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Socioeconomic Status, Intelligence, and the Attainment of Higher Education *

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In this study of a randomly selected cohort of Wisconsin high school seniors, the relative influences of socioeconomic status and measured intelligence are examined at successive stages in higher education by use of cross-tabular analysis, effect parameters, and path analysis. Both socioeconomic status and intelligence have direct effects on planning on college, college attendance, and college graduation, and considerable indirect effect on the level of educational attainment through their effects on college plans and college attendance. However, for females the relative effect of socioeconomic status on college plans, college attendance, and college graduation was greater than was the effect of intelligence, while for males the relative effect of intelligence at each of these stages was greater than the effect of socioeconomic status. When only those who attended college were included in the analysis, intelligence was more important than was socioeconomic status, for both sexes, in determining who eventually graduated from college. But socioeconomic status continued to influence college graduation—even after socioeconomic selection had played its part in determining who would attend college.

Introduction

THE EDUCATIONAL SYSTEM plays an important role in the allocation of personnel to various occupational positions. It sorts people according to differences in valued abilities, channels them into streams of training which develop their capacities, and encourages them to aspire to adult roles that are in keeping with their talents.¹ However, many factors other than the ability of the student influence his eventual educational experiences and attainments. These include differences in the level and quality of education available in the

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¹ Pitirim A. Sorokin, *Social Mobility*, New York: Harper and Brothers, 1927, ch. 9, and Talcott Parsons, "The School Class As a Social System: Some of its Functions in American Society," *Harvard Educational Review*, 29 (1959), pp. 297-318.

country, region, or community in which he lives; differential access to educational facilities according to his social class status, religion, race, and ethnic origins; differences in his motivations, values, and attitudes; and differences in the willingness and ability of his parents and significant others to provide the financial and psychological supports necessary for the maximization of his talent potentials.²

Turner has distinguished two modes of social mobility which are reflected in contrasting strategies of educational selection.³ Where aristocratic conditions underlie the contemporary class structure—as in Britain—mobility is sponsored and educational selection is overt, systematic, and prompt in the school career of an age group of children from which an able minority is chosen for higher education. In American society, on the other hand, an organizing norm of contest mobility is preserved with the aid of a tacit, belated, and prolonged selection through dropout from college rather than from elementary and secondary schools. Free education in public schools and the prescription of a legally permissible school-leaving age have brought about a nearly universal pattern of primary and secondary education. High school graduation has become the norm of the American population, and college education is increasingly common.

But, there is a point beyond which further education is a privilege of some rather than a right of all individuals whose intellectual capabilities qualify them for continued formal education. At the present time, for many Americans this point comes at graduation from high school. This is indicated by a number of studies that have reported that many students with high intelligence are unlikely to aspire to a college education or to go to college—especially if they come from families of low socioeconomic status, are females, are members of disadvantaged racial groups, or come from rural backgrounds.⁴ However, the aspirations of many cross-pressured individuals (those who are low in status but high in ability, or vice versa) are encouraged by the ideology of equal opportunity and the existence of a great diversity of colleges and universities to fit the financial and intellectual capacities of most students.

² There is a vast literature in this regard. References to these studies are given in: William H. Sewell, Archie O. Haller, and Murray A. Straus, "Social Status and Educational and Occupational Aspiration," *American Sociological Review*, 22 (February, 1957), pp. 67-73; William H. Sewell, "Community of Residence and College Plans," *American Sociological Review*, 29 (February, 1964), pp. 24-38; William H. Sewell and Alan M. Orenstein, "Community of Residence and Occupational Choice," *American Journal of Sociology*, 70 (March, 1965), pp. 551-563; William H. Sewell and Archie O. Haller, "Educational and Occupational Perspectives of Farm and Rural Youth," in Lee G. Burchinal (Ed.), *Rural Youth in Crisis*, U. S. Department of Health, Education, and Welfare, Washington, D.C.: Government Printing Office, 1965, pp. 149-169; and William H. Sewell and J. Michael Armer, "Neighborhood Context and College Plans," *American Sociological Review*, 31 (April, 1966), pp. 159-168.

³ Ralph H. Turner, "Sponsored and Contest Mobility and the School System," *American Sociological Review*, 25 (December, 1960), pp. 855-867. Also see Burton R. Clark, "The Cooling-Out Function in Higher Education," *American Journal of Sociology*, 65 (May 1960), pp. 569-576.

⁴ There have been numerous studies of college aspirations; many of the references are included in Sewell, *op. cit.*, pp. 24-25.

Consequently, studies of college plans and college attendance have tended to stress the influence of socioeconomic status, while those of college graduation have tended to emphasize the influence of ability.⁵ This is best summarized by Wolfe who, after examining the evidence then available, reached the conclusion that

. . . the probability of enrolling in college decreases more sharply as one goes down the ability scale for children from economically and socially less favored homes than it does for children from more favored homes. After entering college, the situation changes. The student who gets into college has already overcome most of whatever handicaps his home environment offered; once there, his chances of graduating are much more dependent upon his ability and much less upon his family background than were his chances of getting into college in the first place.⁶

More recently Eckland, in his review of twenty-four studies published during the last fifteen years, observes that even when a positive relationship has been found between social class and college graduation, some researchers have tended to reach an interpretation similar to Wolfe's.⁷ Eckland doubted the validity of this conclusion because most of these studies had been based on graduates from a single college and, consequently, did not include those students who entered the particular college, dropped out, enrolled in another college, and eventually graduated. In his follow-up study of male students in the freshman class of 1952 at the University of Illinois, over 70% of the dropouts had returned either to that university or had entered another college at some time during a ten-year period and about 55% of those who re-entered college eventually graduated. He found that social class was an important determinant of who will transfer or return to college and, consequently, of eventual college graduation. Scholastic ability, however, continued to play an important part in determining graduation from college.⁸

⁵ For references to the literature on college attendance see Bruce K. Eckland, "Social Class and College Graduation: Some Misconceptions Corrected," *American Journal of Sociology*, 70 (July, 1964), pp. 36-50.

⁶ Dael Wolfe, *America's Resources of Specialized Talent*, New York: Harper and Brothers, 1954, p. 163.

⁷ Eckland, *op. cit.*, pp. 44-49, found that the composite index of social class was a better predictor of college success than the separate indicators—education, income, and occupation—and also that a one-year measure of college performance was not significantly related to father's occupation and parents' education, but the four-year graduation rates differed significantly on these two variables. In his review, among the one-year studies, those using father's occupation or parents' education found college performance unrelated to social class, but three others using a composite index of social class found a positive relationship with college performance. Eleven of the seventeen two-to-four year studies reported positive correlations between social class indicators and college performance.

⁸ Eckland, *ibid.* See also his "Academic Ability, Higher Education, and Occupational Mobility," *American Sociological Review*, 30 (October, 1965), pp. 735-746. Although Eckland's research was a good step forward over most past studies, it too has certain limitations including the following: (i) since it deals only with college students, the effects of socioeconomic status and ability on the high school graduates who did not go to college are unknown, (ii) since his sample includes only full-time resident students at the Urbana campus of the University of Illinois, the effect due to the selective admission policy of the university is unknown, and the diversity among the institutions of higher

It seems that a student's persistence in his educational pursuit even in the face of academic failure plays an important part in the selective mechanism of the educational system. Up to high school graduation, persistence in educational pursuits may be merely an outcome of the legal structure as reflected in free and compulsory education up to a certain level and the prescription of a minimum school-leaving age. But at the college level, it may be greatly influenced by social origins because a determined student of modest ability but high status may ultimately find an institution where he will not be weeded out; or a student of low socioeconomic status but superior ability may find an institution in which he will be given adequate opportunities and motivation to succeed in higher studies. Thus, the question of the relation of socioeconomic status and of ability to educational selection should be examined through time by following a cohort of students wherever they go for higher education, rather than by looking at the product of a single institution.

While there are local, statewide, and national studies that have attempted to examine the influences of socioeconomic status and ability on educational aspirations and achievements of students, past studies are deficient because of inadequate samples, failure to take account of those who dropped out, and insufficient follow-up to relate eventual educational attainment to either ability or status. Therefore, there is great need to determine the relative influences of socioeconomic status and ability at successive stages in the educational career of a large and representative cohort. Another advantage in studying the educational attainments of a cohort over time is that such a procedure provides an indirect control for those many events that influence in common the educational careers of all members of the cohort. The purpose of this study is to determine the relative influence of socioeconomic status and measured intelligence on the attainment of higher education for a randomly selected cohort of Wisconsin high school seniors during a seven-year period after their graduation from high school (1957-1964). A major advantage of this study over past research is that it presents a comparative picture of the influences of socioeconomic status and intelligence on the educational attainments of a large cohort of youth who pursued their higher education at diverse institutions over a period of years. Moreover, the statistical analysis followed in this paper permits not only the demarcation of certain subpopulations of socioeconomic status and intelligence which vary in educational plans and attainments, but also provides estimates of the direct and indirect effects of socioeconomic status and intelligence at successive stages in the educational careers of males and females separately.

The use of Wisconsin students for a study of this kind is, of course, less ideal than would be a large, randomly selected cohort of the nation's students chosen at some point earlier in the educational process than graduation from

education available to students in general is not taken into account, (iii) Eckland studied only the male students, and it is reasonable to hypothesize that the relative influences of family socioeconomic status and ability differ in magnitude at successive stages in the educational careers of males from that of females, and finally (iv) he lacked an adequate measure of ability with a single normative standard on which all members of his sample could be ranked.

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high school. Wisconsin, however, is in many ways a good state for a study of the educational attainment of high school youth. Its holding power over its school children is very high; more than 88% of its 16–17 year olds were in school in 1960.⁹ Thus, the high school senior class retains a more representative body of students of all ability and socioeconomic levels than would be true in states where the dropout rate is higher. Moreover, Wisconsin provides greatly diversified opportunities for higher education with a large and prestigious state university, which includes not only its Madison and Milwaukee campuses but also a statewide network of university centers offering first- and second-year college level courses, a state college system consisting of nine four-year colleges offering a full range of curricula at low cost, a large urban Catholic university, and thirteen accredited private liberal arts colleges. It can be truly said that Wisconsin provides facilities of higher education suitable for most levels of ability if not for all levels of socioeconomic status.

Purposes and Statistical Techniques

The specific purposes of this paper are as follows:

- (1) To examine the association of socioeconomic status with college plans, college attendance, and college graduation for a cohort of Wisconsin youth;
- (2) To examine the association of measured intelligence with college plans, college attendance, and college graduation in this cohort;
- (3) To examine the association of socioeconomic status with college plans, college attendance, and college graduation for various categories of measured intelligence in this cohort;
- (4) To examine the association of measured intelligence with college plans, college attendance, and college graduation for various socioeconomic categories in this cohort;
- (5) To obtain relative estimates of the magnitude of the direct and indirect effects of socioeconomic status and measured intelligence on college plans, college attendance, and college graduation for this cohort; and
- (6) To examine the association of socioeconomic status and measured intelligence with college graduation for those members of the cohort who attended college.

The accomplishment of these purposes will require the use of several statistical procedures. For purposes (1) and (2), bivariate tables will be constructed showing the proportions with college plans, college attendance, and college graduation. For purposes (3) and (4), multiple cross-tabular analysis will be employed. This will result in tables that give the proportions with college plans and various levels of educational attainment for each combination of socioeconomic status and intelligence categories. The statistical significance of the associations will be determined by the chi-square test using

⁹ In Wisconsin there is little variation in enrollment in this age group between major Census categories: urban, 89.2%; rural-nonfarm, 86.8%; and farm, 87.6%. See Douglas G. Marshall, *Wisconsin's Population: Changes and Prospects*, Madison: Wisconsin Agricultural Experiment Station Bulletin 241, 1963, p. 29.

the .05 probability level. To summarize the cross-tabular analysis, unweighted effect parameters will be computed. This statistic, developed by Coleman, provides a simple, convenient estimate of the effect of the independent variables on the dependent variable in a multivariate table and is based on percentage differences between ordered or continuous categories.¹⁰ For purpose (5), the method of path analysis, developed by the geneticist Wright, and recently introduced into sociology by Boudon and by Duncan, will be used.¹¹ Path analysis provides a convenient and efficient method for determining the direct and indirect effects of each of the independent variables in a causal chain composed of standardized variables in a closed system. These effects are expressed in path coefficients which are the partial beta-weights of all of the preceding independent variables on the successive dependent variables in the system. For purpose (6), multiple cross-tabular analysis, effect parameters, and path coefficients will be employed.

Throughout the analysis, separate tabulations will be made for males and females because of known differences in their propensity to pursue higher education as well as likely differences in the influences of socioeconomic status and intelligence on their educational plans and attainments.

The Data

The data for the present study come from two sources: (1) a questionnaire survey of all high school seniors in Wisconsin public, private, and parochial schools in 1957¹² and (2) a follow-up study conducted in 1964–1965 of approximately a one-third sample of these students. The 1957 survey included information on a number of particulars including the student's educational and vocational plans, the socioeconomic status of his family, his high school record and course of study, educational attitudes of the student and his family, his parent's name and address, and similar matters. In the summer of 1964, seven years after the students were in the senior class of high school, a follow-

¹⁰ James S. Coleman, *Introduction to Mathematical Sociology* (New York: Free Press of Glencoe, 1964), pp. 206–210.

¹¹ The method of path analysis assumes a complete system including, if necessary, residual variables to represent unmeasured influences, which are assumed to be uncorrelated with the measured ones. See Raymond Boudon, "A Method of Linear Causal Analysis: Dependence Analysis," *American Sociological Review*, 30 (June, 1965), pp. 365–374. For a brief summary of the method of path analysis, see Otis Dudley Duncan, "Path Analysis: Sociological Examples," *American Journal of Sociology*, 72 (July, 1966), pp. 1–16; C. C. Li, *Population Genetics*, (Chicago: University of Chicago Press, 1955), ch. 12, and also C. C. Li, "The Concept of Path Coefficient and Its Impact on Population Genetics," *Biometrics*, 12 (June, 1956), pp. 190–210. For more details, see Sewall Wright, "The Method of Path Coefficients," *Annals of Mathematical Statistics*, 5 (September, 1934), pp. 161–215; Sewall Wright, "Path Coefficient and Path Regressions: Alternative or Complementary Concept?" *Biometrics*, 16 (June, 1960), pp. 189–202; and Sewall Wright, "The Treatment of Reciprocal Interaction With or Without Lag, in Path Analysis," *Biometrics*, 16 (September, 1960), pp. 423–445.

¹² The results of this survey are given in J. Kenneth Little, *A Statewide Inquiry into Decisions of Youth about Education Beyond High School*, Madison: School of Education, University of Wisconsin, 1958.

up study was made of a random sample of 10,321 students. The purpose of the follow-up study was to obtain information on the educational and occupational attainments of the students since high school graduation.

The follow-up study was conducted by means of a mailed questionnaire and by telephone interviews. A postage-paid, double post-card questionnaire was sent to the parents of the students at their 1957 address. One side of the post card gave a brief explanation of the purposes of the study and asked the parents' cooperation in providing information on their child's educational and occupational activities since high school; the other side contained the questions the parents were to answer.¹³ If the parents did not respond to the first questionnaire within a month after it was mailed out, a second post-card questionnaire stamped "Urgent Second Request" was sent. Nonrespondents to this second request were sent a third questionnaire marked "Urgent Third Request." Those who did not respond to the third request were written a personal letter on university stationery urging their participation, and were given another copy of the postage-paid questionnaire. Those who did not respond to this letter were interviewed by telephone, whenever a telephone number could be found. For the questionnaires returned by the post office because they were undeliverable for want of proper addresses, accurate up-to-date addresses were obtained, where possible, from Wisconsin tax rolls, and the process was begun over again. By these methods 91.1% of the parents were reached, and 95.8% of those reached furnished the information requested. Thus, responses were obtained for 9007 or 87.2% of the one-third sample used in the original survey. Various tabulations comparing known characteristics of the students indicate nonsignificant differences between those for whom responses were obtained and those for whom responses were lacking.¹⁴

The variables employed in this paper are sex of the student, the socioeconomic status of the student's family of origin, the student's measured intelligence, the student's college plans, the student's college attendance, the student's college graduation, and a summary measure of the student's educational attainment. Information for the first four variables came from the 1957 survey; the educational attainment information was based on the 1964 follow-up study.

The variable *socioeconomic status* (X_1) is based on a weighted combination of father's occupation, father's formal educational level, mother's formal educational level, an estimate of the funds the family could provide if the student were to attend college, the degree of sacrifice this would entail for the family, and the approximate wealth and income status of the student's family. The sample was divided into four roughly equal groups,

¹³ Some readers will question the accuracy of the parents' responses to questions regarding the educational attainments of their children. A check is currently being made on all students in the sample whose parents reported that their child attended the University of Wisconsin. The final results are not yet available, but from the results obtained thus far, it seems that parents' reports on attendance and graduation are quite accurate.

¹⁴ The follow-up procedures and other details concerning the resulting sample are contained in a manuscript now being revised for publication as a journal article under the title "Characteristics of Willing and Reluctant Respondents."

labeled High, Upper Middle, Lower Middle, and Low in socioeconomic status.¹⁵

The variable *intelligence* (X_2) is based on scores on the Henmon-Nelson Test of Mental Maturity which is administered annually to all high school juniors in Wisconsin.¹⁶ The categories used represent the division of the sample into approximately equal fourths in measured intelligence, according to established statewide norms, labeled High, Upper Middle, Lower Middle, and Low.

The variable *college plans* (X_3) is based on a statement by the student when he was a senior in high school that he definitely planned to enroll in a degree-granting college or university (or one whose credits are acceptable for advanced standing by the University of Wisconsin).

The variable *college attendance* (X_4) indicates that the student had enrolled in a degree-granting college or university (or one whose credits are acceptable for advanced standing by the University of Wisconsin) at some time between 1957 and 1964. It includes those who had graduated as well as those who had not yet received a bachelor's degree.

The variable *college graduation* (X_5) means that the student had obtained a bachelor's degree.¹⁷

The variable *educational attainment* (X_6), used only in the path analysis, indicates the level of higher education attained by the student. It is scored as follows: did not attend college (0), attended college, but did not graduate (1), and graduated from college (2).

Results

Table 1 shows the percentage of Wisconsin male and female high school seniors who planned on college in 1957, the percentage who actually attended college, and the percentage who graduated from college for each of the categories of socioeconomic status and intelligence. Among males 37.4%, regardless of their socioeconomic status, planned to attend college at the time they

¹⁵ The six indicators were factor-analyzed using the principal-components method, and were orthogonally rotated according to the verimax criterion. This produced a three-factor structure composed of a factor on which the three economic items were most heavily loaded, a factor on which the two educational items were most heavily loaded, and a factor on which the occupational item was most heavily loaded. The composite socioeconomic status index was developed by squaring the loadings of the principal items on each factor as weights, then multiplying students' scores on the items by the respective weights, and finally summing the weighted scores of the principal items on each factor. The three factors were combined into a composite socioeconomic status score after multiplying the factor scores of all students by certain constants which would produce approximately equal variances for each status dimension. The resulting sum of the weighted scores was then multiplied by a constant to produce a theoretical range of scores between 0 and 99.

¹⁶ V. A. C. Henmon and M. J. Nelson, *The Henmon-Nelson Test of Mental Ability*, Boston: Houghton Mifflin Co., 1942.

¹⁷ Because the subsequent analysis deals only with higher education, a category is not included for those students who continued their education beyond high school in vocational and technical schools which do not offer college level curricula.

TABLE 1
 PERCENTAGE WHO PLANNED ON COLLEGE, ATTENDED COLLEGE, AND GRADUATED FROM COLLEGE, BY SOCIOECONOMIC STATUS AND BY INTELLIGENCE, SEPARATELY FOR MALES AND FEMALES*
 (Total Cohort)

Socioeconomic Status Levels	Males				Females			
	Planned on College	At- tended College	Grad- uated from College	N	Planned on College	At- tended College	Grad- uated from College	N
Low	14.8	20.5	7.5	(972)	7.9	8.5	2.7	(1,101)
Lower Middle	26.8	33.8	14.2	(1,152)	20.4	21.2	7.9	(1,194)
Upper Middle	39.3	44.6	21.7	(1,155)	29.3	30.5	12.4	(1,195)
High	66.3	73.4	42.1	(1,107)	60.2	62.6	35.0	(1,131)
Total	37.4	43.7	21.8	(4,386)	29.5	30.7	14.5	(4,621)
Intelligence Levels								
Low	12.2	15.0	3.2	(1,070)	10.5	11.4	1.8	(1,122)
Lower Middle	25.4	33.5	11.5	(1,100)	20.9	22.5	7.1	(1,205)
Upper Middle	45.5	51.0	23.9	(1,083)	33.7	34.7	16.1	(1,183)
High	65.2	73.8	47.2	(1,133)	53.3	54.9	33.5	(1,111)
Total	37.4	43.7	21.8	(4,386)	29.5	30.7	14.5	(4,621)

* All χ^2 's for each column in this table are significant beyond the 0.05 level.

were still seniors in high school, but only 14.8% of those of low socioeconomic status, in comparison with 66.3% of those with high socioeconomic status, indicated such plans. Likewise, 29.5% of all females planned on college but only 7.9% of those with low socioeconomic status, in comparison with 60.2% of those with high socioeconomic status, had such plans.

The picture is essentially the same when the students are classified by intelligence levels (Table 1). While only 12.2% of the males in the low quarter of the intelligence distribution planned to attend college, 65.2% of those in the high quarter had college plans. Of the girls in the low quarter of the intelligence distribution, 10.5% had planned on college, while 53.3% of those in the high quarter had college plans. As with socioeconomic status, for both males and females, there is not a single exception to the rule—the higher the intelligence level the higher the proportion who had planned on college.

Exactly the same relationship is found for both socioeconomic status and intelligence with college attendance and college graduation. Of the males in the low socioeconomic status category, 20.5% attended college and 7.5% graduated, while 73.4% of the high socioeconomic status males attended and 42.1% graduated. For females, in the low socioeconomic status category, 8.5% attended college and 2.7% graduated, while in the high socioeconomic status category, 62.6% attended and 35.0% graduated. In the low intelligence category, 15.0% of the males attended college and 3.2% graduated, in contrast to 73.8% and 47.2%, respectively, of the males in the high intelligence category. For females, 11.4% of the low intelligence category attended

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college and 1.8% graduated, while for the high intelligence category 54.9% attended and 33.5% graduated.

Thus, when the educational progress of the whole cohort is examined through time, it is apparent that both socioeconomic origins and intelligence are significantly associated not only with plans for higher education but also with progress through the system of higher education.

Several other points should be made. The first is that progress through the system is by no means automatic. Whereas 43.7% of the total male cohort attended college, only 21.8% (less than half of those who had attended college) had graduated by 1964. For the females, the respective figures are 30.7% attended and 14.5% graduated.

Second, in all socioeconomic and intelligence categories females are less likely than males to have planned on college or to have attended college or to have completed college. This trend reflects the normative differentiation of male and female roles in American society. Although the proportion of women joining the labor force is higher now than ever in the past, there is still a prevalent norm that seems to lead many women to choose their household role as primary, and their occupational role as occasional, part-time and secondary. Unless women are strongly committed to a professional occupation as a full-time career, they are less likely than men to be oriented toward higher education. Also, it is apparent from the results already reported that socioeconomic status is of greater significance to the educational plans and attainments of females than of males, and that intelligence seems to be somewhat more decisive for males than for females.

Finally, perceptive readers will have noted some discrepancy between the plans and the actual college attendance of the students in the cohort. In general, a slightly larger proportion of both males and females in each category of socioeconomic status and intelligence actually attended college than had said in 1957 that they planned to go to college. This reflects the fact that the 1957 responses were to a question about definite plans to attend college. Doubtless some of the students who were still uncertain were reluctant to say that they had definite plans. Since there is less discrepancy in females' college plans and college attendance in each category of family socioeconomic status and intelligence than among the males in the respective categories, the plans of the female seniors were more realistic than those of the male seniors. This may in part have been due to the uncertainties that the males had about fulfilling their compulsory military obligations.

Since both socioeconomic status and intelligence are related to college plans, college attendance, and college graduation of both males and females, as shown by the analysis thus far, the influence of socioeconomic status on the educational attainments of the cohort at each of the successive stages should be examined while controlling for intelligence. Likewise, the influence of intelligence on educational attainment should be examined while controlling for socioeconomic status. The results of this analysis for college plans, college attendance, and college graduation are shown separately for males and females in Tables 2-4.

Table 2 presents the percentages of male and female students who planned

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TABLE 2
 PERCENTAGE WITH COLLEGE PLANS, BY SOCIOECONOMIC STATUS AND INTELLIGENCE, SEPARATELY FOR MALES AND FEMALES *
 (Total Cohort)

Socioeconomic Status Levels	Males					Females				
	Intelligence Levels					Intelligence Levels				
	Low	Lower Middle	Upper Middle	High	Total	Low	Lower Middle	Upper Middle	High	Total
Low	4.7 (363)	12.0 (267)	23.3 (193)	33.6 (149)	14.8 (972)	2.7 (411)	4.4 (316)	11.0 (236)	26.1 (138)	7.9 (1,101)
Lower Middle	9.3 (300)	19.8 (324)	33.5 (275)	49.4 (253)	26.8 (1,152)	10.2 (335)	17.3 (342)	24.4 (291)	35.0 (226)	20.4 (1,194)
Upper Middle	17.2 (273)	25.6 (277)	47.8 (316)	64.0 (289)	39.3 (1,155)	14.0 (250)	24.7 (324)	27.4 (332)	49.8 (289)	29.3 (1,195)
High	28.4 (134)	48.3 (232)	68.6 (299)	85.8 (442)	66.3 (1,107)	30.2 (126)	44.4 (223)	65.1 (324)	72.7 (458)	60.2 (1,131)
Total	12.2 (1,070)	25.4 (1,100)	45.5 (1,083)	65.2 (1,133)	37.4 (4,386)	10.5 (1,122)	20.9 (1,205)	33.7 (1,183)	53.3 (1,111)	29.5 (4,621)

* All χ^2 's for each column and row in this table are significant beyond the 0.05 level.

Effect parameters: Males: Socioeconomic Status .131 Intelligence: .144

Females: Socioeconomic Status .140 Intelligence: .105

on college by socioeconomic status and intelligence. The percentages shown in each cell of this and subsequent tables are based on the N's given in the parentheses in the respective cells. For example, among 363 low socioeconomic status males who are also low in intelligence, only 4.7% had planned on college, while 85.8% of the 442 high socioeconomic status males who are high in intelligence had college plans. Similarly, among the 411 females who are low in socioeconomic status and low in intelligence, 2.7% had planned on college, while among 458 high socioeconomic status females who are also high in intelligence, 72.7% had planned on college. Reading the table in this way, it is observed that there is a positive, monotonic, and statistically significant relationship between socioeconomic status and college plans of males and females in each category of intelligence.

A similar relationship holds between intelligence and college plans of males and females in each category of socioeconomic status. Looking at the differences in the percentages of the lowest and the highest categories of socioeconomic status, it is found that the higher the level of intelligence, the greater the influence of socioeconomic status on college plans of both males and females. Similarly, looking at the difference in the percentages of the lowest and the highest categories of intelligence, it is apparent that the higher the level of socioeconomic status, the greater the influence of intelligence on college plans of males and females. The cross-pressured cells are particularly noteworthy in that high socioeconomic status males in the low intelligence category are a little less likely to plan on college (28.4%) than are highly intelligent males who are low in socioeconomic status (33.6%), while high socioeconomic status females who are low in intelligence (30.2%) are more likely to plan on college than are highly intelligent females who are low in socioeconomic status (26.1%).

From the cross-tabular analysis there is a monotonic relationship between the combined effects of socioeconomic status and intelligence on college plans of both males and females. The effect parameters given at the bottom of the table indicate that on the whole the plans of the male seniors are slightly more influenced by their intelligence than by their socioeconomic status (intelligence, .144; socioeconomic status, .131). On the other hand, the plans of the female seniors are more affected by their socioeconomic status than by their intelligence (intelligence, .105; socioeconomic status, .140).

From Table 3 it is observed that in each category of socioeconomic status and intelligence, more men than women actually attended college. The relationship of socioeconomic status to college attendance is positive, monotonic, and statistically significant for both males and females in each category of intelligence. Similarly, without any exception the relationship of intelligence to college attendance is positive, monotonic, and statistically significant for both males and females in each category of socioeconomic status. While only 6.3% of males with low intelligence and low socioeconomic status attended college, 90.7% of males with high intelligence and high socioeconomic status attended college. A similar trend holds for females: only 3.7% of females with low intelligence and low socioeconomic status attended college, but 76.4% of females with high intelligence and high socioeconomic status

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TABLE 3
 PERCENTAGE WHO ATTENDED COLLEGE, BY SOCIOECONOMIC STATUS AND INTELLIGENCE, SEPARATELY FOR MALES AND FEMALES *
 (Total Cohort)

Socioeconomic Status Levels	Males					Females				
	Intelligence Levels					Intelligence Levels				
	Low	Lower Middle	Upper Middle	High	Total	Low	Lower Middle	Upper Middle	High	Total
Low	6.3 (363)	16.5 (267)	28.0 (193)	52.4 (149)	20.5 (972)	3.7 (411)	6.3 (316)	8.9 (236)	27.5 (138)	8.5 (1,101)
Lower Middle	11.7 (300)	27.2 (324)	42.6 (275)	58.9 (253)	33.8 (1,152)	9.3 (335)	20.2 (342)	24.1 (291)	36.7 (226)	21.2 (1,194)
Upper Middle	18.3 (273)	34.3 (277)	51.3 (316)	72.0 (289)	44.6 (1,155)	16.0 (250)	25.6 (324)	31.0 (332)	48.1 (289)	30.5 (1,195)
High	38.8 (134)	60.8 (232)	73.2 (299)	90.7 (442)	73.4 (1,107)	33.3 (126)	44.4 (223)	67.0 (324)	76.4 (458)	62.6 (1,131)
Total	15.0 (1,070)	33.5 (1,100)	51.0 (1,083)	73.8 (1,133)	43.7 (4,386)	11.4 (1,122)	22.5 (1,205)	34.7 (1,183)	54.9 (1,111)	30.7 (4,621)

* All χ^2 's for each column and row in this table are significant beyond the 0.05 level.

Effect parameters: Males: Socioeconomic Status .134 Intelligence: .166

Females: Socioeconomic Status .146 Intelligence: .105

attended. The combined effect of socioeconomic status and intelligence on college attendance is monotonic for both males and females. However, the percentages in the cross-pressured cells—namely, the low socioeconomic status but high intelligence category and the low intelligence but high socioeconomic status category—are noteworthy. Of the males with high intelligence but low socioeconomic status, 52.4% attended college. The corresponding figure for males with high socioeconomic status but low intelligence is 38.8%. Of the females with high socioeconomic status but low intelligence, 33.3% attended college as compared with 27.5% of females with high intelligence but low socioeconomic status. Thus, the influence of intelligence on college attendance appears to be greater for males than for females, while the influence of socioeconomic status on college attendance is greater for females than for males. This is apparent also from the magnitudes of the effect parameters in this table. For males, the effect of intelligence (.166) is greater than the effect of socioeconomic status (.134) on college attendance. For females, the effect of family socioeconomic status (.146) is greater than the effect of intelligence (.105) on college attendance.

From Table 4, it is observed that the association of socioeconomic status with college graduation continues to be positive, monotonic, and statistically significant for both males and females in each of the intelligence categories. Similarly, the association of intelligence with college graduation also continues to be positive, monotonic, and statistically significant for both males and females in each of the socioeconomic status categories. However, it seems that low level of intelligence rather than low level of socioeconomic status is the greater limitation in obtaining a college degree in the case of both males and females. This is evident in that only 10.5% of the males in the high socioeconomic status-low intelligence category graduated from college as against almost twice that proportion (20.1%) in the low socioeconomic status-high intelligence category. The same holds true for females; while 7.9% of females in the high socioeconomic status-low intelligence category graduated from college, 13.8% in the low socioeconomic status-high intelligence category graduated. Although the over-all effect of intelligence on college graduation is greater among males (.123) than among females (.083), the magnitude of the effect of socioeconomic status on graduation is almost the same for both males and females (.081 and .077, respectively). In terms of the relative influence of socioeconomic status and intelligence on college graduation, it seems that the males are somewhat more affected by intelligence than socioeconomic status, but the females are almost equally affected by intelligence and socioeconomic status.

The results of the cross-tabular analysis and the effect parameters presented in Tables 2–4 clearly indicate that both socioeconomic status and intelligence continue to be associated with the progress of the 1957 cohort of Wisconsin high school seniors through the educational system at every successive stage, beginning with plans for college, through college attendance, to college graduation. A comparison of the effect parameters reveals differences in the relative magnitude of the effects of socioeconomic status and intelligence on the various levels of educational attainment. There are also sex differences; the

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TABLE 4
 PERCENTAGE WHO GRADUATED FROM COLLEGE, BY SOCIOECONOMIC STATUS AND INTELLIGENCE, SEPARATELY FOR MALES AND FEMALES *
 (Total Cohort)

Socioeconomic Status Levels	Males					Females				
	Intelligence Levels					Intelligence Levels				
	Low	Lower Middle	Upper Middle	High	Total	Low	Lower Middle	Upper Middle	High	Total
Low	0.3 (363)	7.9 (267)	10.9 (193)	20.1 (149)	7.5 (972)	0.2 (411)	1.3 (316)	2.5 (236)	13.8 (138)	2.7 (1,101)
Lower Middle	2.3 (300)	7.4 (324)	16.7 (275)	34.4 (253)	14.2 (1,152)	0.9 (335)	5.3 (342)	8.9 (291)	20.8 (226)	7.9 (1,194)
Upper Middle	4.4 (273)	9.8 (277)	24.4 (316)	46.7 (289)	21.7 (1,155)	2.4 (250)	9.3 (324)	12.1 (332)	24.9 (289)	12.4 (1,195)
High	10.5 (134)	23.3 (232)	38.5 (299)	64.0 (442)	42.1 (1,107)	7.9 (126)	15.3 (223)	36.4 (324)	51.1 (458)	35.0 (1,131)
Total	3.2 (1,070)	11.5 (1,100)	23.9 (1,083)	47.2 (1,133)	21.8 (4,386)	1.8 (1,122)	7.1 (1,205)	16.1 (1,183)	33.5 (1,111)	14.5 (4,621)

* All χ^2 's for each column and row in this table are significant beyond the 0.05 level.
 Effect parameters: Males: Socioeconomic Status .081 Intelligence: .123
 Females: Socioeconomic Status .077 Intelligence: .083

college plans of males are more influenced by their intelligence level than by their socioeconomic status, but the plans of females are more affected by their socioeconomic status than by their intelligence. This pattern continues for college attendance. But for college graduation the influence of intelligence is greater than that of socioeconomic status for males, while socioeconomic status and intelligence are about equally effective for females. On the basis of these findings, neither socioeconomic status nor intelligence can be discounted as influences on higher education at any stage in the process when the cohort is studied through time.

Although the results of the cross-tabular analysis are useful in mapping out the separate and joint effects of socioeconomic status and intelligence on college plans and various attainment levels in higher education, and although the effect parameters provide a summary picture of the cross-tabular analysis, there is still need for a more precise estimation of the relative influence of these variables in terms of a standardized measure that is strictly comparable from one stage to another and that takes into account the full range of the available data. As mentioned earlier, the path coefficients are appropriate measures for this purpose. The relative influence of socioeconomic status and intelligence on college plans at successive levels of higher education is examined in two separate path analyses—by first considering each stage separately, and then by considering stages in the educational pursuit of the total cohort. Figures 1 and 2 present this analysis.¹⁸

The simple path diagrams shown in Figure 1 indicate the influence of socioeconomic status and intelligence on each of the three dependent variables—college plans, college attendance, and college graduation.¹⁹ To illustrate, the

¹⁸ In these figures, the determination of the relationship between socioeconomic status and intelligence is not analyzed, and therefore only the zero-order correlation coefficient between socioeconomic status and intelligence is shown by two-headed arrows on a curved line. One-way arrows leading from each of the independent variables to the variables dependent on them are shown by straight lines to indicate that these relationships are analyzed assuming a recursive and closed system composed of all standardized variables. The quantities entered in the figure are the numerical values of path coefficients, or the beta-weights as they are commonly known. The residual paths are shown above each dependent variable.

¹⁹ The zero-order intercorrelation coefficients on which subsequent computations are based are given below, by sex:

Males

Variable	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆
X ₁ Socioeconomic status29	.42	.42	.34	.43
X ₂ Intelligence43	.45	.40	.48
X ₃ College Plans67	.56	.69
X ₄ College Attendance60	.86
X ₅ College Graduation82
X ₆ Educational Attainment

Females

Variable	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆
X ₁ Socioeconomic Status32	.44	.45	.37	.45
X ₂ Intelligence35	.35	.33	.37
X ₃ College Plans78	.58	.76
X ₄ College Attendance62	.87
X ₅ College Graduation78
X ₆ Educational Attainment

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FIGURE 1. PATH DIAGRAMS SHOWING THE INFLUENCE OF SOCIOECONOMIC STATUS AND INTELLIGENCE ON COLLEGE PLANS, COLLEGE ATTENDANCE, AND COLLEGE GRADUATION, FOR MALES AND FEMALES.

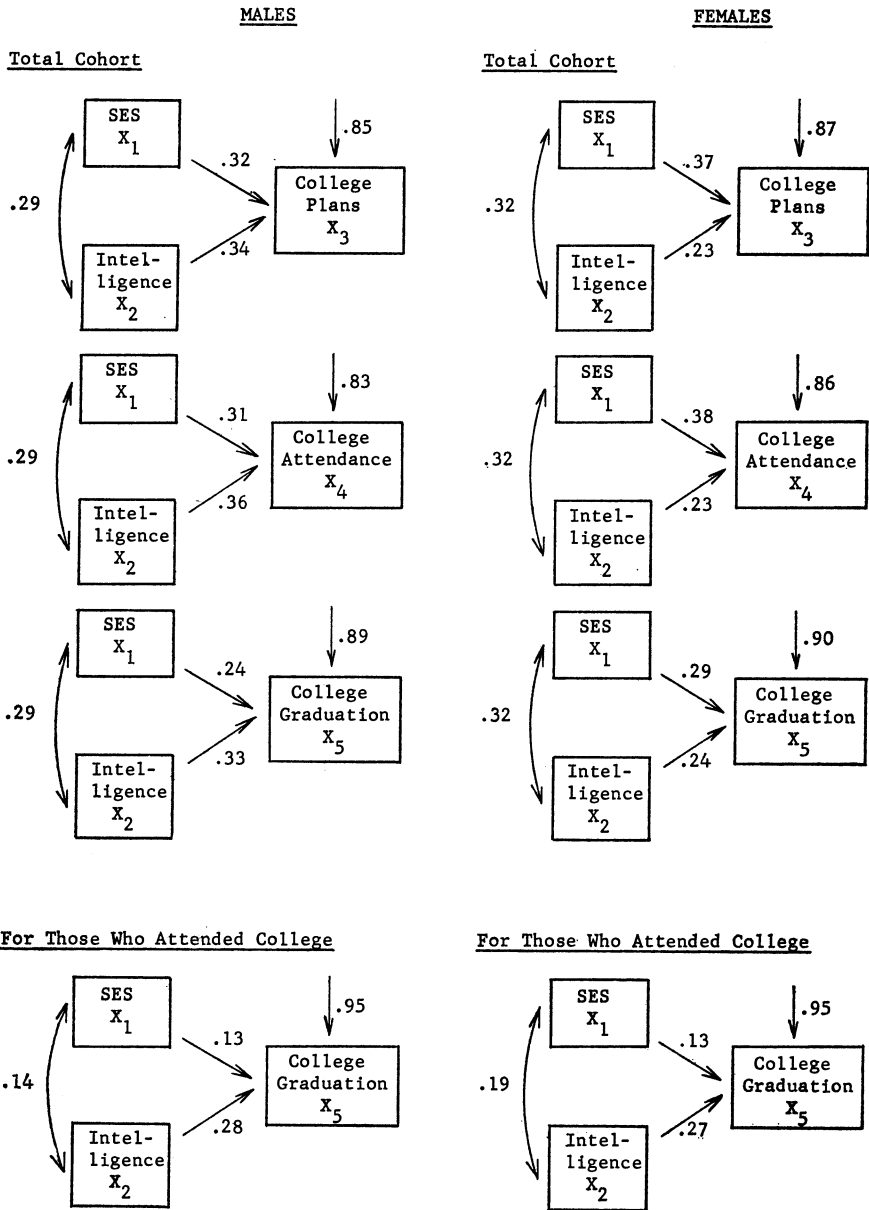
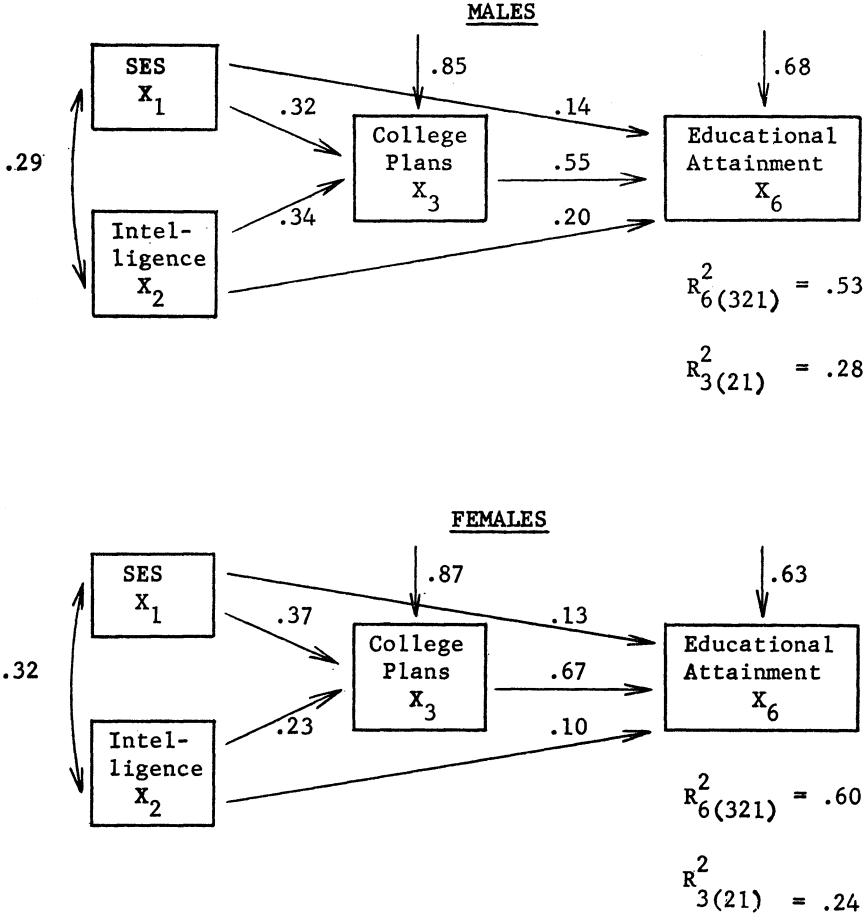


FIGURE 2. PATH DIAGRAMS SHOWING THE INFLUENCE OF SOCIOECONOMIC STATUS AND INTELLIGENCE ON THE ATTAINMENT OF HIGHER EDUCATION BY SEX (TOTAL COHORT).



first path diagram on the left side of the page shows that for males the influence of socioeconomic status on college plans, controlling for intelligence, is .32 while the influence of intelligence on college plans, controlling for socioeconomic status, is .34. Thus, each is about equally important as a determinant of college plans.²⁰

²⁰ These quantities indicate only the direct effect of socioeconomic status and intelligence on college plans. Since no intervening variables are shown in the path diagram, there is no indirect influence of socioeconomic status or intelligence on college plans. Similarly in Figure 2 for males, the direct influences of socioeconomic status, intelligence, and college plans on educational attainment are .14, .20, and .55 respectively. The indirect effects of socioeconomic status and intelligence on educational attainment can be examined from their direct effects on college plans and the direct effect of college plans on educational attainment. Thus, any statement regarding the indirect effect is made only descriptively, and it is not expressed in any quantitative terms.

Figure 1 shows that the independent influence of intelligence is greater than the independent influence of socioeconomic status on college plans, college attendance, and college graduation of males, but that the reverse is the pattern in the case of females; the independent influence of socioeconomic status is greater than the independent influence of intelligence on college plans, college attendance, and college graduation of females. The magnitude of the influence of intelligence increases slightly from college plans to college attendance, but the magnitude of the influence of socioeconomic status decreases at each successive stage in the educational pursuit of males. Although the magnitude of the influence of socioeconomic status is almost identical for college plans and college attendance and decreases for college graduation for females, the magnitude of the influence of intelligence on college plans, college attendance, and college graduation remains about the same. This is essentially what was found when the cross-classification tables and effect parameters were observed; path coefficients, however, give a more precise statement of the independent effects of the two variables at different points in the higher education process.

The path diagrams in Figure 2 give a comprehensive picture of the direct and indirect influences of socioeconomic status and intelligence on the attainment of higher education. Several points may be noted from Figure 2. First, the association between college plans and educational attainment is stronger than the association of either socioeconomic status or intelligence with college plans or with educational attainment for both males and females. Second, there is a stronger net association between college plans and educational attainment for females (.67) than for males (.55). Third, for males the direct effect of socioeconomic status on the attainment of higher education is smaller than the direct effect of intelligence, although the indirect effects are approximately equal. But for females, both the direct and the indirect effects of socioeconomic status are larger than the direct and the indirect effects of intelligence on educational attainment. In summary, the preceding analysis suggests that both socioeconomic status and intelligence continue to influence the educational attainment of the 1957 cohort of Wisconsin high school seniors—through their direct effects on each step in the process of higher education and through indirect effects on college graduation via their effects on college plans and college attendance.

Although the results of all of the analysis thus far point unequivocally to the continuing influence of both socioeconomic status and intelligence on each stage in the higher education process through both direct and indirect causal paths, another question raised by the literature remains to be answered. This is Wolfle's observation that whereas socioeconomic status plays an important part in who goes to college, once one has cleared the hurdle of college entrance, socioeconomic status sharply declines as a factor in college graduation, and intelligence becomes the determining factor.²¹ This idea, of course, is based on the assumption that a good deal of socioeconomic selection has already taken place in determining who enters college, and that selection from this point on is largely based on performance, which presumably would be power-

²¹ Wolfle, *op. cit.*, p. 163.

fully affected by intelligence. To test Wolfe's observation, a table has been prepared for both sexes showing college graduation by socioeconomic status and intelligence but based only on those students (1,916 males and 1,420 females) who actually entered college.

The relative influence of socioeconomic status and intelligence on college graduation for those who attended college is shown in Table 5, and is illustrated in the simple path diagrams at the bottom of Figure 1. From the table, it is seen that even for this group both socioeconomic status and intelligence continue to have considerable influence on college graduation. For example, only 4.4% of males in the low intelligence-low socioeconomic status category graduated from college, while 70.6% of males in the high intelligence-high socioeconomic status category graduated. Similarly, while only 6.7% of females in the low intelligence-low socioeconomic status category graduated from college, 66.9% of females in the high intelligence-high socioeconomic status category graduated. Except for three out of a total of thirty-two cells in this table, the pattern of relationship between socioeconomic status and college graduation is generally positive, monotonic, and statistically significant for both males and females in each category of intelligence. Likewise, except for males in the low socioeconomic status category, the relationship between intelligence and college graduation is positive, monotonic, and statistically significant for both males and females in each category of socioeconomic status. However, looking at the proportion of college graduates in the extremely cross-pressured cells, it becomes apparent that intelligence has a greater influence than socioeconomic status. Whereas 26.9% of males who are low in intelligence but high in socioeconomic status graduated from college, 38.5% of males who are low in socioeconomic status but high in intelligence graduated. Similarly, whereas 23.8% of females who are low in intelligence but high in socioeconomic status graduated from college, 50.0% of females who are low in socioeconomic status but high in intelligence graduated. The comparative magnitudes of the effect parameters indicate that the over-all influence of intelligence is much greater than that of socioeconomic status for both males and females. The path coefficients indicate the same thing. Thus, these findings support the conclusion arrived at by Wolfe fifteen years ago. The fact that the magnitude of the effect of intelligence on college graduation among those who attended college is about the same as that for the total cohort suggests that Wolfe's statement regarding the increasing importance of ability on educational achievement among those who attend college may somewhat overstate the importance of intelligence. But the much smaller magnitude of the effect of socioeconomic status on college graduation among those who attended college than for the total cohort is in agreement with his observation that the influence of socioeconomic status tends to decrease once college is entered. Nevertheless, it should be noted that along with intelligence, socioeconomic status continues to influence college graduation even after socioeconomic selection has taken place in the process of determining who will attend college.

Thus, all of the analysis reported in this paper points to the conclusion that one's socioeconomic origins exert a continuing influence on the process

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TABLE 5
 PERCENTAGE WHO GRADUATED FROM COLLEGE, BY SOCIOECONOMIC STATUS AND INTELLIGENCE, SEPARATELY FOR MALES AND FEMALES
 (Based on the number who attended college, not the total cohort)

Socioeconomic Status Levels	Males						Females								
	Intelligence Levels						Intelligence Levels								
	Low	Lower Middle	Upper Middle	High *	Total *	Low	Lower Middle	Upper Middle	High *	Total *	Low	Lower Middle	Upper Middle	High *	Total *
Low	4.4 (23)	47.7 (44)	38.9 (54)	38.5 (78)	36.7 (199)	6.7 (15)	20.0 (20)	28.6 (21)	50.0 (38)	31.9 (94)	6.7 (15)	20.0 (20)	28.6 (21)	50.0 (38)	31.9 (94)
Lower Middle	20.0 (35)	27.3 (88)	39.3 (117)	58.4 (149)	42.2 (389)	9.7 (31)	26.1 (69)	37.1 (70)	56.6 (83)	37.2 (253)	9.7 (31)	26.1 (69)	37.1 (70)	56.6 (83)	37.2 (253)
Upper Middle	24.0 (50)	28.4 (95)	47.5 (162)	64.9 (208)	48.7 (515)	15.0 (40)	36.1 (83)	38.8 (103)	51.8 (139)	40.5 (365)	15.0 (40)	36.1 (83)	38.8 (103)	51.8 (139)	40.5 (365)
High	26.9 (52)	38.3 (141)	52.5 (219)	70.6 (401)	57.3 (813)	23.8 (42)	34.3 (99)	54.4 (217)	66.9 (350)	55.9 (708)	23.8 (42)	34.3 (99)	54.4 (217)	66.9 (350)	55.9 (708)
Total	21.3 (160)	34.2 (368)	46.9 (552)	64.0 (836)	49.8 (1916)	15.6 (128)	31.7 (271)	46.2 (411)	61.0 (610)	47.0 (1420)	15.6 (128)	31.7 (271)	46.2 (411)	61.0 (610)	47.0 (1420)

* χ^2 's for each column designated and for all rows for both sexes are significant beyond the 0.05 level.
 Effect parameters: Males: Socioeconomic Status .049 Intelligence: .131
 Females: Socioeconomic Status .061 Intelligence: .142

of educational selection beginning with planning to enter college, attending college, and, finally, graduation from college. Also, one's intelligence has a similar influence as one passes from one stage to the next in the process. Whereas males are more influenced by intelligence than by socioeconomic origins and females are more influenced by socioeconomic origins than by intelligence throughout the process of selection in higher education, both factors continue to operate on both sexes.²²

Perhaps the most critical factor in the process of obtaining higher education is the decision to plan on and to enter college. At this point, over a fourth of the high ability males (those in the top quarter of the intelligence distribution) and almost half of the high ability females drop out of the process by not planning on or not entering college. Socioeconomic origins powerfully affect these decisions of high ability youth of both sexes; just over half (52.4%) of the high ability males of low socioeconomic status enroll in college in comparison with 90.7% of the high status males of equal ability; for females the corresponding percentages are 27.5 and 76.4 (Table 3). Moreover, the yield of college graduates from high ability males is only 20.1% for those with low socioeconomic status origins in comparison with 64.0% from those with high socioeconomic status backgrounds; for females the yields of college graduates are 13.8 and 51.1%, respectively (Table 4). Even if only those who enter college are considered, socioeconomic status exerts a powerful influence; only 38.5% of the high ability males who are low in socioeconomic status graduate in comparison with 70.6% of those of equal ability but high in socioeconomic status. For females the respective figures are 50.0 and 66.9% (Table 5). Similar trends hold for less able youth.

From all of this evidence it seems clear that although intelligence plays an important role in determining which students will be selected for higher education, socioeconomic status never ceases to be an important factor in determining who shall be eliminated from the contest for higher education in this cohort of Wisconsin youth.

Summary and Conclusions

This study of a randomly selected cohort of Wisconsin high school seniors over a seven-year period (1957–1964) shows that both socioeconomic status and intelligence are related to planning on college, college attendance, and college graduation for both sexes. When intelligence is controlled in multivariate tables, socioeconomic status is positively, monotonically, and significantly related to planning on college, college attendance, and college graduation for both sexes. Similarly, when socioeconomic status is controlled, intelligence is positively, monotonically, and significantly related to planning on college, college attendance, and college graduation for both sexes. On the whole, the relative effect of socioeconomic status is greater than is the effect

²² Our results on the relative influence of socioeconomic status and intelligence on college graduation are also quite similar to those reported by Eckland for his sample of University of Illinois males, "Academic Ability, Higher Education, and Occupational Mobility," *op. cit.*, p. 470.

of intelligence for females, while the relative effect of intelligence is greater than is the effect of socioeconomic status for males. This is true whether effect parameters or path coefficients are used to measure the effects.

When the whole process is studied by means of path analysis, both socioeconomic status and intelligence have direct effects on planning on college, college attendance, and college graduation, and considerable indirect effects on the level of educational attainment through their effects on college plans. Again this is true for both males and females although there are differences in the magnitude of these effects by sex.

When only those who attended college are included in the analysis, it is clear that intelligence is much more important than socioeconomic status in determining who will eventually graduate. Prior socioeconomic selection has already exerted much of its influence on who attends college. After this point intelligence, probably as it is reflected in performance, is more important. However, even among this group socioeconomic status continues to exert an influence that is independent of intelligence in determining college graduation for both sexes. In general, these findings confirm and extend those of previous research by Wolfe, Eckland, and others, and should be of significance not only to those interested in higher education, but also to students of social mobility.

There are, of course, many other interesting ways in which socioeconomic status and intelligence may be examined in relation to the process of selection in higher education. For example, it would be most instructive to look at the differences in the quality of colleges that students with different backgrounds and abilities attend. It would also be useful to investigate the differences in the patterns by which the college degree is eventually obtained by students of different socioeconomic and intelligence levels—that is, whether they differ in the number of colleges they will attend or the length of time they will remain in college to obtain a degree. It would also be interesting to examine how factors other than socioeconomic status and intelligence may intervene and shape the educational progress of the student. These and other problems will be investigated in other papers based on the data of this research project.