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ABSTRACT

This norms study, initiated to aid in score interpretation, is designed to provide current information on Preliminary Scholastic Aptitude Test/National Merit Scholarship Qualifying Test (PSAT/NMSQT) scores of a national sample of high school juniors. Earlier national norms were developed on the basis of tests administered in 1960 and 1966. The present study is similar in design to the two earlier norms studies. Substantial attention was given to evaluating the representativeness of the sample by comparing participating and nonparticipating schools on the basis of geographical region, control, and percentage of minority students and by comparing student data for the norms sample with data from the National Longitudinal Study of the High School Class of 1972. The results of this study were compared with those of the 1960 and 1966 norms studies. These comparisons, although not definitive, should be considered in assessing whether a shift in the ability level of high school students can help to account for the SAT score decline. (EVH)

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VERBAL AND MATHEMATICAL ABILITY OF HIGH SCHOOL JUNIORS IN 1974: A NORMS STUDY OF PSAT/NMSQT

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Educational Testing Service

Princeton, New Jersey

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ABSTRACT

This study was undertaken to obtain current information on the performance of a national sample of all high school juniors on the Preliminary Scholastic Aptitude Test/National Merit Scholarship Qualifying Test (PSAT/NMSQT). The distributions of scores for such a sample are useful in score interpretation because they make it possible to find a student's relative standing in a suitable reference group. Beginning in 1960, results of similar surveys have been used to prepare national norms for the PSAT and SAT. Because the students taking these tests are self-selected with respect to ability, national norms based on all students provide a useful supplement to descriptive statistics based on test candidate groups. The steady decline of SAT scores beginning in 1963-64 suggested the need for new data to replace those obtained from a similar study conducted in 1966.

The sample design for this study was similar to that used in the surveys conducted in 1960 and 1966. Provision was made, however, to replace non-participating schools in the initial sample with similar schools. Substantial attention was given to evaluating the representativeness of the sample by comparing participating with nonparticipating schools on the basis of geographical region, control, and percentage of minority students and by comparing student data for the norms sample with data from the National Longitudinal Study.

The results of this study were compared with those of the 1960 and 1966 norms studies. These comparisons, although not definitive, should be considered in assessing whether a shift in the ability level of high school students generally can help to account for the SAT score decline.

VERBAL AND MATHEMATICAL ABILITY OF HIGH SCHOOL JUNIORS IN 1974: A NORMS STUDY OF PSAT/NMSQT

Introduction

This norms study, initiated to aid in score interpretation, is designed to provide current information on PSAT/NMSQT scores earned by a national sample of high school juniors. Earlier national norms were developed on the basis of tests administered in 1960 and 1966. The present study is similar in design to the two earlier norms studies. The 1960 study was based on data for a national sample of high school juniors and seniors who were tested in the fall of 1960. These data were used along with information on the growth in the abilities measured by the test to produce Scholastic Aptitude Test (SAT) norms (Chandler and Schrader, 1966). The 1966 norms data were collected as part of a major study of interests. Katz, Norris, and Halpern (1970) tested a national sample of high school sophomores, juniors, and seniors. These data provided the basis for 1966 norms for PSAT and for SAT.

Sampling and Data Collection

The present study, like its two predecessors, was designed on the basis of two main conceptions:

(1) The basic operations involved in the norms testing were closely integrated with the operations of the PSAT/NMSQT testing program. A student who participated in the norms study was treated like any other person who took the PSAT/NMSQT with respect to score reporting. Every effort was made to keep program activities for the school as similar as possible to regular PSAT/NMSQT procedures. The advantages of this approach are evident. The testing is conducted in a natural, realistic setting and scores earned by students who would be taking the test in any case are used both for norms and for the other purposes. In comparison with a separate norms study involving special test administrations, substantial savings in time and money are achieved. One limitation of this approach arises from the fact that the great majority of schools that participate in the norms study administer the same test form. As a result, the small random error of equating

of that particular test form has a direct effect on the results of the norms study. However, because PSAT/NMSQT scores on different forms are carefully equated by a method that ties directly to SAT equating this limitation of the study design should have very little effect on the precision of the norms.

(2) Each school was assigned the same probability of being selected, and within each school, all students in the designated group were included in the sample. Thus, if a school were selected for the sample in the present study, it was asked to test all juniors. If schools are selected at random, this procedure insures that every junior whose school is included in the entire list of schools has an equal probability of being selected for the final sample. This approach is less efficient from a statistical standpoint than designs that would provide for testing only a small proportion of students in each of a larger number of schools and that would take advantage of stratification of schools. It was decided, however, to retain the basic design of the earlier studies for the present study. In addition, the testing of all juniors rather than a sample was judged to be preferable from an administrative point of view for most schools.

The basic list of schools used in this study was the CEEB/ETS Secondary School Master File, which includes about 25,300 schools. This list, which includes public, parochial and independent schools, is revised monthly to make it as comprehensive and accurate as possible. A random sample of approximately 1,000 schools was selected from the file for use in this study, and a sequence number was assigned at random to each selected school. The study design called for a sample of 200 schools in the initial mailing. When the names of the first 200 schools in the random sequence were reviewed, it was found that four of the listed institutions were not secondary schools in the usual sense. (Two were correctional institutions; two were special evening schools.) The next four schools in the random sequence were substituted for these institutions.

A letter from Sidney P. Marland, President of the College Board, inviting each of the 200 schools to participate in the norms testing was sent to the principal of each school shortly after May 15, 1974.

Accompanying the letter was a copy of the PSAT/NMSQT Announcement and a form that the school could use to indicate willingness to participate and to provide the necessary information for shipping test materials for the fall testing. An information copy of the materials was sent to the person in each school who would ordinarily receive PSAT/NMSQT communications.

Both mail follow-up and telephone follow-up by staff members of College Board Regional Offices were used in order to obtain a decision concerning participation from each school. These efforts identified 43 schools that were unable to participate and 11 schools that were judged not to have been appropriate for the norms sample. (Four of the 11 schools had closed, one was an Area Technical School that offered training to students enrolled in other schools, three offered special programs rather than the usual high school offerings, two did not have eleventh grade students, and one had been consolidated with another school that was not in the sample.) For each of the 43 schools that declined to participate a replacement school was selected from the approximately 800 schools remaining in the 1,000 school sample. In each instance, the matching school was from the same geographical region (Northeast, Southeast, Midwest, or West and Southwest). A school that participated in PSAT/NMSQT in 1973 was replaced with another participating school similar in enrollment size and in type of control (public vs. private). Any public school that did not administer PSAT/NMSQT in 1973 was replaced by another nonparticipating school, matching in 1968 enrollment data from the set of directories issued by the United States Office of Education in the fall of 1972. Private schools were matched only by region. The 11 schools that were judged not to be eligible for the sample were replaced by the next 11 schools in the random sequence. Invitations were extended to the 54 replacement schools early in September. In all, 243 eligible schools were invited to participate. Of these, 189 were on the initial list, 11 were random replacements for ineligible schools, and 43 were replacements for schools that declined to participate.

Two schools chose to test a random sample of their juniors. Each school supplied a list of its juniors and a sample was chosen for it, using a table of random numbers. In the subsequent analysis, duplicate records were created at random for the students tested to make the

sample size for each school equal to the school's 11th grade enrollment.

Characteristics of Participating and Nonparticipating Schools

In evaluating test norms, the extent to which the schools selected for the sample participate in the testing is of primary importance. To the extent that the schools that do not participate differ from the participating schools in the ability level of their students, the obtained norms will differ from those that would have been obtained if all selected schools had participated.

An important question in defining participation arises when some schools test only a small proportion of their enrolled students. In the 1960 PSAT norms study, schools that tested less than 80% of the students enrolled in the designated grades were regarded as not having participated. In the present study, after reviewing the percentage of students tested in the 167 schools that had agreed to participate, it was decided to use 70% tested as the basis for defining participation. As a result, 25 schools that tested less than 70% of their juniors were not included in the norms tabulations. (Of the 25, 7 did not test any juniors.)

Results on participation may be summarized as follows:

Category	Number of Schools
Included in norms sample	142
Declined to participate or did not reply	76
Agreed to participate but did not test	7
Agreed to participate but tested less than 70%	18
Found to be ineligible for norms sample	11
Total number invited	254
Total number invited (excluding ineligible schools)	243

Of 243 schools eligible for the norms sample, 142 (58%) were defined as participating and 101 (42%) were defined as nonparticipating. Of the 142

participating schools, 122 were from the initial sample of 189 eligible schools, 16 were replacement schools for schools in the initial sample that declined to participate, and 4 were from the 11 schools selected at random to replace ineligible schools. The 142 schools included in the 1974 norms are listed in the Appendix.

Results for participation in the 1960, 1966, and 1974 norms studies may be summarized as follows:

	1960 Study	1966 Study	1974 Study
Number of schools invited (excluding ineligible schools)	200	288	243
Number of schools included in norms	143	166	142
Percentage of schools participating	71.5	57.6	58.4

For all three studies, the percentage of nonparticipating schools is too great to warrant a high degree of certitude in making assertions about the ability level of high school students on the basis of the norms. At the same time, the considerations that affect a school's decision to participate are so numerous, varied, and local, that both high-scoring and low-scoring schools are likely to be found among the nonparticipants.

Table 1 shows the extent to which the participation is associated with geographical region and with public rather than private control. When the percentages for participating schools are compared with the percentages for all schools in the initial sample, it appears that public schools in the Southeast contribute slightly more than their share and that private schools except those in the Southeast are somewhat more heavily represented in the participant group than in the total group. On the whole, the distribution of participating schools by region does not differ greatly from the distribution of the group of schools in the initial sample.

Table 2 makes use of extensive data on minority group representation in public schools published by the Office for Civil Rights (OCR) based on a 1972 survey. It was possible to locate data for 74 of the 113 public schools that participated and for 65 of the 93 public schools that did not participate. (The fact that data were available for only 67.5%

Table 1

Schools Selected for the Initial Sample (Group I) and Replacement Schools (Group II) Classified on the Basis of Participation, Geographical Region, and Control

Region	Control	Schools Initially Selected (Group I)		Participating Schools				Nonparticipating Schools			
				Group: I	II	Total		Group: I	II	Total	
		N	%	N	N	N	%	N	N	N	%
Northeast	Public	26	13.8	13	5	18	12.7	13	7	20	19.8
	Private	12	6.3	11	0	11	7.7	1	1	2	2.0
Southeast	Public	40	21.2	29	5	34	23.9	11	8	19	18.8
	Private	5	2.6	3	0	3	2.1	2	1	3	3.0
Midwest	Public	52	27.5	30	5	35	24.6	22	7	29	28.7
	Private	8	4.2	7	1	8	5.6	1	0	1	1.0
West and Southwest	Public	38	20.1	23	3	26	18.3	15	10	25	24.8
	Private	8	4.2	6	1	7	4.9	2	0	2	2.0
Subtotal	Public	156	82.5	95	18	113	79.6	61	32	93	92.1
	Private	33	17.5	27	2	29	20.4	6	2	8	7.9
Total Schools		189	100.0	122	20	142	100.0	67	34	101	100.0

Note: Schools were classified by geographical region as follows:

Northeast: Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont.

Southeast: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia.

Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin.

West and Southwest: Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oklahoma, Oregon, Texas, Utah, Washington, Wyoming.

Table 2

Percentage of Minority Group Students in Participating and Nonparticipating Public Schools: 1974 PSAT/NMSQT Norms Sample

Percentage of Minority Students	Participating Schools		Nonparticipating Schools	
	N	%[a]	N	%
75.1 - 100.0	4	5.4	6	9.2
50.1 - 75.0	11	14.9	5	7.7
25.1 - 50.0	6	8.1	5	7.7
0.0 - 25.0	53	71.6	49	75.4
Total Schools	74	100.0	65	100.0

[a]Percentages are based on schools for whom data on minority students are available. Data were not available for 39 of the 113 public schools that participated or for 28 of the 93 public schools that did not participate.

of the schools is presumably attributable mainly to the fact that the OCR survey provided data for a sample of districts, the sampling fraction being larger for the larger districts. The authors of the OCR survey indicate that 46% of districts and 72.5% of schools were included.) Among the schools that were located, it is evident that little relationship exists between having a large proportion of minority students and participation or nonparticipation.

Comparison of 1974 PSAT/NMSQT Results with 1972 National Longitudinal Study (NLS) Results

Certain characteristics of the 1974 PSAT/NMSQT sample may be compared with the characteristics of the national probability sample of high school seniors included in the 1972 National Longitudinal Study (NLS). Because a highly sophisticated sample design and elaborate data collection procedures were used in the NLS survey, these comparisons should provide useful information about the representativeness of the PSAT/NMSQT sample.

Table 3 shows the ethnic group composition of the two samples. The comparison is complicated by differences in the formulation of the question on ethnic group membership and by the higher rate of nonresponse for the PSAT/NMSQT sample (13.7%) than for the NLS sample (2.1%). The two samples agree fairly closely with respect to the percentage of White or Caucasian students. In the PSAT/NMSQT sample 19.61% of those who replied reported membership in a minority group; the corresponding figure for NLS was 18.16%. The Black, Afro-American, or Negro group constituted 12.28% of PSAT/NMSQT students who replied to this question and 9.43% of NLS students. The percentage of Mexican-American or Chicano students was higher in the PSAT/NMSQT sample, and the percentages of American Indian, Puerto Rican, and Oriental or Asian-American were higher in the NLS sample. On the whole, the two samples are reasonably similar with respect to ethnic composition.

The PSAT/NMSQT norms group may also be compared with the NLS group with respect to the percentage planning to attend college during the academic year following their completion of high school. For the PSAT/NMSQT sample, those students who reported that they planned to enter college in 1975 or 1976 were included in this group. For NLS, students who stated that they planned to attend a four-year college, a junior

Table 3

Ethnic Composition of National Longitudinal Study (NLS) Sample of Seniors and of the PSAT/NMSQT Sample of Juniors

NLS		PSAT/NMSQT	
How do you describe yourself? (Question 84)		Ethnic Group (Optional)	
Response	% [a]	Response	% [a]
American Indian	1.13	American Indian	0.75
Black or Afro-American or Negro	9.43	Black or Afro-American or Negro	12.28
Mexican-American or Chicano	2.68	Mexican-American or Chicano	4.17
Puerto Rican	0.36	Puerto Rican	0.15
Other Latin-American origin	0.67	----------	----
Oriental or Asian-American	0.95	Oriental or Asian-American	0.85
White or Caucasian	81.84	White or Caucasian	80.38
Other	2.94	Other	1.41
Total	100.00		99.99

[a] The percentage of students who did not respond to this question was 2.1 for NLS and 13.7 for PSAT/NMSQT.

college or a community college during the year after high school graduation constituted the comparison group. Only a small proportion of students omitted the question on which this grouping was based. (2.7% omitted it in the PSAT/NMSQT group, and 1.5% omitted it in the NLS group.) The following percentages of students who reported plans to attend college directly after high school were obtained:[1]

	PSAT/NMSQT (1974 juniors)	NLS (1972 seniors)
Men	49.7	51.4
Women	56.4	50.1
Total	53.0	50.7

The percentage of women in the PSAT/NMSQT sample who plan to attend college is somewhat higher than the percentages in the other three groups. This result suggests the possibility that the women in the 1974 sample may also be higher in ability than the total sample of high school junior women.

Table 4 shows the intended college major field for male and female students who reported plans to enter college directly after completing high school. Although comparisons of major field choices should be useful in evaluating the similarity of the samples, the precision of the comparisons is impaired by several difficulties. First, the fact that one sample was based on 1974 juniors and the other on 1972 seniors is likely to affect the comparability of the results. Second, there were substantial differences in the formulation of the question on major field choice. In the NLS questionnaire, each student was asked to choose a particular major field group, and all but 1.5% of the group did so. In the PSAT/NMSQT questionnaire, on the other hand, both an

[1] The PSAT/NMSQT percentages are based on all students who responded to the question on college plans. The NLS percentages are based on respondents who had data on sex, race, curriculum and father's education. The percentage for all NLS respondents was 49.9.

Table 4

Intended College Major Fields Reported by Students Who Planned to Attend College During the Academic Year Following High School Graduation

(Based on Seniors in 1972 National Longitudinal Study (NLS) and Juniors in PSAT/NMSQT 1974 Norms Sample)

NLS			PSAT/NMSQT		
This question asks for your present choices among certain fields of study in college. Circle one number in the first column to indicate your first choice...If the exact field of study is not listed, pick the most similar one. (Question 69)			College major. If you plan to attend college, indicate in section 19 the subject you think you want to major in. Find your college major in the list on page 38. If it is not listed, select the one most closely related to it. Enter the two-digit code number for your college major in section 19. If your choice of a college major, or a closely related one, is not listed, use code number 99. If you plan to enter college but cannot specify even a tentative college major at this time, use code number 90.		
Response	Male %	Female %	Response	Male %	Female %
Agriculture (for example, agricultural economics, agronomy, forestry, and soils)	5.9	0.5	Agricultural engineering; Agriculture, Forestry	8.4	1.3
Architecture	3.9	0.3	Architecture	6.1	1.1
Art (for example, art appreciation, design, drawing, and sculpting)	2.6	5.4	Art (fine arts); Art (graphic, design)	2.1	4.2
Biological sciences (for example, botany, ecology, predentistry, premedicine, and zoology)	12.6	7.5	Biology; Premedicine; Predentistry, Veterinary Science; Biological Sciences (unspecified); Botany; Physiology; zoology	15.5	11.2
Business (for example, accounting, business administration, industrial management, marketing, and finance)	17.9	10.1	Advertising; Business administration; Accounting; Banking, finance; Transportation studies	11.3	13.9
Education (for example, business education, elementary education, and physical education)	6.9	18.2	Education (unspecified); Elementary education; Secondary education; Physical education; Special education; Art education; Religious education; Music education	8.7	17.3
Engineering (for example, chemical engineering, civil engineering, electrical engineering, and mechanical engineering	10.9	0.1	Petroleum engineering; Engineering (unspecified); Aeronautical; Ceramics; Civil, structural; Electrical; Industrial; Mechanical; Metallurgical; Mining; Engineering science	22.5	1.7
English (for example, creative writing, linguistics, literature and speech and drama)	1.7	4.9	English; Drama; Speech	1.3	3.3
Foreign languages (for example, French, German, Italian, Latin, and Spanish)	0.2	2.6	Languages (classical); Languages (modern)	0.4	1.6
Health-related careers (for example, nursing, medical technology, and x-ray technology)	3.7	20.2	Technology (medical, lab, dental); Nursing; Occupational therapy; Physical therapy	1.7	20.5
Home economics (for example, dietetics, family and child development, nutrition; and textiles and clothing	0.0	3.4	Home economics	0.0	3.7
Journalism (for example, communications and radio and television)	2.2	1.8	Journalism	1.6	2.1
Mathematics (for example, calculus and statistics)	2.8	1.8	Mathematics, statistics	2.8	1.9
Music (for example, music appreciation and composition)	3.2	3.8	Music	1.7	2.8

Table 6 (Continued)

Intended College Major Fields Reported by Students Who Planned to Attend College During the Academic Year Following High School Graduation

NLS			PSAT/NMSQT		
Response	Male %	Female %	Response	Male %	Female %
Philosophy or religion (for example, ethics, logic, and theology)	1.6	1.4	Philosophy; Religion, theology	0.8	0.1
Physical science (for example, astronomy, biochemistry, chemistry, geology, and physics)	4.4	1.1	Astronomy; Chemistry; Geology; Physics; Meteorology; Biochemistry; Biophysics; Earth sciences (unspecified); Physical Sciences (unspecified)	3.3	1.0
Social sciences (for example, anthropology, economics, government, history, political science, pre-law, psychology social work, sociology and urban affairs)	19.5	16.7	History; Social sciences (unspecified); Psychology; Anthropology, archaeology; Economics; Political Science; Prelaw; Sociology	11.6	12.5
Total Percent	100.0	99.8		99.8	100.2

Note: This comparison is limited to responses which were judged to be comparable in the two surveys. These responses received 92.6% of the choices for males and 96.2% of the responses for females in NLS and received 2,349 of 2,527 (93.0%) of specific choices of males and 2,697 of 2,826 (95.4%) of specific major field choices of females in the PSAT/NMSQT sample. Other major fields chosen by 30 or more participants in the PSAT/NMSQT norms study, with the number of choices are as follows: Males--Sciences (unspecified) (63); Oceanography (42); and Pharmacy (32). Females--Liberal Arts (unspecified) (40); and Pharmacy (31).

"undecided" option and an "other" option were provided. These two options were chosen by 23.7% of the male students in the college-going sample, and an additional 19.8% omitted the item. For female students, the corresponding figures were 25.0% for "undecided" and "other" and 16.3% for omit. For calculating the percentages shown in Table 4, students who omitted the items were excluded from both samples and students who responded "undecided" or "other" were excluded from the PSAT/NMSQT sample. This procedure is based on the assumption that the students who did not report a major field choice would have the same distribution of choices as students who reported a major field choice. To the extent that this assumption is not fulfilled, the results will not be directly comparable. Finally, the PSAT/NMSQT question listed 81 relatively specific college major fields, while NLS listed 21 major field groups. This difference may affect the comparability of the results.

Results for male students show several substantial differences. The percentage choosing engineering majors is much higher (22.5%) in the PSAT/NMSQT than in the NLS sample (10.9%). A difference in the opposite direction occurs for social sciences, with 19.5% of NLS males and 11.6% of PSAT/NMSQT males choosing these fields. The percentage of male students choosing a business major was higher for the NLS sample (17.9%) than for the PSAT/NMSQT sample (11.3%). For females, agreement of results is considerably closer. Women in the PSAT/NMSQT sample are somewhat more likely to choose majors in biological sciences, business, and engineering than their counterparts in the NLS sample. Females in the NLS sample were somewhat more likely than those in the PSAT/NMSQT sample to choose majors in social sciences, foreign languages, and philosophy or religion. The differences, however, are not very large.

The results for choice of major field are difficult to interpret. Even when allowance is made for substantial differences in question format, for differences between juniors and seniors, and for attitude changes between 1972 and 1974, the results for men raise some question concerning the strict comparability of the two samples. The nature of the differences would suggest that the mean mathematical score of the PSAT/NMSQT norms group may tend to overestimate the mathematical ability of 11th grade students.

Comparison of 1960, 1966, and 1974 Norms Studies

Table 5 shows the distribution of participating schools in the 1960, 1966, and 1974 norms samples. The percentages in the eight subgroups are reasonably similar in all three samples, although private schools constitute a larger proportion of the 1966 sample than of the other two. The 1960 sample has a somewhat larger proportion of mid-western public schools and a somewhat smaller proportion of south-eastern public schools than the other two samples.

Table 6 provides the basic data for score comparisons in the three studies. Results for means and standard deviations for the total groups are as follows:

	Verbal		Mathematical	
Year	M	SD	M	SD
1960	34.2	10.4	38.7	9.8
1966	35.8	11.2	37.8	11.4
1974	34.3	10.8	38.6	10.6

For verbal scores, the mean rises somewhat from 1960 to 1966 and then declines to the 1960 level. For mathematical scores, the 1966 mean declines slightly from 1960 to 1966 and then rises to the 1960 level. For both verbal and mathematical scores, standard deviations are largest midway between those for the other two years. When the data presented in Table 6 for various subgroups are considered, it is apparent that results based only on total public school students show similar patterns to those for all students. When patterns for male and female students are considered, however, some detailed difference in trends are apparent. On verbal, female students have a lower mean in 1974 than in 1960 while male students have a higher mean in 1974 than in 1960. On mathematical, females show a higher mean in 1974 than in 1960 while males show a lower mean in 1974 than in 1960.

Table 5

Schools Participating in PSAT/NMSQT Norms Studies
Classified by Geographical Region and Control

Region	Control	Participating Schools					
		1960[a]		1966		1974	
		N	%	N	%	N	%
Northeast	Public	22	15.4	20	12.0	18	12.7
	Private	9	6.3	15	9.0	11	7.7
Southeast	Public	26	18.2	44	26.5	34	23.9
	Private	3	2.1	8	4.8	3	2.1
Midwest	Public	45	31.5	35	21.1	35	24.6
	Private	8	5.6	11	6.6	8	5.6
West and Southwest	Public	25	17.5	25	15.1	26	18.3
	Private	5	3.5	8	4.8	7	4.9
Total	Public	118	82.5	124	74.7	113	79.6
	Private	25	17.5	42	25.3	29	20.4
Total Schools		143	100.0	166	100.0	142	100.0

[a]Schools that tested 11th grade students.

Table 6

PSAT/NMSQT Scores for Public School Juniors and for All Juniors in 1960, 1966, and 1974

PSAT/NMSQT-Verbal

Type of School	Sex	1960 Mean	1960 SD	1960 N	1966 Mean	1966 SD	1966 N[a]	1974 Mean	1974 SD	1974 N[a]
Public	Male	32.7	9.6	4,317	34.5	11.3	8,760	33.2	10.5	7,852
	Female	33.8	10.2	4,365	35.4	10.8	8,779	33.6	10.4	7,775
	Total	33.2	9.9	8,682	34.9	11.0	17,539	33.4	10.5	15,639
All Schools	Male	33.6	10.2	4,956	35.3	11.5	10,035	34.4	10.9	9,274
	Female	34.8	10.5	5,357	36.2	10.9	10,507	34.3	10.7	8,750
	Total	34.2	10.4	10,313	35.8	11.2	20,542	34.3	10.8	18,036

PSAT/NMSQT-Mathematical

Type of School	Sex	1960 Mean	1960 SD	1960 N	1966 Mean	1966 SD	1966 N[a]	1974 Mean	1974 SD	1974 N[a]
Public	Male	39.6	9.7	4,317	38.4	11.9	8,752	38.6	11.1	7,852
	Female	36.5	9.1	4,365	35.8	10.3	8,772	37.2	9.8	7,775
	Total	38.1	9.5	8,682	37.1	11.2	17,524	37.9	10.5	15,639
All Schools	Male	40.4	10.2	4,956	39.2	12.1	10,027	39.5	11.2	9,274
	Female	37.1	9.2	5,357	36.5	10.4	10,500	37.7	9.9	8,750
	Total	38.7	9.8	10,313	37.8	11.4	20,527	38.6	10.6	18,036

[a]The N's shown for the 1966 and 1974 groups are somewhat larger than the number of students tested because three schools in 1966 and two schools in 1974 were permitted to test a random sample of students. The data for each of these schools was so weighted as to make the N for each school correspond to its enrollment. The actual numbers of students in the samples for verbal tests are as follows:

	Male	Female	Total
1966	9,341	9,523	18,864
1974	9,152	8,606	17,770

The actual numbers included in the 1966 norms for mathematical tests are slightly less than the figures shown. In the 1974 study, 12 students omitted the question on sex.

It is difficult to evaluate the precision of the means on which these comparisons are based. Because a substantial proportion of schools invited to participate declined to do so, a rigorous determination of the precision of the mean cannot be made. However, if the 142 schools in the 1974 study were a probability sample, it can be estimated, using a formula developed by Lord (Angoff, 1971, p. 553), that the standard error of the mean would be about .6 scaled score points. Thus, there would be about 2 chances in 3 that the observed mean would differ by no more than .6 scaled score points from the mean of the population sampled and about 95 chances in 100 that the observed mean would differ by no more than 1.2 points from the mean of the population sampled. In evaluating the precision of the comparisons of means, it is also necessary to consider the methods used in equating scores on the tests. Scores on successive editions of PSAT/NMSQT are equated by a system of direct linkages to the SAT scale. A recent study by Modu and Stern (1975) suggests that the methods used for SAT equating, although satisfactory for short-term comparisons over a few years, may tend to underestimate the amount of decline during a long period when mean scores become progressively lower. A review of the equating indicates that this limitation would have virtually no effect on the comparison of 1960 and 1966 scores. There is some reason to believe, however, that the 1974 means are too high, relative to 1960 and 1966 scores, by a small amount.

The effects of nonparticipation by schools and by students, of sampling error in the norms samples, and of possible scale shifts, although difficult to evaluate, are probably small. Because of these limitations, however, the results of the norms studies can provide only an approximate description of trends in the ability level of all high school juniors in the years studied.

PSAT/NMSQT and SAT Norms

PSAT/NMSQT norms for juniors were prepared by determining the percentage of juniors who scored below each scaled score. Results are shown in Table 7.

In order to use the data of the present study to provide current norms for SAT, it was assumed that a line of relationship based on scores earned by juniors tested in 1966 and 1974 would also describe the relationship between scores earned by juniors and seniors tested in 1966 with corresponding scores in 1974. Separate lines of relationship were calculated for verbal scores, for mathematical scores of male students, and for mathematical scores of female students, using the means and standard deviations of junior scores earned in 1966 and 1974. The resulting lines were applied to the 1966 SAT norms to provide current SAT norms. Essentially, this procedure used data for juniors to measure shifts in candidate ability level between 1966 and 1974. The procedure used assumed that the shift in performance level from high school juniors to high school seniors remained the same over this period and that the adjustments applied in 1966 to PSAT/NMSQT scores earned in October in order to estimate SAT scores earned by juniors in May and by seniors in December are still appropriate. The 1966 adjustment made use of the growth study results obtained by Levine and Angoff (1958) and of the mean junior to senior score change in the 1966 norms study. The rate at which the abilities measured by SAT are developing and high school retention and promotion policies have probably changed to some extent during these years. It can be argued that up-to-date empirical evidence on senior performance and on SAT growth patterns would have resulted in slightly lower SAT norms than those obtained. On the other hand, it was recognized that a much larger and more complex study than the present study would have been required to evaluate these relatively subtle differences, and that high schools would be less likely to participate in a study requiring the testing of seniors as well as juniors. On the whole, it was judged that data for high school juniors provided an acceptable basis for revising the SAT norms. Results are shown in Table 8.

Table 7

Percent of High School Juniors Scoring Below Each PSAT/NMSQT Scaled Score in Fall 1974 (Based on a national sample of juniors in 142 schools)

PSAT/NMSQT Scaled Score	VERBAL			MATHEMATICAL			PSAT/NMSQT Scaled Score
	Male	Female	Total	Male	Female	Total	
76 & above	99+	99+	99+	99+	99+	99+	76 & above
75	99+	99+	99+	99+	99+	99+	75
74	99+	99+	99+	99+	99+	99+	74
73	99+	99+	99+	99+	99+	99+	73
72	99+	99+	99+	99+	99+	99+	72
71	99+	99+	99+	99	99+	99+	71
70	99+	99+	99+	99	99+	99	70
69	99+	99+	99+	99	99+	99	69
68	99+	99+	99+	99	99+	99	68
67	99+	99+	99+	98	99+	99	67
66	99	99+	99	98	99+	99	66
65	99	99	99	97	99	98	65
64	99	99	99	97	99	98	64
63	99	99	99	97	99	98	63
62	99	99	99	96	98	97	62
61	98	98	98	95	98	96	61
60	98	98	98	94	98	96	60
59	97	98	98	93	97	95	59
58	97	97	97	92	96	94	58
57	96	97	97	91	95	93	57
56	96	96	96	90	95	92	56
55	95	96	95	88	94	91	55
54	95	95	95	87	92	90	54
53	93	93	93	85	91	88	53
52	92	92	92	83	90	86	52
51	91	92	91	82	88	85	51
50	90	90	90	80	87	83	50
49	88	89	89	78	85	81	49
48	87	88	87	76	83	79	48
47	85	86	85	73	80	77	47
46	84	85	84	72	78	75	46
45	80	81	81	70	76	73	45
44	78	79	79	67	73	70	44
43	76	77	77	64	70	67	43
42	75	75	75	62	67	64	42
41	73	73	73	59	65	62	41
40	70	71	71	56	61	59	40
39	68	68	68	53	57	55	39
38	63	64	64	49	54	52	38
37	61	61	61	47	51	49	37
36	58	58	58	44	47	45	36
35	55	54	54	40	44	42	35
34	52	51	51	36	39	37	34
33	50	50	50	32	35	34	33
32	47	47	47	29	32	31	32
31	43	44	44	25	28	27	31
30	37	37	37	21	24	22	30
29	35	35	35	17	19	18	29
28	32	32	32	14	16	15	28
27	28	28	28	12	13	13	27
26	25	25	25	6	7	6	26
25	22	21	22	4	4	4	25
24	20	20	20	3	3	3	24
23	17	17	17	2	2	2	23
22	11	11	11	1	1	1	22
21	8	9	9	1-	1-	1-	21
20							20
N	9,274	8,750	18,036	9,274	8,750	18,036	
Mean	34.4	34.3	34.3	39.5	37.7	38.6	
Standard Deviation	10.9	10.7	10.8	11.2	9.9	10.6	

Table 8

Percentile Ranks of SAT scores for All Juniors and Seniors and of SAT-Mathematical Scores for Men and Women Separately[a]

Score	All Students		Men	Women
	Verbal	Mathematical	Mathematical	Mathematical
800	99+	99+	99+	99+
750	99+	99+	99+	99+
700	99+	99	99	99
650	99	98	96	98
600	97	94	92	96
550	93	88	85	91
500	86	80	75	84
450	76	69	64	73
400	64	56	52	61
350	49	41	38	46
300	33	23	20	25
250	17	5	4	6
Mean	368	402	416	390
Standard Deviation	111	112	117	104

[a]In preparing this table, it was assumed that juniors would take SAT at the May administration and that seniors would take SAT at the December administration.

REFERENCES

Angoff, W. H. Scales, norms, and equivalent scores. In R. L. Thorndike (Ed.), Educational measurement (2nd ed.). Washington: American Council on Education, 1971. Pp. 508-600.

Chandler, M. O., & Schrader, W. B. Preliminary Scholastic Aptitude Test: 1960 national norms (ETS SR 66-3). Princeton, N. J.: Educational Testing Service, 1966.

Hilton, T. L., Rhett, H., Broudy, I. L., Bower, C., Carter, M. M., Creech, F. R., & Echternacht, G. J. The base-year survey of the National Longitudinal Study of the high school class of 1972 (Final report to the U. S. Department of Health, Education, and Welfare, National Center for Educational Statistics, Contract No. OEC-0-72-0903). Princeton, N. J.: Educational Testing Service, June 1973.

Katz, M. R., Norris, L., & Halpern, G. The measurement of academic interests: Part I. Characteristics of the academic interest measures (CEEB RDR 70-71, No. 4). Princeton, N. J.: Educational Testing Service, 1970.

Levine, R. S., & Angoff, W. H. The effects of practice and growth on scores on the Scholastic Aptitude Test (ETS SR 58-6). Princeton, N. J.: Educational Testing Service, 1958.

Modu, C. C., & Stern, J. The stability of the SAT score scale (CEEB RDR 74-75, No. 3). Princeton, N. J.: Educational Testing Service, 1975.

National Center for Education Statistics, Office of Education. Directory of nonpublic elementary and secondary day schools, 1968-69 (OE-20126, Vol. I-IV). Washington, D. C.: Government Printing Office, 1970.

National Center for Education Statistics, Office of Education. Directory of nonpublic elementary and secondary day schools, 1968-69 (OE-20127, Vol. V). Washington, D. C.: Government Printing Office, 1970.

Office for Civil Rights, U. S. Department of Health, Education, and Welfare. Directory of public elementary and secondary schools in selected districts: Enrollment and staff by racial/ethnic group, Fall 1972.

SCHOOLS INCLUDED IN 1974 PSAT/NMSQT NATIONAL NORMS

School	Location
Banks High School	Birmingham, Alabama
Lineville High School	Lineville, Alabama
Talladega Co. Training School	Talladega, Alabama
Bradford High School	Bradford, Arkansas
Corning High School	Corning, Arkansas
Dumas High School	Dumas, Arkansas
Dollarway High School	Pine Bluff, Arkansas
Springdale Sr. High School	Springdale, Arkansas
Wilmar High School	Wilmar, Arkansas
Notre Dame High School	Belmont, California
Delano High School	Delano, California
Happy Camp High School	Happy Camp, California
San Fernando Valley Academy	Northridge, California
Palmdale High School	Palmdale, California
Aragon High School	San Mateo, California
Santa Clara High School	Santa Clara, California
Hotchkiss Jr.-Sr. High School	Hotchkiss, Colorado
St. Thomas Aquinas High School	New Britain, Connecticut
Tower Hill School	Wilmington, Delaware
Woodrow Wilson Sr. High School	Washington, District of Columbia
Cardinal Gibbons High School	Ft. Lauderdale, Florida
Satellite High School	Satellite Beach, Florida
Seminole Co. High School	Donalsonville, Georgia
Bradwell Institute	Hinesville, Georgia
Twiggs Co. High School	Jeffersonville, Georgia
St. Anthony High School	Wailuku Mau, Hawaii
St. Willibrord High School	Chicago, Illinois
Flora Twp. High School	Flora, Illinois
Griggsville High School	Griggsville, Illinois
Harvard High School	Harvard, Illinois
Minonk-Dana-Rutland High School	Minonk, Illinois
Egyptian Consolidated School No. 5	Tamms, Illinois
Washington High School	Washington, Illinois
Taylor High School	Center, Indiana
North Miami High School	Denver, Indiana
Scecina Memorial High School	Indianapolis, Indiana
Guthrie Center High School	Guthrie Center, Iowa
Mar-Mac High School	McGregor, Iowa
St. Ansgar High School	St. Ansgar, Iowa
Sutherland Community High School	Sutherland, Iowa

SCHOOLS INCLUDED IN 1974 PSAT/NMSQT NATIONAL NORMS

School	Location
Morland High School	Morland, Kansas
Mulvane High School	Mulvane, Kansas
Frederic Remington High School	Whitewater, Kansas
Paducah Tilghman High School	Paducah, Kentucky
McCreary Co. High School	Whitley City, Kentucky
Albany High School	Albany, Louisiana
Chalmette High School	Chalmette, Louisiana
Haynesville High School	Haynesville, Louisiana
All Saints High School	Pelican, Louisiana
Pine Prairie High School	Pine Prairie, Louisiana
Washington High School	Washington, Louisiana
Agawam High School	Agawam, Massachusetts
Don Bosco High School	Boston, Massachusetts
Beaver Country Day School	Chestnut Hill, Massachusetts
Nipmuc Regional High School	Mendon, Massachusetts
Middleborough High School	Middleboro, Massachusetts
Pioneer Valley Academy	New Braintree, Massachusetts
Uxbridge High School	Uxbridge, Massachusetts
Ware High School	Ware, Massachusetts
Xaverian Brothers High School	Westwood, Massachusetts
Doherty Memorial High School	Worcester, Massachusetts
Covert Public School	Covert, Michigan
Sacred Heart High School	Dearborn, Michigan
Galien High School	Galien, Michigan
Milford High School	Milford, Michigan
Newberry High School	Newberry, Michigan
Elbow Lake-Wendell High School	Elbow Lake, Minnesota
West Lincoln High School	Brookhaven, Mississippi
Leakesville High School	Leakesville, Mississippi
Olive Branch High School	Olive Branch, Mississippi
Oak Hill Academy	West Point, Mississippi
Chilhowee High School	Chilhowee, Missouri
Dora High School	Dora, Missouri
Bozeman Senior High School	Bozeman, Montana
Roberts High School	Roberts, Montana
Cambridge High School	Cambridge, Nebraska
Norfolk Catholic High School	Norfolk, Nebraska
North Loup-Scotia High School	Scotia, Nebraska
Wakefield High School	Wakefield, Nebraska
Park Ridge High School	Park Ridge, New Jersey

SCHOOLS INCLUDED IN 1974 PSAT/NMSQT NATIONAL NORMS (Cont.)

School	Location
Hutchinson Central Technical High School	Buffalo, New York
Midlakes High School	Clifton Springs, New York
Saint Mary's Academy	Hoosick Falls, New York
Yeshiva High School of Queens	Holliswood, New York
Xavier High School	New York, New York
Indian River Central School	Philadelphia, New York
Park School of Buffalo	Snyder, New York
Solvay High School	Solvay, New York
So. Kortright Central School	So. Kortright, New York
Faith Christian Day School	Hendersonville, North Carolina
Mattamuskeet School	Swanquarter, North Carolina
Donnybrook High School	Donnybrook, North Dakota
Bradford High School	Bradford, Ohio
Miami Valley School	Dayton, Ohio
Dixie High School	New Lebanon, Ohio
Orrville High School	Orrville, Ohio
Saint Mary's High School	Sandusky, Ohio
Jewett Scio High School	Scio, Ohio
St. Francis High School	Tiffin, Ohio
Sooner High School	Bartlesville, Oklahoma
B. Franklin High School	Carbondale, Pennsylvania
Mining & Mechanical Institute	Freeland, Pennsylvania
Line Mountain High School	Herndon, Pennsylvania
Richland Township High School	Johnstown, Pennsylvania
Montgomery Area High School	Montgomery, Pennsylvania
E. Providence Sr. High School	E. Providence, Rhode Island
Greenwood High School	Greenwood, South Carolina
Orangeburg-Wilkinson High School	Orangeburg, South Carolina
Atwood High School	Atwood, Tennessee
Central High School	Bolivar, Tennessee
Lanier High School	Maryville, Tennessee
Carbon High School	Carbon, Texas
Coldspring High School	Coldspring, Texas
Deweyville High School	Deweyville, Texas
Dumas High School	Dumas, Texas
Pine Tree High School	Longview, Texas
Hamlin High School	Hamlin, Texas
Hearne High School	Hearne, Texas
Powell Point High School	Kendleton, Texas
Rockwall High School	Rockwall, Texas

SCHOOLS INCLUDED IN 1974 PSAT/NMSQT NATIONAL NORMS

School	Location
Blessed Sacrament Academy	San Antonio, Texas
John F. Kennedy High School	San Antonio, Texas
Seminole High School	Seminole, Texas
North Hopkins High School	Sulphur Springs, Texas
Vanguard High School	Waco, Texas
Winnsboro High School	Winnsboro, Texas
Lehi High School	Lehi, Utah
Southampton High School	Courtland, Virginia
New Kent High School	New Kent, Virginia
Ervinton High School	Nora, Virginia
Adna High School	Adna, Washington
Wahkiakum High School	Cathlamet, Washington
Eatonville High School	Eatonville, Washington
Marycliff High School	Spokane, Washington
Tacoma Baptist School	Tacoma, Washington
Fort Gay High School	Fort Gay, West Virginia
St. John's Military Academy	Delafield, Wisconsin
Medford Senior High School	Medford, Wisconsin
South Shore High School	Pt. Wing, Wisconsin
Prentice High School	Prentice, Wisconsin
Sheboygan Falls High School	Sheboygan Falls, Wisconsin
Elva-Strum Central High School	Strum, Wisconsin