COLLEGE EFFECTS ON EDUCATIONAL
AND OCCUPATIONAL ATTAINMENTS

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Introduction

A recurrent theme in the sociology and economics of education is the notion that differences among colleges, e.g. quality differences, affect the latter educational and socioeconomic attainments of the students and/or graduates of colleges (Clark, 1962; Becker, 1964; Miliband, 1969; Collins, 1971; Milner, 1972; Jencks, 1971, 1972). The hypothesis is relevant to a wider body of theory and research on the process of social stratification in American society (Blau and Duncan, 1967; Sewell, Haller and Portes, 1969; Sewell, Haller and Ohlendorf, 1970; Hauser, 1972; Sewell and Hauser, 1972; Duncan, Featherman and Duncan, 1972), in that the effects of college differences on educational and socioeconomic achievements may serve to mediate part of the effects of family background factors and academic ability on later achievements. In order for such an interpretive role to be accorded college differences, it is essential that colleges have an independent effect on such outcomes. The present paper addresses the issue of whether we can attribute unique effects on educational achievement and occupational status attainment to differences which exist among colleges.
Some Theoretical Issues in the Assessment of College Effects

The differential impact of colleges on their students has received the attention of educators, social psychologists, sociologists and economists for some time. Recently, Feldman and Newcomb (1970, see also Feldman, 1969) review much of the literature which this attention has generated. The focus of the bulk of this vast quantity of research has been on the general socialization effects of the college experience or on the short-term effects of differential college experience rather than on the role which differential college attendance plays in the life chances of college attenders.

Most writers on the subject of college effects recognize that colleges can have differential impact on student outcomes by way of both socialization and certification influences. Socialization effects are usually discussed in terms of the actual changes which schools bring about in their students (Feldman and Newcomb, 1970), whereas certification effects are described as operating through the responses of members of the society to the presumed socialization effects (Meyer, 1972). Kamens (1971) recently argues that some of the variables often thought of in socialization terms, e.g. college prestige and size, can also be viewed in terms of certification (or "charter") effects. In practice, the effects of differential socialization and differential certification are difficult to separate since the actual processes involved are rarely if ever measured. Typically researchers make use of measures which assess the characteristics of colleges, and such measures clearly reflect both socialization and certification aspects of college differences.
A second issue considered here involves the fact that much of the research which has focused on the effects of college differences on the life chances of individuals has primarily dealt with the effects of college quality. Beyond the difficult issues of the conceptualization and measurement of college quality is the possibility that there are potentially relevant differences among colleges which are not easily subsumed under the rubric of "college quality." An example of such a differentiating feature of colleges is enrollment size, a dimension which is neither "qualitative" nor necessarily reflective of the quality of education. Yet, size of the college or university which a person attends may be an important factor in later achievements (Kamens, 1971).

Another issue, related to the second, which is theoretically relevant to the study of college effects in general has to do with the manner in which college differences are conceptualized. When social scientists study the effects of college differences on various outcome characteristics of students, a variety of measures are used to summarize the relevant differences. These various approaches are discussed at length in a number of sources (Astin, 1970; Feldman, 1969, 1970, 1971; Feldman and Newcomb, 1970) and will not be reviewed here. The most common approach involves the use of one or more college characteristics, e.g. "selectivity," "productivity," "prestige," "size," etc. It is important to point out that such measures of college differences, even when taken together, may not fully summarize the relevant differences of the colleges involved.

A fourth issue in the assessment of differential college impact has to do with the fact that students are not randomly allocated to
colleges. The process of selection and recruitment into different colleges results in the fact that colleges differ in their student composition on a number of important achievement related variables, e.g. socioeconomic background, ability, motivational factors, etc. (Wolfle, 1954; Cooley and Becker, 1966; Astin and Panos, 1969; Jencks and Riesman, 1968; Folger et al., 1970; Spaeth and Greeley, 1970; Wegner and Sewell, 1970). Such variables must be taken into account in the assessment of college effects. Failure to adequately control variation in key selection/recruitment factors will result in the spurious attribution of causal status to aspects of college differences.

While it is frequently tempting to speculate about the sources of differences in achievement which are related to the differentiating features of schools, both secondary and post-secondary, the overwhelming lesson we learn from the existing empirical analyses of such factors for secondary schools is that at best only a minor role can be accorded them (Sewell and Armer, 1966; Coleman et al., 1966; Hauser, 1969, 1971). Since students are much more likely to select themselves or get recruited by others into various institutions of higher education than is the case at the secondary level, we should expect that even a smaller role can be assigned to the differentiating features of post-secondary institutions. While schooling itself is important in the socioeconomic attainment process, the "quality" (or other differences) of schools appear to be less so.

A Review of the Literature

One of the earliest interests in the effects of college differences on educational outcomes can be found in the studies of Knapp and his
associates on institutional productivity (Knapp and Goodrich, 1952; Knapp and Greenbaum, 1953; Knapp, 1964). While their interpretation of the apparent institutional effects are not insensitive to the selection/recruitment hypothesis, such factors are not taken into account empirically in their analyses. Their research stimulated a number of attempts to take such selection/recruitment factors into account in the computation of productivity indices (Holland, 1957; Thistlethwaite, 1959; Astin, 1961, 1962). However, most of the studies of institutional productivity have dealt with data aggregated at the institutional level, and the results of these studies tell us little, if anything, about the effect of college differences on individual differences in educational achievement.

The research literature concerned with college effects on individual educational outcomes has generally supported the presence of such effects. This support comes from two major sources: 1) follow-up studies of high school seniors (Folger et al., 1970; Wegner and Sewell, 1970), and 2) follow-up studies of entering college freshmen (Astin, 1969, 1971; Kamens, 1971). Follow-up studies of college graduates (Sharp, 1970; Spaeth and Greeley, 1970) and entering graduate students (Wright, 1964) support the view that colleges have only weak or essentially zero effects. This literature suggests three conclusions. First, as the variance in the dependent variable is more restricted, college differences have much smaller effects. For example, the effects of colleges are stronger in the studies of high school seniors than they are in studies of college graduates. Second, as the range of variation in college differences is decreased, weaker college effects are observed. For example, when a set of categories is used (e.g. Wegner
and Sewell, 1970) in contrast to the use of a single measure of college quality, larger effects are observed. Third, and most important for theoretical reasons, smaller effects are generally observed when a larger number of selection/recruitment factors are included.

The literature on the effects of college differences on occupational attainment is scanty. There are two available studies—both based on samples of college graduates (Sharp, 1970; Spaeth and Greeley, 1970). Spaeth and Greeley (1970, p. 166) report a very small effect, while Sharp (1970, pp. 105-111) merely explores the relationship at the zero-order level.

The issue of the returns to college quality (and other college differences) is far from settled. Further replication and research is necessary using samples from known populations and sets of data with a wide range of available measures on selection/recruitment factors and college differences. In order to give the hypothesis of unique college effects a fair examination, attempts must be made to 1) avoid unnecessary restriction of the variance in the particular dependent variables involved, 2) maximize the measured differences among colleges, and 3) include a wide range of selection/recruitment factors as controls in the analysis. The failure to meet these requirements may result in a biased estimate of the unique college effect.

The Research Problem

The "school effects" literature suggests a general theoretical model for the study of college effects which draws attention to the fact that students are not randomly allocated to colleges. This model also underlies what sociologists refer to as contextual analysis.
(Hauser, 1970) and certain studies of socialization (Brim and Wheeler, 1966). Werts (1968) calls this the Input-Output model of school effects. The basic idea is that persons select themselves or get recruited by others, often de facto, into groups, contexts, social institutions, etc., and as a result of their contact with these groups are influenced, changed or marked in some way. To the extent that the effect of a group is unique or different in some way from that of other groups, we may talk about a group or contextual effect. In the case of colleges this effect may be due to differential socialization, certification, or both (Jencks, 1971).

A version of an Input-Output model for the present problem is presented in Figure 1. It is convenient to refer to the factors which select and recruit students into different colleges as "inputs."

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Figure 1 about here
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A number of factors are important in the selection/recruitment process: ability, academic performance, socioeconomic background, and motivational factors. These factors determine both specific college attendance and later achievements, and in order to talk about a college effect it is essential that the effect be assessed controlling variation in these input variables. The causal ordering of the variables in Figure 1 is consistent with the temporal ordering of the variables: the inputs occur prior to college attendance, the inputs and college experience both occur prior to educational and occupational attainments, and educational attainment precedes occupational status attainment. We therefore have a recursive model with the set of input variables as a major source of predetermined variation in the system. It is also possible
to set forth a causal model for the relationships among the input
variables. This has been substantially carried out elsewhere (Sewell
et al., 1969, 1970; Hauser, 1972; Sewell and Hauser, 1972) and will
not be reproduced here.

The goal of the present analysis is to assess the effects of
college differences on educational and occupational status attainments
for a representative sample of high school graduates. The particular
sample used is described in detail below. Two approaches to the assess-
ment of college effects are used. First we assess the effects using
conventional measures of college differences, e.g. enrollment size,
prestige, selectivity and other characteristics which are used to
represent college quality. Since such measures have been used singly
or in combination in previous empirical analyses, it is well to attempt
to replicate the findings of these studies using a somewhat different
population and a more extensive set of control variables. Second we
assess the effects using a set of college categories to represent the
range of college differences of interest. A similar set of categories
has been used previously in assessing the effects of college differ-
ences on graduation from college for students attending four year
colleges and universities (Wegner and Sewell, 1970). The two approaches
will be compared in terms of the extent to which they detect a unique
college effect. The relationship between the two approaches will also
be explored. In both cases the college differences for first college
attended are used to assess the effects on educational attainment,
while information on last college attended is used in assessing the
effect on occupational status attainment.
Methods

The analysis reported here involves the assessment of college effects on educational achievement after high school and occupational status attainment seven years after graduation from high school. These effects are estimated for the male cohort of 1957 Wisconsin high school seniors with some college experience between 1957 and 1964, who were alive, not enrolled in any school and not on active duty with the armed forces in 1964. The data used in this estimation come from a one-third probability sample of the 1957 Wisconsin high school graduates whose parents responded to a 1964 mail follow-up questionnaire. A total of 1198 men with college information available meet the eligibility criteria set forth above.

The data for the one-third sample come from a number of sources: 1) a 1957 high school administered questionnaire (see Little, 1958); 2) solicited high school records; 3) Wisconsin State Testing Service records; 4) Wisconsin State Tax Service records; and 5) a 1964 follow-up mail questionnaire survey. The data set includes a range of important variables, including measures of socioeconomic background, academic ability, academic performance, measures of aspirations and perceptions during the senior year of high school, measures of the social psychological process of interpersonal influence in the development of status aspirations, measures of educational attainment, and 1964 occupation. These data have been the subject of a number of research publications on social stratification, social inequality and the process of social status attainment among the members of the 1957 cohort (Sewell, 1964; Sewell and Orenstein, 1965; Sewell and Armer, 1966; Sewell and Shah, 1967, 1968a, 1968b; Sewell, Haller and Portes, 1969; Sewell, Haller

The Variables--Outcomes

The respondent's education (U) and 1964 occupation (W) were obtained from the 1964 follow-up questionnaire. Education, although not reported as such, is scaled in years of schooling completed. Years of schooling is actually translated from statements of educational certification, so that in a sense it only approximates the number of years of schooling actually completed. The 1964 occupation is coded into Duncan SEI scores, representing occupational status (Duncan, 1961).

Inputs

A large number of variables are included in the analysis to represent the selection and recruitment factors involved in attending colleges of different types. Several classes of factors are systematically considered: socioeconomic background, academic ability, academic performance in high school, aspirations, significant other influence, and commitment to college. Four socioeconomic background variables are included: mother's education (M) and father's education (V) were obtained from the respondent in 1957 and are coded in years of schooling completed. Parental income (I) averaged over all available years for the period 1957-60 was obtained from Wisconsin tax records. It is expressed in dollar units for present purposes. Father's occupation (X) was also obtained from tax records for 1957 or the nearest available year. It is coded in the Duncan SEI scale.

The respondent's score on the Henmon-Nelson Test of Mental Ability taken during his junior year in high school, obtained from the Wisconsin
State Testing Service, is used as a measure of academic ability (Q). The scores are expressed in the metric of IQ scores with a mean of 100 and a standard deviation of 15 (for the total 1/3 sample). The respondent's academic performance (G) in high school is indexed by a normalized percentile rank in high school class, so that there is some control over interschool variation in the allocation of grades. These data were obtained from high school records.

Information on aspirations, commitment to college and the influence of significant others to attend college were obtained from the 1957 school administered questionnaire. Occupational aspirations (J) is scored in Duncan SEI units for the occupation category which the respondent said he hoped to enter. Educational aspirations (E) is represented by a dummy variable indicating whether the respondent planned to attend college. Several variables are included to tap the student's cognitive, financial and academic commitment to attending college: the respondent's high school curriculum (college preparatory) (C), his willingness to borrow to finance his college education (B), and whether he has made applications for scholarships (S) are all treated as dummy variables. The respondent's perceived value of college (A) is measured as a composite score based on several items. The respondent's perception of possible parental support (K) and his consideration of college attendance (D) are both measured as three-level ordinal variables and are treated as continuous in the present analysis. Three significant other influence variables are included: perception of teacher encouragement (T) and parental encouragement (P) to attend college are three-level ordinal variables treated as continuous; and the perception of friend's college plans (F) is expressed as a dummy variable.
College Measures


The first approach to the measurement of college differences uses
the above measures as such, while the second approach uses a classification of colleges which is derived in part from an analysis of the similarity of the profiles of the colleges on the above variables. Twelve categories of college attended are used. The first six categories --University of Wisconsin, Madison; University of Wisconsin, Milwaukee; the University of Wisconsin Center System (two-year colleges); the Wisconsin County Teachers colleges (two-year colleges); the Wisconsin State Universities; and Marquette University--represent single colleges or groups of quite homogenous colleges in the state of Wisconsin. The next four categories--Prestigious colleges and universities; Liberal Arts colleges, General; Liberal Arts colleges, Catholic; and Universities--were created on the basis of a similarities analysis of 134 colleges and universities not appearing in the other categories. In brief a matrix of similarity coefficients among the 134 schools was subjected to a Q-type factor analysis.4 The final two categories--Technological colleges and institutes and Other colleges--were created primarily on the basis of a priori considerations. The Technological category contains engineering colleges, art schools and military institutes. The final category is a residual category containing junior colleges, theological seminaries, business colleges and foreign colleges.5 These categories are represented by a set of dummy variables in the present analysis.

Given the regional limitations placed on the colleges attended by the 1957 Wisconsin cohort of graduating seniors, one might argue that the external generality of the findings reported here is severely limited. Still, at the extremes one finds some representation of the Eastern "elite" colleges in the category of Prestigious colleges and universities
and some representation of out-of-state junior colleges in the residual category. The Liberal Arts categories contain colleges both within and outside the state of Wisconsin, while the Universities category is exclusively out-of-state universities. Thus, even though the amount of regional variation is not extensive, there are grounds for studying college effects in these data.

Results

The initial task here is to ascertain the extent to which the college measures are related to the dependent variables. Table 1 presents the zero-order correlations between the several measures of college differences and educational and occupational status attainments. An initial observation that can be made is that the college characteristics taken singly are only minimally related to education and occupational status. The strongest of the relationships for both variables is with the number of National Merit Scholars enrolled, which accounts for about four percent of the variance in each dependent variable.

The next step in the analysis is to determine whether the measures of college characteristics can be used in combination to predict the dependent variables. In order to make this determination a step-wise regression procedure was used (Draper and Smith, 1966). In brief, the set of college characteristics were entered into an analysis in order to find which subset of variables would maximally predict the dependent variables. A summary of the results of this analysis is also presented in Table 1. We find that three variables—liberal arts curriculum (LA),
public control (PC), and the number of National Merit Scholars enrolled (MS)---contribute maximally to the prediction of educational attainment. Similarly, two variables---public control (PC) and the number of Merit Scholars enrolled (MS)---maximally predict occupational status attainment. In both cases the addition of the remaining college characteristics results in only a trivial addition to the explained variance in the dependent variables. One of the reasons for this is that the college measures are all highly related, and in several cases the measures are correlated at very high levels (with correlations greater than .8 or .9). The use of the step-wise regression procedures assists us in reducing the amount of redundancy among the college measures.

In each case the number of significant predictors is reduced to a surprisingly low number of variables. This suggests that there may be a small number of dimensions on which the college characteristics measured actually differentiate the colleges involved. From a perusal of the correlations among the variables (correlated over individuals) not presented here, it is evident that many of the variables are highly related to enrollment size. The size dimension is highly related to liberal arts curriculum (LA) and the number of Merit Scholars enrolled (MS). Another dimension which appears to be measured in part by these variables is college prestige. For example, the number of Merit Scholars enrolled is highly related to the several measures of prestige appearing in Table 1, e.g. the Knapp-Greenbaum index, the presence of scholastic honor societies, doctorate production, the Chicago Tribune rating. There are obviously differences tapped by these college measures which are unrelated to size and prestige, but these appear to be prominent features of the significant predictor variables.
Table 1 presents the coefficients of determination for the "best" college characteristics and also for the set of college categories. A comparison between the two approaches indicates that with regard to educational attainment the two explain about the same amount of variance--seven to eight percent of the total; but with occupational status as the dependent variable the college categories appear to be slightly superior in terms of accounting for variance in occupational status. In neither case is the amount of explained variance large, suggesting that any unique college effect which we might observe controlling variation in selection/recruitment factors is likely to be small. This issue is pursued at length below.

Several linear multiple regression equations are estimated to provide an assessment of the presence of unique college effects. Both approaches to the measurement of college differences--the use of college categories and the use of college characteristics--are used in parallel throughout most of the analysis. The equations estimated for educational attainment are presented and discussed first, followed by the equations estimated for occupational status attainment. Both sets of equations are presented in Table 2. The first model estimated in Table 2 involves the regression of education (U) on the selection/recruitment factors (or inputs) only. This equation indicates that a person's academic performance in high school (G), the influence of his friends via his perception of their college plans (F), his perception of possible financial support from his parents (K), and his motivation to obtain scholarship
support (S) are the major variables which have a direct influence on his educational attainment. It should be pointed out that the number of variables in a subset of similar variables, e.g. the set of socio-economic background variables (V,M,X,I) and the set of commitment to college variables (K,D,B,S,C,A), affects the magnitude of their individual effects (Gordon, 1968), and we should perhaps block the effects of similar variables (Heise, 1972) in order to provide a definitive assessment of the relative magnitudes of effects from general sources. Our major interest, however, is in college effects, so we will ignore this problem here. It should also be pointed out that the first equation in Table 2 gives us no information regarding possible indirect effects of the input variables. The major desideratum for present purposes is that we have all the relevant selection/recruitment factors represented in this and subsequent equations. To the extent that we have omitted an important source of variation in the dependent variable which is also related to the measures of college differences (which will appear in later equations) we will obtain a biased estimate of the unique college effect.

The second and third models in Table 2 add the college categories and the "best" college characteristics, respectively, to the equation considered above. The increments in the explained variance in the two models over the variance explained by model 1 are .0227 and .0146 respectively, both of which are significant at conventional levels of statistical significance given the sample size. The increment associated with the entry of the college categories is slightly larger, but in either case the variance in education uniquely attributable to college differences appears to be small.
The increments in $R^2$ presented above may provide an unfair test of the hypothesis of college effects since they represent the relationship of education with only the variation in the college measures (college categories or characteristics) which is orthogonal to the inputs (Linn and Werts, 1969; Darlington, 1968; Duncan, 1970). In this way we may understate the magnitude of the college effects. There are other ways to decompose the explained variance in the dependent variable without perhaps unfairly representing the variation which is due to college differences. Stated simply, it is possible to decompose the $R^2$ for education into three orthogonal pieces (see Werts and Linn, 1969, 1971) --that which is due to the inputs alone, that which is due to the college measures alone, and that which is jointly due to the inputs and the college measures.\(^7\)

This type of decomposition is computed for the equation in model 2 as follows:

$$R_U^2 = \text{inputs} + \text{categories} + \text{joint}$$

$$0.2929 = 0.2578 + 0.0236 + 0.0115$$

and for the equation in model 3 as follows:

$$R_U^2 = \text{inputs} + \text{characteristics} + \text{joint}$$

$$0.2848 = 0.2412 + 0.0162 + 0.0274$$

These estimates of the contribution of college differences to variation in educational attainment are not very different from those based on the increments in the explained variance of models 2 and 3 over model 1 which are presented above, and lead to the same conclusion regarding the magnitude of college effects on education.
The presence of small college effects can also be observed by viewing the adjusted means of the college categories on educational attainment, where we have adjusted the original sample means for differences in the category composition on all input variables in model 2. These adjustments are presented in Table 3. Note that the initial gross differences are substantially reduced by the adjustments. The prestigious colleges and universities, the Liberal Arts colleges and the Technological schools have positive effects on education which are not removed by adjustment for differences on the input variables, although they are reduced. Note also that when students of equal ability, background, motivation etc., are considered, the residual category and the County Teachers colleges have small positive effects; and the University of Wisconsin, Madison effect is reduced. On the negative end of the continuum, the University of Wisconsin, Milwaukee, the University of Wisconsin, Center, the Wisconsin State Universities and the Universities category all have negative effects on education which remain even after the adjustment. These residual differences are in general smaller than the gross differences. Thus, in most cases the gross differences are reduced or removed by considering the selection/recruitment process.

Finally, model 4 in Table 2 adds the college categories to the equation for education after the three college characteristics (LA, PC, MS) have been added to the equation in model 3. The increment in $R^2$ of model 4 over model 3 is only trivially different from zero. This result
models 7 and 8. The increments in variance explained in the two models over and above that explained in model 6 are .0187 and .0016 respectively, only the first of which is statistically significant given the present sample size. As with educational attainment the increment associated with the addition of the college categories is larger than that associated with college characteristics. It is possible to decompose the $R^2$ in models 7 and 8 a second way as above, this time into six orthogonal pieces—one which represents the effects of the inputs alone, one which represents the effects of the college differences alone, one which represents the effect of education alone, one which represents the joint effects of the inputs and the college measures, one which represents the joint effects of the inputs and education, and one which represents the joint effects of education and the college measures. This type of decomposition for the equation in model 7 is as follows:

$$R^2_W = \text{inputs} + \text{college categories} + \text{education} + \text{joint inputs-college categories}$$

$$.3295 = .0130 + .0217 + .2007 + ( -.0019 )$$

$$\text{joint inputs-education} + \text{joint education-college categories} + .0814 + .0146$$

and for the equation in model 8:

$$R^2_W = \text{inputs} + \text{characteristics} + \text{education} + \text{joint inputs-college characteristics}$$

$$.3124 = .0295 + .0019 + .1991 + .0042$$

$$\text{joint inputs-education} + \text{joint education-college characteristics} + .0729 + .0049$$

These decompositions make several things clear. First, as noted above, most of the explained variation in occupational status can be
attributed to years of schooling completed. This is consistent with most of the current literature on status attainment (Duncan, Featherman and Duncan, 1972; Sewell and Hauser, 1972). Second, because of the presence of education in the equations, very little of the variation in occupational status is directly attributable to the input variables, but a sizeable portion is due to the joint influence of the inputs and education. Since the input variables are causally prior to education in the model (see Figure 1) this joint portion of explained variance can be interpreted as summarizing the indirect effects of the inputs via education. This reiterates our earlier discussion and is consistent with the current literature. Third, the variance in occupational status attributable to college differences alone is modest, and is quite small where college differences are measured by the set of college characteristics. Fourth, since the college differences precede educational attainment in our causal model, we can interpret the joint influence of education and the college measures as representing the indirect effects of colleges via their effects on education. In the case of the college categories this adds about 1.5 percent to the proportion of variance attributable to the college categories. Finally, the proportion of variance in occupational status due to the joint effects of the inputs and college differences is trivial on balance, although college differences clearly mediate, albeit in a small way, part of the individual effects on some of the input variables.

The presence of small college effects on occupational status attainment net of selection and recruitment factors can be further observed in Table 3. When the college category means on occupational status are adjusted for differences on the input variables the general magnitude of
the effects is reduced. Also, controlling for differences in selection/recruitment factors results in some interesting reversals. For students of equal ability, background, aspirations etc., those attending the County Teachers Colleges attain the highest mean occupational status. This results in part from the fact that many of these students become certified as teachers with only two years of schooling and are not differentiated from teaching positions requiring four years of schooling on the Duncan SEI scale. At the other extreme; those attending the Prestigious colleges and universities attain the lowest mean status. This reversal is difficult to interpret except in terms of unspecified socialization and certification factors. The adjustment of the category means for educational attainment as well generally reduces the effects further. 9

A general attempt to interpret the residual college effects via the measures of college characteristics is presented in Table 2. The equation in model 9 contains both the college categories and the "best" college characteristics. This equation can be compared with the equation in model 8 in terms of the additional variance the college categories explain in occupational status over the model which contains the inputs, education, and the college characteristics. The inability of the college characteristics--public control and the number of Merit Scholars enrolled--to interpret the effects of the college categories is evidenced by the fact that the latter are able to explain additional variance in occupational status, an increment of .0206 in the coefficient of determination.

The observation of small college effects on both educational and occupational attainments leads us to inquire regarding the role of
college differences in interpreting the effects of the input variables on educational and occupational attainments. The extent to which the coefficients for the determinants of a given outcome are reduced when the measures of college differences are entered into the equation reflects the amount by which the college measures interpret the effects involved. If we consider the key determinants of educational attainment in models 1 and 2 of Table 2, we can see that about ten percent of the effect of friends' plans and about seven percent of the effect of having applied for scholarships on education is mediated by the college categories. Virtually none of the effects of high school rank and perceived parental support can be interpreted in this way. Considering the equations for occupational status in models 6 and 7, we note that only the effect of occupational aspirations is reduced by the inclusion of the college categories. It is reduced by about twelve percent. This suggests that a small part of the effect of occupational aspirations on occupational attainment occurs by virtue of the fact that persons with higher (lower) aspirations attend different colleges, which in turn affects their attainment. The effects of other key determinants of occupational status—education and teachers' encouragement—are unaffected by the inclusion of the college categories in the equation.

Summary and Conclusion

The purpose of this paper was to assess the differential impact of colleges on the educational and early occupational status attainments of their students for a sample of high school graduates. The basic hypothesis which guided the analysis was that when the process of selection and recruitment into colleges of different types is taken into account, the role of college differences as a source of variation
in both educational and occupational attainments will be considerably reduced. While the consideration of selection and recruitment factors, e.g. ability, background, aspirations, etc., does play a role in reducing the observed differences in the attainments of persons attending different types of colleges, there remains a small portion of variance in both of the outcomes considered which can be attributed to the effects of college differences. The college effects on educational attainment are larger than those on occupational status attainment, but both are generally small. Further, the college effects are more apparent when a set of college categories is used to measure college differences in contrast to a set of college characteristics.

There are at least two interpretations for the present results. First, other input (selection/recruitment) factors must be taken into account, or, second, some aspect of the college experience, either differential socialization, differential certification, or both, is responsible for the residual effect. The two interpretations are not necessarily mutually exclusive. The first interpretation involves the possibility that other input variables may exist, e.g. religious affiliation, which, if included in a similar analysis, might lead to a conclusion that the above residual effects are spurious. Further analysis of this nature must, by necessity, be carried out using other sets of data.

The second possibility, noted above, is perhaps more plausible in the present case, since a serious attempt has been made to include a wide range of theoretically relevant input variables. An attempt was made here to interpret the observed college effects via gross measures of college differences. Unfortunately, these gross measures of college
differences are not very helpful in the interpretation of the observed effects in terms of socialization and/or certification processes. The problem of untangling the possible socialization and certification effects which may be operating to produce such results poses a challenge for future theory and research into the study of college effects on educational and socioeconomic outcomes. One possibility which goes beyond the scope of the present data is that academic performance in college plays a role in creating the observed effects. Academic performance in college is a major determinant of dropping out of college (educational attainment) (Astin, 1969, 1971; Kamens, 1971) and there is some evidence of between college variation in grades net of ability (Davis, 1966; Astin, 1969, 1971; Werts and Watley, 1969; Drew and Astin, 1972).

While the unravelling of the observed college effects may prove to be an interesting challenge for future research, it is important that we keep this concern in perspective. It is clear from the analysis presented above that the variation in both educational and occupational attainments which is left unexplained within types of colleges (i.e. after the college measures have entered the equation) is much larger than the variation left unexplained between types of colleges. This fact may suggest that the most productive area for theoretical speculation is the within college variation, even though the major determinants of both education and occupation have been well specified (Sewell and Hauser, 1972; Duncan, Featherman and Duncan, 1972).

Finally, the paper began by setting forth several issues which are raised by the current literature on the topic of college effects and we noted several requirements which should be met in order to obtain a
reasonable estimate of the unique college effect for the population of interest. It is appropriate then to evaluate our present findings in terms of these requirements. In brief review, the requirements set forth above included the need to maximize the variability in content associated with college differences, the need to include a wide range of theoretically relevant selection/recruitment factors, and the need to avoid the unnecessary restriction of variance in the dependent variables. Since we have included the major determinants of education and occupational status (Sewell and Hauser, 1972; Duncan, Featherman and Duncan, 1972) as selection and recruitment factors, the analysis cannot be faulted on this basis. In addition, we have made an effort to capture the relevant variation in college differences using two related approaches based on the measurement of college characteristics. As noted above the analysis here is based on a one-third probability sample of 1957 Wisconsin high school graduates. Data are analyzed for males with some college experience between 1957 and 1964, who were alive, not enrolled in any school and not on active duty with the armed forces in 1964. Since twenty-two percent of the total sample of male college attenders alive in 1964 (N = 1869) were still enrolled in school in 1964 and fourteen percent of this group were on active duty with the armed forces it is not possible to generalize the present findings to the total group of male college attenders. We have in part selected the sample on the basis of the dependent variables, and as a result have limited variation on the dependent variables. This does not limit the generality of the results for the subpopulation studied, but the analysis of college effects for the total subsample of male college attenders must await further follow-up data.
1. The research reported here is part of a larger research project concerned with the study of social and psychological factors related to achievement under the direction of William H. Sewell. The research was supported by grants from the National Institute of Mental Health (M-6275) and the Social Security Administration (CRD-314). The author wishes to thank William H. Sewell and Robert M. Hauser for critical comments on an earlier draft of this paper, and Taissa Hauser and Jean Vivian for clerical and computational assistance.

2. Some other early sources which are often cited as evidence of college effects are the Time Inc. studies of the effect of type of college on the incomes of college graduates (Babcock, 1941; Haveman and West, 1952). For the most part, these studies are inadequate for purposes of generalizing about college effects.

3. In addition to the literature reviewed here on the effects of college differences on educational and occupational attainments there is a modest amount of literature on the effects of college quality on the earnings of college graduates (Hunt; 1963; Weisbrod and Karpoff, 1968; Reed and Miller, 1970; Daniere and Mechling, 1970; Solmon and Wachtel, 1971; Solmon, 1972; Wales, 1973; Kinloch and Perrucci, 1969; Laumann and Rapoport, 1968). A few other studies exist which are concerned with the effects of college differences on other sorts of achievements (Ladinsky, 1963; Smigel, 1964; Hargens and Hagstrom, 1967; Perrucci, 1969).

4. As noted above the similarity coefficients were based on the similarity of the colleges in terms of their profiles on several variables representing college characteristics. The set of variables used is a bit
more extensive than the set of variables listed above. For a complete
discussion of the procedures used to classify these 134 colleges and
universities, see Alwin (1972).

5. The frequencies of college attendance for the twelve categories are
as follows (first college, last college): University of Wisconsin,
Madison (221, 231); University of Wisconsin, Milwaukee (124, 121); the
University of Wisconsin, Center System (71, 44); Wisconsin State Uni-
versities (361, 383); Wisconsin County Teachers Colleges (21, 18); Marquette
University (70, 74); Prestigious colleges and universities (33, 31);
Liberal Arts colleges, General (121, 120); Liberal Arts colleges, Cath-
olic (56, 45); Universities (55, 61); Technological colleges and insti-
tutes (38, 45); and Other colleges (27, 25).

6. A few words about Table 2 are in order. First, only the stan-
dardized regression coefficients are presented. Since we wish only to
view the effects of the variables in a common metric and not make any
direct comparisons with studies carried out on other populations, the
presentation of standardized coefficients is sufficient for present pur-
poses. Second, for the models which include the set of dummy variables
representing the college categories we have not presented their stan-
dardized coefficients. The metric effects of these categories are
presented in Table 3, so it is unnecessary to present their effects
here in a form which may be confusing. Finally, the symbols used in
the table to denote the variables are largely consistent with earlier
uses in the status attainment literature (see Blau and Duncan, 1967;
Duncan, Featherman and Duncan, 1972; Hauser, 1972; Sewell and Hauser, 1972).

7. For a detailed discussion of the general problem of decomposing
explained variance and blocking the effects of variables see Heise (1972).
Footnotes continued

8. These adjustments take the form:

\[
\bar{Y}_i^* = \bar{Y}_i - \sum_j b_{YX_j} (\bar{X}_{ij} - \bar{X}_j),
\]

where \( \bar{Y}^* \) is the adjusted mean for category \( i \), \( \bar{Y}_i \) is the unadjusted \( i \)th category mean, \( b_{YX_j} \) is the pooled within category regression slope for the regression of \( Y \) on the \( X_j \)'s (\( j \) runs over all variables in the equation for \( Y \)), \( \bar{X}_{ij} \) is the \( i \)th category mean on \( X_j \), and \( \bar{X}_j \) is the grand mean for \( X_j \). This adjustment assumes that the within category regression equations are equivalent over all categories. This amounts to the assumption of additivity in the analysis of covariance, i.e. it is assumed that the college categories do not interact with the inputs and intervening variables in their effects on the outcome variables. This assumption is met in the present data for educational attainment.

9. In order to adjust the category occupational status means using the equation which includes education we must violate the nonadditivity assumption required for covariance adjustments since there is a small interaction effect involving education. The presence of this effect does not, however, alter our interpretation of the additive college effects on occupational status.
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Clark, Burton


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Davis, James A.


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Jencks, Christopher


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Figure 1.--General causal model for the assessment of college effects on educational and occupational status attainments.
Table 1.--Relationships between the measures of college differences and the dependent variables: eligible subsample with bivariate subsample data present.

<table>
<thead>
<tr>
<th>College measures</th>
<th>Dependent Variable</th>
<th>Education</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liberal Arts Curriculum (LA)</td>
<td></td>
<td>-.006</td>
<td>-.075</td>
</tr>
<tr>
<td>Public Control (PC)</td>
<td></td>
<td>-.167</td>
<td>-.059</td>
</tr>
<tr>
<td>Catholic Control (CC)</td>
<td></td>
<td>.080</td>
<td>.049</td>
</tr>
<tr>
<td>Highest Degree Offered (HD)</td>
<td></td>
<td>.156</td>
<td>.188</td>
</tr>
<tr>
<td>Enrollment (EN)</td>
<td></td>
<td>.112</td>
<td>.160</td>
</tr>
<tr>
<td>Undergraduate Enrollment (UE)</td>
<td></td>
<td>.097</td>
<td>.155</td>
</tr>
<tr>
<td>Male Enrollment (ME)</td>
<td></td>
<td>.116</td>
<td>.162</td>
</tr>
<tr>
<td>Full-time Faculty (FF)</td>
<td></td>
<td>.124</td>
<td>.161</td>
</tr>
<tr>
<td>Faculty holding Doctorate (FD)</td>
<td></td>
<td>.119</td>
<td>.133</td>
</tr>
<tr>
<td>Average Faculty Compensation (FC)</td>
<td></td>
<td>.112</td>
<td>.128</td>
</tr>
<tr>
<td>Library Volumes (LV)</td>
<td></td>
<td>.132</td>
<td>.153</td>
</tr>
<tr>
<td>Library Expenditures (LE)</td>
<td></td>
<td>.141</td>
<td>.173</td>
</tr>
<tr>
<td>Tuition and Fees--academic year (TF)</td>
<td></td>
<td>.185</td>
<td>.075</td>
</tr>
<tr>
<td>B. A. Degrees conferred (BD)</td>
<td></td>
<td>.119</td>
<td>.163</td>
</tr>
<tr>
<td>Doctorate Production (DP)</td>
<td></td>
<td>.097</td>
<td>.146</td>
</tr>
<tr>
<td>Merit Scholars enrolled (MS)</td>
<td></td>
<td>.205</td>
<td>.202</td>
</tr>
<tr>
<td>Chicago Tribune prestige rating (CT)</td>
<td></td>
<td>.148</td>
<td>.153</td>
</tr>
<tr>
<td>Knapp-Greenbaum index (KG)</td>
<td></td>
<td>.148</td>
<td>.100</td>
</tr>
<tr>
<td>Astin Selectivity score (AS)</td>
<td></td>
<td>.158</td>
<td>.129</td>
</tr>
<tr>
<td>Phi Beta Kappa chapter (PB)</td>
<td></td>
<td>.164</td>
<td>.130</td>
</tr>
<tr>
<td>Phi Kappa Phi chapter (PK)</td>
<td></td>
<td>.028</td>
<td>.094</td>
</tr>
<tr>
<td>Social Fraternities (SF)</td>
<td></td>
<td>.015</td>
<td>.020</td>
</tr>
<tr>
<td>Faculty Prestige (FP)</td>
<td></td>
<td>.128</td>
<td>.162</td>
</tr>
</tbody>
</table>

For the college categories:

\[ \beta_{LA} = 0.0835 \quad R = 0.2792 \]
\[ \beta_{PC} = -0.1656 \quad R^2 = 0.0780 \]
\[ \beta_{MS} = 0.2477 \quad \bar{R}^2 = 0.0752 \]

For Public Control (PC) and Merit Scholars enrolled (MS):

\[ \beta_{PC} = -0.0689 \quad R = 0.2135 \]
\[ \beta_{MS} = 0.2053 \quad R^2 = 0.0456 \]
\[ \bar{R}^2 = 0.0437 \]

For College categories:

\[ R = 0.2810 \quad 0.2438 \]
\[ R^2 = 0.0790 \quad 0.0594 \]
\[ \bar{R}^2 = 0.0687 \quad 0.0490 \]
Table 2.--Multiple regression equations for educational and occupational status attainments including selection/recruitment factors and measures of college differences: eligible subsample with bivariate subsample data present.

<table>
<thead>
<tr>
<th>Model</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predetermined Variable</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>W</td>
<td>W</td>
<td>W</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Regression coefficients in standard form</td>
<td>0.0298</td>
<td>0.0256</td>
<td>0.0281</td>
<td>0.0261</td>
<td>0.0389</td>
<td>0.0257</td>
<td>0.0337</td>
<td>0.0250</td>
<td>0.0353</td>
</tr>
<tr>
<td>V</td>
<td>0.0490</td>
<td>0.0363</td>
<td>0.0343</td>
<td>0.0359</td>
<td>0.0018</td>
<td>-0.0200</td>
<td>-0.0070</td>
<td>-0.0207</td>
<td>-0.0068</td>
</tr>
<tr>
<td>M</td>
<td>0.0307</td>
<td>0.0316</td>
<td>0.0259</td>
<td>0.0316</td>
<td>0.0233</td>
<td>0.0097</td>
<td>0.0068</td>
<td>0.0087</td>
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<tr>
<td>X</td>
<td>0.0067</td>
<td>-0.0084</td>
<td>-0.0098</td>
<td>-0.119</td>
<td>0.0312</td>
<td>0.0282</td>
<td>0.0449</td>
<td>0.0247</td>
<td>0.0382</td>
</tr>
<tr>
<td>I</td>
<td>0.0569</td>
<td>0.0575</td>
<td>0.0549</td>
<td>0.0562</td>
<td>0.0619</td>
<td>0.0365</td>
<td>0.0395</td>
<td>0.0322</td>
<td>0.0372</td>
</tr>
<tr>
<td>Q</td>
<td>0.2785*</td>
<td>0.2765*</td>
<td>0.2679*</td>
<td>0.2735*</td>
<td>0.1676*</td>
<td>0.0436</td>
<td>0.0403</td>
<td>0.0371</td>
<td>0.0356</td>
</tr>
<tr>
<td>G</td>
<td>0.0093</td>
<td>0.0090</td>
<td>0.0119</td>
<td>0.0100</td>
<td>0.0776*</td>
<td>0.0735*</td>
<td>0.0722*</td>
<td>0.0758*</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>0.0006</td>
<td>0.0075</td>
<td>0.0014</td>
<td>0.0074</td>
<td>0.0289</td>
<td>0.0291</td>
<td>0.0300</td>
<td>0.0274</td>
<td>0.0299</td>
</tr>
<tr>
<td>P</td>
<td>0.1197*</td>
<td>0.1085*</td>
<td>0.1065*</td>
<td>0.1061*</td>
<td>0.0912*</td>
<td>0.0379</td>
<td>0.0442</td>
<td>0.0377</td>
<td>0.0400</td>
</tr>
<tr>
<td>F</td>
<td>0.0568</td>
<td>0.0515</td>
<td>0.0443</td>
<td>0.0493</td>
<td>-0.0021</td>
<td>-0.0274</td>
<td>-0.0226</td>
<td>-0.0272</td>
<td>-0.0246</td>
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<tr>
<td>E</td>
<td>0.0417</td>
<td>0.0515</td>
<td>0.0472</td>
<td>0.0514</td>
<td>0.1190*</td>
<td>1.004*</td>
<td>0.0880*</td>
<td>0.0983*</td>
<td>0.0868*</td>
</tr>
<tr>
<td>J</td>
<td>0.0735*</td>
<td>0.0765*</td>
<td>0.0740*</td>
<td>0.0763*</td>
<td>0.0720*</td>
<td>0.0393</td>
<td>0.0316</td>
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</tr>
<tr>
<td>K</td>
<td>0.0082</td>
<td>0.0072</td>
<td>0.0060</td>
<td>0.0065</td>
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<td>-0.0190</td>
<td>-0.0227</td>
<td>-0.176</td>
<td>-0.256</td>
</tr>
<tr>
<td>D</td>
<td>0.0552</td>
<td>0.0479</td>
<td>0.0524</td>
<td>0.0480</td>
<td>-0.0032</td>
<td>-0.0278</td>
<td>-0.0271</td>
<td>-0.0260</td>
<td>-0.259</td>
</tr>
<tr>
<td>B</td>
<td>0.1274*</td>
<td>0.1183*</td>
<td>0.1203*</td>
<td>0.1183*</td>
<td>0.0682*</td>
<td>0.0115</td>
<td>0.0152</td>
<td>0.0076</td>
<td>0.0162</td>
</tr>
<tr>
<td>S</td>
<td>0.0358</td>
<td>0.0446</td>
<td>0.0400</td>
<td>0.0452</td>
<td>0.0188</td>
<td>0.0028</td>
<td>-0.0002</td>
<td>0.0029</td>
<td>0.0010</td>
</tr>
<tr>
<td>C</td>
<td>-0.0171</td>
<td>-0.0119</td>
<td>-0.133</td>
<td>-0.1017</td>
<td>0.0003</td>
<td>0.0079 0.0065</td>
<td>0.0082</td>
<td>0.0092</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>0.4452*</td>
<td>0.4480*</td>
<td>0.4462*</td>
<td>0.4464*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LA</td>
<td>0.0694*</td>
<td>-0.0054</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td>-0.0979*</td>
<td>-0.0651</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS</td>
<td>0.0701*</td>
<td>0.0502</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R =</td>
<td>0.5198</td>
<td>0.5412</td>
<td>0.5336</td>
<td>0.5422</td>
<td>0.4076</td>
<td>0.5575</td>
<td>0.5740</td>
<td>0.5590</td>
<td>0.5771</td>
</tr>
<tr>
<td>R² =</td>
<td>0.2702</td>
<td>0.2929</td>
<td>0.2848</td>
<td>0.2940</td>
<td>0.1661</td>
<td>0.3108</td>
<td>0.3295</td>
<td>0.3124</td>
<td>0.3330</td>
</tr>
</tbody>
</table>

Variable abbreviations are as follows: V - father's education, M - mother's education, X - father's occupational status, I - parental income, Q - academic ability, G - high school rank, T - teachers' encouragement, P - parents' encouragement, F - friends' college plans, E - college plans, J - occupational status aspirations, K - possible parental support, D - consideration of college, B - willingness to borrow, S - scholarship applications, C - high school curriculum, A - perceived value of college, U - educational attainment, LA - liberal arts curriculum, PC - public control, MS - number of Merit Scholars enrolled.

NOTE: models 2, 4, 7 and 9 include the college category dummies, but their coefficients are not presented in the table. * p < .05
Table 3.—Mean education and occupational status by type of college attended: eligible subsample with bivariate subsample data present.

<table>
<thead>
<tr>
<th>College category</th>
<th>Education unadjusted</th>
<th>Education adjusted*</th>
<th>Occupation unadjusted</th>
<th>Occupation adjusted(1)*</th>
<th>Occupation adjusted(2)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Wisconsin, Madison</td>
<td>15.48 .40</td>
<td>14.99 -.09</td>
<td>63.3 6.7</td>
<td>58.4 1.8</td>
<td>58.2 1.6</td>
</tr>
<tr>
<td>University of Wisconsin, Milwaukee</td>
<td>14.51 -.57</td>
<td>14.54 -.54</td>
<td>52.5 -4.0</td>
<td>53.8 -2.7</td>
<td>57.5 .9</td>
</tr>
<tr>
<td>University of Wisconsin, Center System</td>
<td>14.35 -.73</td>
<td>14.52 -.55</td>
<td>43.5 -13.0</td>
<td>46.9 -9.6</td>
<td>52.7 -3.8</td>
</tr>
<tr>
<td>Wisconsin State Universities</td>
<td>14.85 -.23</td>
<td>15.00 -.08</td>
<td>54.3 -2.3</td>
<td>57.1 .6</td>
<td>56.8 .3</td>
</tr>
<tr>
<td>Wisconsin County Teachers Colleges</td>
<td>14.38 -.70</td>
<td>15.29 .22</td>
<td>50.3 -6.2</td>
<td>61.7 5.1</td>
<td>61.6 5.1</td>
</tr>
<tr>
<td>Marquette University</td>
<td>15.61 .54</td>
<td>15.10 .02</td>
<td>65.0 8.4</td>
<td>60.8 4.3</td>
<td>59.5 2.9</td>
</tr>
<tr>
<td>Prestigious Colleges and Universities</td>
<td>16.49 1.41</td>
<td>15.48 .40</td>
<td>56.2 - .4</td>
<td>45.3 -11.3</td>
<td>41.7 -14.9</td>
</tr>
<tr>
<td>Liberal Arts Colleges, General</td>
<td>15.35 .27</td>
<td>15.19 .11</td>
<td>56.0 -.5</td>
<td>55.7 -.8</td>
<td>54.1 -2.4</td>
</tr>
<tr>
<td>Liberal Arts Colleges, Catholic</td>
<td>15.36 .28</td>
<td>15.47 .39</td>
<td>52.9 -3.6</td>
<td>55.9 -.6</td>
<td>53.8 -2.7</td>
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<tr>
<td>Universities</td>
<td>14.93 -.15</td>
<td>14.93 -.14</td>
<td>58.1 -2.1</td>
<td>58.1 1.6</td>
<td>58.4 1.9</td>
</tr>
<tr>
<td>Technological Colleges and Institutes</td>
<td>15.50 .42</td>
<td>15.19 .12</td>
<td>65.5 6.9</td>
<td>63.4 6.8</td>
<td>61.3 4.8</td>
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<tr>
<td>Other Colleges</td>
<td>14.81 -.26</td>
<td>15.41 .33</td>
<td>46.3 -10.2</td>
<td>52.7 -3.9</td>
<td>51.8 -4.7</td>
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<td>Grand mean</td>
<td>15.078</td>
<td>15.41 .33</td>
<td>56.535</td>
<td></td>
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<tr>
<td>Standard deviation</td>
<td>1.629</td>
<td>22.678</td>
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</tr>
</tbody>
</table>

*adjusted for differences on all input variables.

**adjusted for differences on the input variables and educational attainment.