Male		Female		Male	
M	SD	M	SD	M	SD	M	SD
Verbal Scholastic Aptitude Test							
589.7	89.2	569.9	86.3	499.9	96.9	509.1	81.4
Math Scholastic Aptitude Test							
565.9	92.3	590.8	83.2	508.9	84.0	539.5	84.1
Delay Avoidance							
25.2	10.6	21.0	9.7	26.3	10.3	21.5	9.9
Work Methods							
29.7	8.3	28.0	8.3	31.8	7.7	29.4	9.4
Teacher Approval							
30.1	6.8	28.2	7.3	32.5	7.1	29.6	7.9
Educational Acceptance							
29.3	7.0	27.0	7.3	31.4	6.8	28.5	7.7
Percentile Rank in High School Class[a]							
79.9	0.3	67.8	0.3	79.4	0.3	73.0	0.3

Note: The number of females and males within each class may be found in the body of the paper.

a/Percentile rank means are untransformed.

Table 2

Analysis of Variance for Each Dependent Variable

MS Error	Effect: Class (C) MS	Class (C) F	Sex (S) MS	Sex (S) F	C X S MS	C X S F
Verbal Scholastic Aptitude Test						
7723.2	1200827.4	155.48***	6073.1	.79	44520.3	5.76*
Math Scholastic Aptitude Test						
7281.6	620584.6	85.23***	163297.1	22.43***	1731.4	.24
Delay Avoidance						
100.7	146.3	1.45	4236.0	42.07***	14.8	.15
Work Methods						
72.3	659.6	9.12**	888.3	12.28***	27.3	.38
Teacher Approval						
53.7	769.3	14.33***	1203.0	22.41***	51.0	.95
Educational Acceptance						
52.4	641.8	12.25***	1404.5	26.81***	14.8	.28
Percentile Rank in High School Classa/						
.1	.1	.83	3.9	42.23***	.2	2.60

Note: Degrees of freedom are 903 for MS error and 1 for each main effect and interaction.

a/Analysis performed on transformed data, as explained in the body of the paper.

*p<.05
**p<.01
***p<.001

Table 3

Correlations of SAT Scores with Study Habits and Attitudes for each Class and Sex

			SSHA Scalesa/			
SAT	Sex	N	DA	WM	TA	EA
		Class of 1973				
Math	Female	167	-.173*	-.033	-.072	-.066
Math	Male	328	-.075	.121*	.108	.066
Verbal	Female	167	-.148	.173*	-.098	-.093
Verbal	Male	328	-.125*	.159**	.166**	.089
Total	Combined	495	-.141**	.129**	.069	.124
		Class of 1983				
Math	Female	182	-.059	.179*	.021	.096
Math	Male	230	-.105	.048	.067	.033
Verbal	Female	182	-.085	.306**	.129	.090
Verbal	Male	230	.001	.235***	.184**	.210**
Total	Combined	412	-.099*	.188***	.092	.095

a/DA, WM, TA, and EA are, respectively, the delay avoidance, work methods, teacher approval, and educational acceptance scales of the SSHA.

*p<.05

**p<.01

***p<.001