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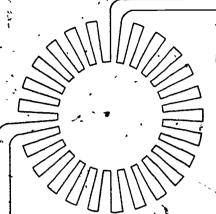                Washington, D.C.
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ABSTRACT
           Conceptualizing progress through college as a
sequential process, the study examined factors that affect rates of
persistence and dropping out, using longitudinal data for a national
sample of young men attending college in the late 1960's. A principal
conclusion was that factors important to understanding persistence
vary with the stage of the undergraduate career. Pre-college
attributes of parental socioeconomic status, race and age exhibit no
significant net relationship with dropping out at any stage. The
effect of having pursued a college preparatory program in high school
is relevant only to completion of the freshman year. The net
importance of pre-college measured ability declines substantially
after the freshman year and is nonsignificant by the junior year.
While working evidently inhibits persistence in college, not all
employed students become dropouts and the impediment appears to be
greatest for those who work between half and full time. It is found
that young men who initially matriculate in a two-year institution
are much more likely to drop out at every stage of undergraduate
life, even after having transferred to four-year institutions.
Receipt of a scholarship bears a consistently positive relationship
to the probability of successful persistence in college. It is
concluded that much previous theoretical and empirical research on
dropping out must be viewed with caution. (Author/LBH)

# Center for Human Resource Research

College of
Administrative Science

The Ohio State University

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A NEW APPROACH TO PERSISTENCE IN
UNDERGRADUATE PROGRAMS

Andrew I. Kohen
Gilbert Nestel
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Success and Failure in College:
A New Approach to Persistence in
Undergraduate Programs

Notwithstanding a vast literature on the achievement of success in higher education, there are major gaps in knowledge about the determinants of persistence to completion (or dropping out) of undergraduate programs. Recent reviews by Karmas (1974) and Tinto (1975) point to a variety of shortcomings in past studies; the former focusing on empirical problems and the latter concentrating on theoretical ones. A principal problem with most theoretical and empirical research in this area is the failure to treat success in college as a sequential process. Most studies focus on the rate of graduation of a particular cohort of persons by some specified date (e.g., the proportion of a freshman class who were graduates four years later). Alternatively, some studies concentrate on attrition during or at the end of the freshman year (Nelson, 1966), presumably because overcoming this first-year hurdle is the most critical achievement in the process of attaining the status of graduate. However, as some researchers have recognized, it is uncertain whether the factors that determine successful completion of the freshman year are the same as those that lead to success in subsequent undergraduate years. While framed in terms of individual and institutional commitments (and changes therein), Tinto's theoretical model (1975) is one of the few instances in the literature in which dropping out of college is viewed as a longitudinal process.

Another major conceptual and empirical problem has been the failure to distinguish between "permanent" and "temporary" withdrawals. At the conceptual level, the researcher must deal with the ambiguity of what constitutes permanent withdrawal--especially in view of the recent trends toward lifelong learning and recurrent education. Virtually any time span of nonattendance after which a dropout is defined as permanent is open to challenge. At the empirical level, difficulty in distinguishing temporary from permanent dropouts is compounded by data limitations. That is, study populations often are restricted to a single school or a small group of schools (thereby counting transfer students as dropouts), and long-run longitudinal data are infrequently available.

Another issue is definitional--i.e., "dropout" means different things to different people. For example, few researchers have distinguished between dropouts and "pushouts"--i.e., between voluntary and involuntary withdrawals. Clearly, the distinction is not unambiguous, even theoretically, when one considers that a student doing acceptable academic work may be "forced" to discontinue his/her schooling by a lack of funds to cover the out-of-pocket expenses of college attendance. In addition, research that employs self-reported reasons for discontinuation may well be faulted for excessive reliance on data whose reliability is at least open to question.

Finally, most of the empirical research on withdrawal from college does not employ multivariate statistical analysis. Clearly this

deficiency precludes our having confidence about the independent effects of the various factors which are correlated both with dropping out of college and with each other.

Although this study does not propose to address all of the preceding problems, it does deal with some of them.[1] First, the question of success is framed in terms of the probability of completing a given college year (e.g., the sophomore year) in a 12- or 24-month period. Thus we are not concerned directly with the permanency of withdrawal, although the analysis always focuses on a group containing young men who were first-time enrollees in the year in question (at the beginning of the time period). Further, by extending the analysis to examine a 24-month period and by using national sample data we minimize the impact of overstating dropout rates because of short-term temporary withdrawals and/or because of transfers.

Second, the study employs multiple regression analysis so as to permit the identification of the independent effects of several correlated variables. Third, the analysis directly incorporates the sequential nature of success in college by investigating withdrawal rates in the freshman, sophomore, junior and senior years, seriatim. This approach also permits tests of the stability of the model in the sense that the absolute and relative importances of several factors can be assessed at different stages of the undergraduate career. Finally, in order to relate the study to prior research, the inferences from our several

models are compared to a more conventional analysis of dropouts--i.e.,
the factors determining whether a freshman graduates within four years
of initial entry.

## The Data

. The data used in this study are drawn from the files of the
National Longitudinal Surveys of Labor Force Experience (NLS) of a
cohort of males who were 14 to 24 years of age when the surveys began
in 1966 (see Parnes, Miljus, Spitz and Associates, 1970). Members of
the panel were interviewed annually (in late autumn) through 1971,
although only the data through 1970 were available for this analysis.
We also employ information gathered in a mailed survey of the secondary
schools from which the young men graduated. Of the 5,225 members of
the sample, about 1,300 are used in our analysis. The rest of the
sample was excluded for one, or more of the following reasons: (1) did
not attend college as an undergraduate between 1966 and 1969; (2) were
not between the ages of 16 and 24 upon first entering the year of
college being analyzed;[2] (3) did not participate in the survey beyond
the initial year; (4) did not provide complete information on all
variables used in the analysis.

Several features of the data base merit brief discussion at this
point. First, because the information derives from a national sample,
the potential for generalization from the results is greater than in
most previous research. Second, net attrition from the sample has been

extraordinarily low (less than 25 percent as of the fifth wave of
interviews) and most of the loss was accounted for by entrance to the
Armed Forces (Andrisani and Kohen, 1975). Third, blacks were deliberately
oversampled in order to permit more confident analysis of their behavior
and of intercolor differences than has heretofore been possible in
national sample studies of labor market and educational experiences.
Fourth, because the NLS was designed for purposes much broader than the
analysis of college experiences, some information often available to
researchers of higher education was not collected--e.g., study habits,
peer group relations, relations with faculty. On the other hand the
detailed data on labor market experiences during college attendance are
superior to those available to nearly all investigators of college
student behavior.

### Conceptual Framework and Model

The process of dropping out of, or persisting in, college is
viewed here as a series of interactions over time between the
characteristics of the individual and his home, scholastic, and work
environments. Individuals enter institutions of higher education with
a variety of personal attributes, family backgrounds, and academic
experiences which influence their performance in college. These
characteristics affect both the ability to persist in an undergraduate
program to its completion and the expectations and commitments to
persist. In addition, the decision to complete a college program is

effected by the academic (and social) environment of the particular

institution as well as by factors external to both the individual and

the school environment--e.g., the state of the labor market. Furthermore,

from a few notable exceptions to the mainstream of research on college

dropouts, it is apparent that the many determinants of dropping out

should and do have differential impacts at different stages of the

undergraduate "career" (Bayer, 1968; Eckland, 1964a). Thus, for

example, aspects of the precollege educational experience would be

expected to have less influence on the persistence decision of a junior

than of a freshman.

In order to address various questions about the determinants of

persisting in college, we employ a series of dichotomous measures of

persistence, $L_{ij}$ ($i=1,..,4$; $j=1, 2$), which specify the likelihood of

completing the ith year of college in $j$ calendar years. Thus, for

example, $L_{11}$ represents the probability that an entering freshman will

be enrolled as a sophomore one year later, and $L_{32}$ represents the

probability that a student will have entered the senior year within 24

months after first beginning the junior year.[3] By analyzing these

eight criterion measures we are able to examine whether the determinants

of persistence in college (a) are invariant with respect to the amount

of time allowed for completion and (b) have the same effects at all

stages of the undergraduate career. Finally, for the sake of comparability

to prior research, we also analyze the likelihood of being a college

graduate within four calendar years after initially enrolling as a freshman.

To facilitate the presentation of our model of college persistence we describe below the operational form of each variable included in the model and the hypothesis underlying its inclusion in the analysis. Means and standard deviations of the variables are displayed in Appendix Table I.

.Family Background (SES)-- Nearly all theoretical and empirical analyses of college persistence and performance indicate that socioeconomic status of family of orientation is inversely related to the likelihood of dropping out. Clearly, the umbrella concept of family socioeconomic status covers a host of specific characteristics related to academic achievement, including the following: level of affluence (i.e., ability to pay), level of parental expectations for children's scholastic success, the extent to which education is valued as instrumental to post-school success, role models of academic achievers, and innate talent for intellectual performance.

Partly because of the underdeveloped state of theory on how particular aspects of background relate to school success and partly because of the nature of available data, we employ an ordinal index of background. The index is based on five characteristics of the family of orientation: father's education, mother's education, education of oldest older sibling (if any exist), father's occupation when the

respondent was an adolescent, and the availability of reading material in the home when the respondent was an adolescent.[4] In form and substance the measure is similar to those used in other major studies of educational outcomes such as Project TALENT (Flanagan et al., 1964) and the Youth in Transition Project (Bachman, 1970). Since the index is scaled so that high values represent high socioeconomic status, it is hypothesized that it will exhibit a positive net relationship to the several variables measuring the likelihood of persistence in college.

Ability (IQ)--Because of the obvious theoretical association between mental ability and educational achievement, we employ a standardized score derived from reported results on aptitude, achievement and intelligence tests. These results were based on precollege tests and were reported by the last secondary school attended by the respondent.[5] While there is some evidence that high school grade performance might be a better measure of individual competence (Tinto, 1975, p. 101), the relevant data are not available for our sample. Clearly, ability is expected to exhibit a net positive relationship with persistence. In addition, it is hypothesized that the impact of ability on persistence will diminish beyond completion of the freshman year, when the capacity to perform college level work satisfactorily has been demonstrated. This is not to suggest that ability distinctions become irrelevant in matters of grades, awards, etc., merely that they become less relevant to withdrawal prior to graduation.

High School Curriculum (CURRIC)-- Beyond the personal and familial characteristics that prepare a student to succeed in college we posit that (at least) one aspect of the secondary school experience will be related to persistence, namely high school curriculum (see Jaffe and Adams, 1970). Specifically, it is hypothesized that those who completed the college preparatory curriculum will be less likely than all others to leave college early.[6] Hence we expect a positive sign for the coefficient of a dummy variable which is coded "1" for those from the college preparatory curriculum and "0" for all others. Additionally, it seems reasonable to expect that the effect of this precollege experience will decline, perhaps to insignificance, as the analytical attention moves from the freshman year to later years.

Scholarship Receipt (SCLSHP)-- There are at least three reasons to expect that recipients of scholarships (fellowships) will be less likely than nonrecipients to leave college prematurely. First, holding such an award generally implies an external evaluation that a student has superior capacity for academic accomplishment. Second, it it probably indicative of an above-average commitment to the pursuit of a college degree. Third, it implies a somewhat lower financial burden of persisting in college, ceteris paribus. We operationalize this characteristic in the form of a dummy variable (1 if scholarship recipient that year, 0 otherwise) and expect its coefficient to be positive.

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Age (AGE)-- Because chronological age is frequently used in research on educational outcomes, we include it in our analysis. However, there are competing hypotheses about its effect on dropping out of college. On the one hand, it may be argued that older students are more mature, less adventuresome, and more committed to their educational and occupational goals. On the other hand, the older student obviously has experienced some hiatus in schooling which may have resulted in a deterioration of learning skills. It also should be noted that in prior research age often has served as a proxy for other characteristics that we measure directly (e.g., marital status, employment status, part-time enrollment). Hence, we are unable to specify a priori an expectation for the sign or significance of the age variable.

Race (RACE)-- In response to a principal conclusion of a recent review of research in this area (Tinto, 1975, p. 117), a variable representing the respondent's race (1 if white, 0 if Negro) is included in our model. Nevertheless, it is by no means clear why race per se should exert an effect that is independent of measured ability, social status, type of college and other variables which happen to be correlated both with race and with persistence in college. The sole characteristic not measured in our model for which race may be a proxy is the extent of social integration of the respondent in his collegiate environment.[7] That is, it may be argued that historical discriminatory practices in college admission and the minority status of blacks in the society at

large produce social milieux on college campuses which are not conducive
to full participation by blacks (see also Astin, 1975). As a recent
review summarizes this effect, "Other things being equal, social
integration should increase the likelihood that the person will remain
in college" (Tinto, 1975, p. 107).

Marital Status (MSP)-- Another demographic characteristic which
may influence persistence in college is a student's marital status
(Eckland, 1964c, pp. 82-90); however, once again there are competing
hypotheses about the direction of the effect.  On the one hand, married
students may be more stable, serious and committed to their goals than
unmarried students.  Also, working wives may reduce financial pressure
to drop out.  On the other hand, the familial and financial responsi-
bilities of a married student may constrain his study time and/or his
flexibility in adjusting to the externally imposed schedules of college
attendance.  Without specifying the expected sign of the coefficient,
we include in our model a dummy variable measuring marital status (1
if married, wife present; 0 otherwise).

Enrollment Status (ENRPT)-- It is nearly tautological to hypothesize
that a student who is enrolled on a part-time basis will be less likely
than one enrolled full time to complete a year of academic work in one
calendar year.  However, a dummy variable representing enrollment status
(1 if part time, 0 if full time) is included in the model for several
reasons.  First, we wish to identify the unique effect of working while

attending school, independent of part-time attendance. Second, the
prevalence of quarter and trimester systems along with summer programs
in schools operating on a semester system make it possible for a student
to fulfill the credit-hour requirements for "promotion" even with
part-time attendance during a 12-month period. Third, particularly
for entering freshmen, widespread acceptance of credit by examination
(e.g., CLEP) permits accumulation of credits without full-time attendance.
Finally, our measure of enrollment status refers only to the Fall term
of the academic calendar and may not characterize the student's status
during other terms. Considering these factors and the conventional
wisdom that, other things equal, part-time students are less committed
to higher education, we expect a negative coefficient for the variable
representing enrollment status.

Employment Status (EMP35+, EMP21-34, EMP1-20)-- There are several
reasons that a college student's employment status is theoretically
relevant to the likelihood of his persistence in higher education. To
begin with, working students clearly are less able to be full-time
participants in collegiate life.[8] Since our model already controls
for part-time attendance, this influence of working presumably captures
the diminished time available for studying and/or participation in
nonacademic college activities. Second, the fact that a student works
while attending college suggests a lack of alternative sources of
financial support, which in turn implies an added psychological burden

of school attendance (see also Astin, 1975, pp. 75-77). As a possible partial offset to these effects, it may be that working signifies an above-average commitment to educational goals.

In order to allow for possible nonlinear effects of employment while attending school, we operationalize it in the form of three dummy variables. The first distinguishes those who worked full time (at least 35 hours/week) from all others. The second distinguishes those who worked more than half time but less than full time (21-34 hours/week) from all others. The third distinguishes those who worked as much as half time (1-20 hours/week) from all others. Thus, the coefficient of each variable is expected to be negative because each represents the difference in the probability of success between students who do not work while attending school and those who do work.

Type of College Attended (2YRCOL)-- For a variety of reasons it is expected that young men who begin their post-secondary schooling in two-year institutions will be more likely, on average, to drop out than those who attend four-year institutions. Although the theoretical mechanism is not completely clear, other studies have demonstrated that junior colleges perform a "cooling-out" (Clark, 1960) function of keeping students from going on to senior college, and thereby serve to perpetuate the inequality of opportunity extant in the educational system (Tinto, 1975). In addition, two-year institutions may be reasonably categorized as lower "quality" schools and, despite the

complexities of "frog-pond" effects, institutional quality has been shown to be inversely related to dropout rates (Kamens, 1971; Tinto, 1975). Finally, we hypothesize that even those students who begin in two-year colleges and survive to transfer to four-year institutions will be more likely than those who began in four-year schools to drop out subsequently because of (1) the inferior preparation provided in the junior colleges, and (2) the impediment to progress of incomplete transferability of credits. Hence, the dichotomous variable coded 1 if the student first matriculated at a two-year school is expected to have a negative coefficient in models designed to explain successful persistence in higher education.

## Some Methodological Issues[9]

In order to make full use of the longitudinal data to obtain more precise estimates of the parameters we have employed some nontraditional methodology. First, in analyzing the likelihood of success in one calendar year, we pool data for the periods 1966-67, 1967-68, and 1968-69. That is, to study $L_{11}$ we examine the status (one year later) of young men who were entering college freshmen in 1966 or 1967 or 1968.[10] Similarly, in analyzing the probability of success in two years we pool data for the periods 1966-68, 1967-69, and 1968-70. Second, the definitions of the several criterion measures, $L_{ij}$, are not perfectly symmetric. While success in the freshman year is defined in terms of enrollment in the sophomore year, success in

subsequent years is defined in terms of enrollment in the next higher

level or withdrawal from school with a certificate or diploma signifying

completion of a program of study. This procedure results in junior

college students who acquire an Associate degree after two years of

study being classified as successes, rather than as dropouts for having

failed to enroll as juniors. Likewise seniors who graduate but do not

enter graduate or professional school are not classified as dropouts.[11]

## Empirical Results

It is helpful in structuring the discussion to group the explanatory

variables into two sets. The first group includes characteristics which

are already embodied in the student at the time of entry into college

and thereby beyond his control or that of higher education policy makers.

In this group we include the respondent's socioeconomic status, measured

mental ability, high school curriculum, age and race. Use of these

control variables is required both because of their hypothesized direct

influence on the criterion variables and because of their known

interrelationship with the other hypothesized determinants of successful

persistence in college. These latter measures, or the policy variables,

represent characteristics which lie within the purview of both the

educational policy maker and the student and are susceptible to change.

### Determinants of Successful Completion of the Freshman Year

Approximately seven in ten students (71.1 percent) who entered

the freshman year of college for the first time were enrolled as

sophomores one calendar year later; extending the exposure period from
one to two years raised the likelihood of success to better than three
in four (76.2 percent). Thus, about three in ten students failed to
progress to the sophomore year in a one-year period while in a two-year
period the proportion who failed to meet the success criterion declined
to less than one in four. The latter still represents a very considerable
proportion of students whose college education was discontinued (or
delayed), even if only temporarily.

Control Variables. The data provide no evidence of a net positive
relationship between SES and the successful completion of the freshman
year, regardless of the time allowed for completion (Table 1). This
finding is not entirely surprising. Earlier studies that reported a
significant relationship between SES and college achievement often
failed to control for other factors with which both are positively
correlated and as a consequence the net effect of SES was overstated.
For example, students from families with higher-than-average SES are
more likely to obtain above-average scores on IQ tests, to complete a
college preparatory program in high school, to enroll in a four-year
colleges, and to attend school on a full-time basis.[12] In addition,
students from high SES backgrounds are less likely, on average, to
have to work while going to college. Thus, while family socioeconomic
status may be related to premature withdrawal from college, its effect

## Table 1

Regression Results--Determinants of the Probability of Successfully Completing the Freshman Year in College, by Number of Years Allowed for Completion

| Explanatory variable[a] | One year[b] $(L_{11})$ | Two years[b] $(L_{12})$ |
|---|---|---|
| SES | - 0.1 | 0.4 |
|  | (-0.12) | ( 0.40) |
| IQ | 0.4** | 0.4** |
|  | (2.78) | ( 2.58) |
| CURRIC | 6.0* | 6.0* |
|  | ( 1.39) | ( 1.46) |
| AGE | 0.2 | 2.3 |
|  | ( 0.09) | ( 1.16) |
| SCLSHP | 7.7* | 4.4 |
|  | ( 1.53) | ( 0.92) |
| RACE | - 0.2 | 4.9 |
|  | (-0.03) | ( 0.59) |
| MSP | 5.0 | - 9.5 |
|  | ( 0.41) | (-0.79) |
| ENRPT | -50.2** | -36.1** |
|  | (-5.53) | (-4.15) |
| EMP35+ | -12.1* | - 5.1 |
|  | (-1.36) | (-0.60) |
| EMP21-34 | -20.5** | -16.6** |
|  | (-2.95) | (-2.46) |
| EMP1-20 | - 6.3* | - 4.3 |
|  | (-1.46) | (-1.02) |
| 2YRCOL | - 6.7* | -12.0** |
|  | (-1.57) | (-2.92) |
| CONSTANT | 26.8 | -11.2 |
|  | ( 0.67) | (-0.28) |
| $\bar{R}^2$ | .185 | .145 |
| F-ratio | 11.30 | 8.69 |
| Number of sample cases | 547 | 545 |

Table continued on next page.

Table 1

Continued

Note. Males 16 to 24 years of age at the time of initial matriculation
in college who were first enrolled as freshmen in 1966, 1967 or
1968.

a See text for description of variables.

b Numbers in parentheses are t-ratios.

\* Significant at $.05 < \alpha \leq .10$.

\*\* Significant at $\alpha \leq .05$.

is completely indirect, being transmitted through measured ability,
pre-college educational experiences, and the decision on what type of
school to attend.

In contrast to the findings regarding the SES variable, the results
demonstrate that the likelihood of successfully completing the freshman
year is positively related to measured mental ability. The data also
suggest that the effect of the IQ variable is the same in the one-year
period as in the two-year period. Our hypothesis that students who
complete a college preparatory curriculum in high school are more likely
than students from other programs to complete their freshman year in
either one or two years is also borne out by the data. Focusing on
either time period, the probability of completing the freshman year is
about 6 percentage points higher (in a net sense) for young men who
completed a college preparatory program than for those who studied in
the other high school curricula.

There is evidence in our results that students who are recipients
of a scholarship or a fellowship on entry to college are, on average, 8
percentage points more likely than nonrecipients to complete their
freshman year in one year. However, this difference is much smaller
and not statistically significant when two years are allowed for completion.
What is of particular interest here is that the former finding prevailed
even after controlling for variation in mental ability and high school
curriculum. As noted earlier, the net influence of this variable

doubtless reflects a high commitment to educational pursuits and a dimension of mental ability not captured either by the IQ measure or by other variables in the model. On the other hand, it is hard to maintain the belief that it represents "stick-to-itiveness" since the variable is not significant in the two-year interval, when this attribute would be expected to have a stronger effect.

There is no evidence that the age of a student at the time of his entry to college has a net relationship to the likelihood of his successful persistence through the freshman year in college. This finding is largely consistent with the published results of other researchers. It must be noted, however, that our results cannot distinguish between there being no effect of age and countervailing effects which offset each other. Our findings concerning the effect of marital status on the probability of completing the freshman year are similar to those regarding the effect of age, and the same caveat applies.

Regarding the final "control" variable, our results contrast sharply with the conclusion by a recent reviewer that "It is clear that race is an independent predictor of dropout (independent of both ability and social status). . ." (Tinto, 1975, p. 119). Neither a dichotomous variable entering the equation directly nor a test of interactions between race and the other variables in the model demonstrates a significant relationship between race and the likelihood of success in

the freshman year.[13] Moreover, as noted in our discussion above, it is
not at all apparent why a net relationship should be expected theoretically.
Thus, the five percentage point gross advantage of whites in the
likelihood of completing their freshman year is entirely attributable
to racial differences in other characteristics that influence persistence.

As hypothesized, students who initially enrolled on a part-time
basis were less likely than their full-time counterparts to progress
from freshman to sophomore status in either one or two years. The net
differential in the one-year period between the two enrollment categories
was 50 percentage points; in the two-year period the net differential
was 36 percentage points. Even in the absence of a rigorous statistical
test, it seems safe to conclude that the restraining effect of part-time
enrollment on success is greater in the shorter exposure period.
Nevertheless, the substantial coefficient of ENRPT in the two-year
equation provides strong support for the hypothesis that full-time
commitment to higher education is an important determinant of persistence.

Policy Variables. Students who work while attending their
freshman year are less likely, other things equal, than those who do not
work to be enrolled as sophomores the succeeding year. This finding is
consistent with the hypothesis of an inverse relationship between work
experience and success in school. However, the net likelihood of
success is not monotonically related to the intensity of the work
experience. Students working 20 or fewer hours during the survey week

were, on average, 6 percentage points less likely than those with no work experience to complete their freshman year; those who worked 21-34 hours averaged about 20 percentage points less, while those who worked full-time were, on average, about 12 percentage points less likely than those who did not work to complete the freshman year in one year.

The findings for the two-year period are less conclusive. Students who during their initial year of attendance were working full-time and those working half-time or less were no different, on average, from those who did not work. However, the results do suggest that those who worked between 21 and 34 hours per week were about 17 percentage points less likely to succeed, other things being equal, than those who did not work. These results were not entirely unexpected. While working limits the number of hours available for school work and extracurricular activities, it should be less of a constraining factor in a two-year interval than in a one-year period. Unfortunately, the data do not permit measurement of the allocation of out-of-classroom hours among school study, market work, and other activities. Two students, otherwise equally circumstanced, could devote the same number of hours to study even though one is employed part or full-time while the other is out of the labor force. Moreover, market and school work can be complementary rather than competing activities. What we can say in this context is that, on average, market work is an impediment to to success in a one-year period but its impact is reduced as the period of time allowed for completion is lengthened.[14]

Our data indicate that 32 percent of the male entering college
freshmen between 1966 and 1968 began their higher education in
institutions which offered only the two-year associate degree. There
is evidence that the likelihood of success is lower for these students
than for those who began in four-year institutions. The differential
in favor of the latter group is, on average, 7 percentage points in
the one-year period and 12 percentage points in the two-year period.
Hence there is support for the belief that junior colleges perform a
"cooling-out" function, intentionally or not. The strength of the
variable may be partly attributable to its positive correlation with
an unmeasured variable (i.e., whether the student lives with parents)
known to affect persistence (Astin, 1975).

In summary, several of the background and demographic characteristics--
i.e., SES, age, race, and marital status--are seen to be insignificant
factors in explaining successful completion of the freshman year in a
one- or two-year exposure period. Only the control variables measuring
the student's mental ability and his high school curriculum exerted
positive net effects on success in both periods. In addition, working
while going to school, part-time attendance, nonreceipt of a
scholarship/fellowship and attending a junior college significantly
lowered his probability of success (i.e., increased his likelihood of
withdrawing without enrolling as a sophomore).

## The Sophomore, Junior, and Senior Years

The likelihood of a student completing his sophomore year in one year is 69.7 percent while, for juniors and seniors it is 78.7 and 79.6 percent, respectively (Table A-1). The corresponding two-year completion rates are 76.8, 88.4, and 91.8 percent. Thus, as students advance from the freshman year status the likelihood of their completing a subsequent year of school generally increases. Moreover, the importance of an additional year of opportunity for these completion rates also increases.

The fact that lengthening the exposure period has an increasing effect as attention shifts from the freshmen to the senior year reflects at least two primary factors. First, as students age and progress in school, they become increasingly likely to be independent of parental families and personally responsible for their own financial obligations, while remaining committed to graduation. Thus, the proportion of students married increased from 5 percent of the freshmen to 15 percent of the seniors. Evidently, the desire for independence outweighs the negative effect of employment on persistence because the proportion of students working at least half time is actually higher among seniors (19 percent) than among freshmen (17 percent). While this difference is not dramatic, it should be recalled that employment is an impediment to persistence, i.e., a disproportionate number of the freshmen who worked never reached the sophomore, much less the junior or senior year.

The second factor contributing to the increased impact of
lengthening the exposure period is that changes in field of study are
more likely to occur in the later than in the earlier years. Such changes
are ordinarily accompanied by additional requirements for graduation.
Similarly, the impact of five-year baccalaureate programs (e.g., in
engineering) probably becomes apparent only in the junior and senior
years.

The regression results displayed in Table 2 indicate that the
set of explanatory variables in our model account for between 6 and 19
percent of the variation in the likelihoods of completing the various
years of college. With the exception of the senior year, the model
seems to be more powerful when two years are allowed for completion
than when only one year is allowed. Likewise, the goodness-of-fit of
the model generally declines as the focus shifts from the freshman to
later years, partially as a result of the reduced variation in some of
the explanatory variables (see standard deviations in Table A-1).

Consistent with our findings for the freshman year, several of
the demographic and background variables do not exhibit significant net
relationships with the likelihoods of persisting through the sophomore,
junior and/or senior years. This applies to SES, RACE and AGE.
Additionally, the strong positive effects of measured ability and
pre-college curriculum which were found among freshmen do not prevail

Table 2

Regression Results--Determinants of the Probabilities of Successfully
Completing the Sophomore, Junior and Senior Years of College, by Number
of Years Allowed for Completion

(Coefficients shown in percentage points)

| Explanatory variable[a] | Sophomore[b] | | Junior[b] | | Senior[b] | |
|---|---|---|---|---|---|---|
| | One year $(L_{21})$ | Two years $(L_{22})$ | One year $(L_{31})$ | Two years $(L_{32})$ | One year $(L_{41})$ | Two years $(L_{42})$ |
| SES | - 0.9 | - 0.9 | - 1.7 | 0.3 | 0.8 | 0.8 |
| | (-0.73) | (-0.74) | (-1.15) | ( 0.23) | ( 0.49) | ( 0.74) |
| IQ | 0.2* | 0.3* | 0.3 | - 0.1 | - 0.2 | 0.1 |
| | ( 1.34) | ( 1.62) | (-1.34) | (-0.84) | (-0.62) | ( 0.76) |
| CURRIC | - 6.6 | 0.9 | 10.7** | 5.3 | - 8.0 | 0.7 |
| | (-1.28) | ( 0.18) | ( 1.93) | ( 1.27) | (-1.29) | ( 0.16) |
| AGE | - 1.4 | - 2.2 | 1.7 | 1.9 | - 3.3 | - 2.2 |
| | (-0.68) | (-1.19) | ( 0.68) | ( 1.02) | (-1.28) | (-1.18) |
| SCLSHP | 5.9 | 1.5 | 11.7** | 6.8 | 13.8* | - 0.6 |
| | ( 1.00) | ( 0.28) | ( 1.69) | ( 1.24) | ( 1.95) | (-0.13) |
| RACE | - 4.5 | -10.2 | 25.7 | 4.0 | - 2.9 | - 1.4 |
| | (-0.42) | (-1.06) | ( 1.60) | ( 0.38) | (-0.19) | (-0.13) |
| MSP | 6.6 | 13.3 | 0.9 | 8.3 | 0.7 | - 0.2 |
| | ( 0.66) | ( 1.44) | ( 0.11) | ( 1.32) | ( 0.10) | (-0.04) |
| ENRPT | -53.8** | -60.0** | -36.4** | -46.4** | -32.7** | -36.5** |
| | (-4.69) | (-5.71) | (-2.12) | (-3.66) | (-1.79) | (-2.87) |
| EMP35+ | - 9.9 | - 5.7 | - 6.4 | -14.4* | - 7.0 | 9.9 |
| | (-1.10) | (-0.69) | (-0.53) | (-1.56) | (-0.43) | ( 0.88) |
| EMP21-34 | -18.0** | -19.3** | - 7.2 | - 6.5 | 0.1 | 0.5 |
| | (-2.30) | (-2.66) | (-0.95) | (-1.12) | ( 0.01) | ( 0.09) |
| EMP1-20 | - 7.4* | - 5.7* | 7.5 | 0.2 | - 3.6 | 3.5 |
| | (-1.59) | (-1.35) | ( 1.37) | ( 0.05) | (-0.62) | ( 0.88) |
| 2YRCOL | -20.1** | -14.0** | -15.2** | -11.4** | -19.8** | - 5.3 |
| | (-4.00) | (-3.03) | (-2.40) | (-2.39) | (-2.62) | (-0.99) |
| CONSTANT | 101.2 | 117.2 | 67.3 | 59.3 | 169.4 | 113.6 |
| | ( 2.19) | ( 2.75) | ( 1.12) | ( 1.32) | ( 2.56) | ( 2.48) |
| $\bar{R}^2$ | .172 | .186 | .069 | .125 | .092 | .056 |
| F-ratio | 8.56 | 9.31 | 2.91 | 4.70 | 3.05 | 2.21 |
| Number of sample cases[c] | 438 | 437 | 311 | 312 | 244 | 246 |

Table continued on next page.

Table 2

Continued

Note.   Males 16 to 24 years of age at the time of entrance to the

college year being analyzed.

a   See text for description of variables.

b   Numbers in parentheses are t-ratios.

c   The difference in sample sizes for the one- and two-year equations

derive from the occasional unavailability of data for one or another

time period and is mainly attributable to a respondent having missed

one of the two relevant follow-up interviews.

*   Significant at $.05 < \alpha \leq .10$.

** · Significant at $\alpha \leq .05$.

in later years, i.e., IQ is significant only for sophomores and CURRIC anomalously only for juniors in the one-year period. These results are wholly consistent with our hypotheses that pre-college characteristics and experience will have diminishing effects on college success the farther along a student is in his pursuit of a degree.

As was true of freshmen, our results provide evidence that upperclassmen who receive a scholarship are more likely than nonrecipients to complete the year in question. Indeed, among juniors and seniors the effect of holding a scholarship is larger than among freshmen. Furthermore, the variable SCLSHP does not attain statistical significance when two years are allowed for completion. Inexplicably, the variable fails to achieve significance for sophomores, irrespective of the exposure period.

Only among sophomores do we continue to observe the negative impact of working on persistence in college. Similar to the results for freshmen, those sophomores most likely to drop out prior to entering the junior year worked more than half time and less than full time. Apparently, young men who work while attending their junior and senior years in college are a sufficiently heterogeneous group that those for whom employment is an impediment to scholastic progress are largely counterbalanced by those whose commitment to graduate is extraordinarily high. Consistent with this line of reasoning is the finding that part-time enrollment has a diminishing, albeit significant, negative

impact on persistence as attention shifts from sophomores to juniors to seniors. Unexpectedly, however, the data do not reveal any decline in the effect of part-time attendance as the exposure period is lengthened from one to two years.

Finally, the regression analyses offer support for the hypothesized inverse association between successful persistence in college and initial matriculation in a two-year institution. In fact, the estimated impact of starting in a junior college is stronger for sophomores, juniors and seniors than for freshmen. This suggests that the poor quality of scholastic preparation provided to students who ultimately transfer to four-year institutions and the incomplete transferability of credits may be at least as deleterious as the "cooling-out" or screening performed by two-year institutions.

In summary, it is apparent from these regression analyses that similar, but not identical, factors are important to understanding the likelihood that a young man will persist through his sophomore, junior and senior years. As hypothesized, pre-college traits and experience tend to wane in significance the further a student progresses. Indeed, socioeconomic status of parental family as well as race are irrelevant throughout. Further, while working and scholastic progress appear to be incompatible among sophomores, this does not seem to be true, on average, for juniors and seniors. Finally, although part-time attendance

uniformly impedes persistence, its effect is lower in the later than in the earlier undergraduate years.

## The Likelihood of Graduating within Four Years

For the sake of comparability with much of the existing research on college dropouts, we also estimated the parameters of a model to explain the probability that an entering freshman (in 1966) had graduated 48 months later.[15] For the purpose of this analysis a graduate is defined as one who held an Associate or higher level degree, irrespective of whether he was still enrolled in school at the end of the period. Hence, the definition is perfectly consistent with our earlier definitions of successful persistence through the sophomore, junior and senior years.

Inspection of the results displayed in Table 3 and comparison of them with the data in Tables 1 and 2 unambiguously demonstrate that different factors are important to persistence (withdrawal) at various stages of the undergraduate career. Additionally, even those factors that are statistically significant throughout have differential impacts at different stages. Moreover, relying on the conventional approach of analyzing graduation rates (as in Table 3) would lead researchers and policy makers to erroneous inferences. For example, examination of the estimated parameters of the graduation equation indicates that holding a full-time job while enrolled as a freshman is not a significant

## Table 3

### Regression Results--Determinants of the Probability of Graduating[a] within Four Years of Initial Matriculation in College

(Coefficients shown in percentage points)

| Explanatory variable | Coefficient | t-ratio |
|---|---|---|
| SES | - 2.0 | -1.04 |
| IQ | 0.4* | 1.38 |
| CURRIC | 0.5 | 0.08 |
| AGE | - 3.7 | -1.39 |
| SCLSHP | 14.4** | 1.65 |
| RACE | - 5.3 | 0.33 |
| MSP | 20.5 | 1.26 |
| ENRPT | -36.6** | -2.36 |
| EMP35+ | 16.4 | 1.23 |
| EMP21-34 | -20.4* | -1.54 |
| EMP1-20 | -13.2** | -1.71 |
| 2YRCOL | -12.0* | -1.60 |
| CONSTANT | 79.9 | 1.43 |
| $\overline{R}^2$ | .078 | |
| F-ratio | 2.52 | |
| Number of sample cases | 217 | |
| Mean of dependent variable | 29.8 | |

Note. Males 16 to 24 years of age in 1966 and first enrolled as college freshmen in the Autumn of 1966.

a The dependent variable is coded "1" if the respondent held an Associate or higher level degree as of the Autumn of 1970 and "0" otherwise.

b See text for description of variables.

* Significant at $.05 < \alpha \leq .10$.

** Significant at $\alpha \leq .05$.

impediment to progress in college. However, it is obvious from the results discussed above that this is misleading and that working actually does impede persistence. As another example, the graduation rate results suggest that high school curriculum is irrelevant, whereas that is clearly fallacious because completion of the freshman year is significantly dependent upon the nature of the secondary school preparation.

## Summary

Conceptualizing progress through college as a sequential process, we examined factors that affect rates of persistence and dropping out, using longitudinal data for a national sample of young men attending college in the late 1960's. A principal conclusion was that factors important to understanding persistence vary with the stage of the undergraduate career. Pre-college attributes of parental socioeconomic status, race and age exhibit no significant net relationship with dropping out at any stage. The effect of having pursued a college preparatory program in high school is relevant only to completion of the freshman year. The net importance of pre-college measured ability declines substantially after the freshman year and is nonsignificant by the junior year.

While working evidently inhibits persistence in college, not all employed students become dropouts and the impediment appears to be greatest for those who work between half and full time. This indicates

that students' working full time are a heterogeneous group; some of whom have extraordinarily high commitment to their educational goals and (perceive) no alternative way of meeting the out-of-pocket expenses of college attendance. It should also be borne in mind that working students who manage to persist through college do reduce the "foregone earnings" component of their personal investment in education.

Whether because of their lower commitment to educational achievement, lower quality of instruction, or an institutional function of "cooling them out," it is incontestable that young men who initially matriculate in a two-year institution are much more likely to drop out at every stage of undergraduate life--even after having transferred to a four-year institution. Finally, receipt of a scholarship bears a consistently positive relationship to the probability of successful persistence in college, although it is not entirely clear whether this is a measure of commitment or an additional measure of aptitude.

An important methodological conclusion that derives from this study is that much previous theoretical and empirical work on dropping out of college must be viewed with considerable caution. By ignoring the longitudinal nature of the process of undergraduate education and inadequately controlling for intercorrelated explanatory variables previous research has drawn and perpetuated several erroneous inferences. Not the least of these is that social status background is an important determinant of persistence through college. Another is that there are

significant net racial differentials in the rate of dropping out of
college. Perhaps most critical from the viewpoint of this study is the
myth that the explanation for the causes of dropping out of college can be
modeled in a single equation representing the likelihood of graduation
by any given group of freshmen. Our study clearly demonstrates that
the explanation is far more complex.

Footnotes

[1]This study elaborates a methodological framework utilized in the dissertation by Karmas (1974).

[2]Thus, for example, 23-year-old sophomores in 1966 were excluded from the analysis of seniors in 1968, because they were 25 in 1968.

[3]Some qualifications to this straightforward interpretation of $L_{ij}$ are discussed below in the section on methodology.

[4]For details on the methods of construction and discussion of other variables that might have been included see Kohen (1973).

[5]For technical information concerning the pooling and standardization of scores see Kohen (1973).

[6]In preliminary runs we included an 11-valued index designed to measure the quality of the secondary school attended, but the variable was consistently nonsignificant and methodologically questionable. Therefore, it was excluded from final runs.

[7]However, even this seems improbable since preliminary runs included a measure of the racial composition of the student body--anticipating different behavior by blacks in black schools than by those in "integrated" schools. However, in contrast to Astin's findings (1975, pp. 142-44), neither the variable nor its interaction with race of the respondent were statistically significant.

[8]The suggestion by Baird et al. (1969, p. 66) that this is not true for students at two-year colleges is faulty because their analysis considers only students attending the second term of their second year. Thus, it excludes those whose working led to reduced participation and withdrawal prior to the second year. Astin (1975, p. 87) suggests that the effect of working depends on whether or not the job is on campus. However, since his analysis does not measure the number of hours worked (as a freshman) nor the relationship between hours of work and job location, his conclusions may reflect merely the inverse relation between persistence and hours of work.

[9]The use of ordinary least squares (OLS) estimation where the dependent variable is dichotomous theoretically has the limitation that the estimated (predicted) probabilities may lie outside the unit interval. While theoretically preferable, an alternative estimation technique (e.g., logit analysis) could not be attempted since no available program allows for variation among respondents in the probability of selection to the sample.

[10]Examination of the separate analyses of the individual entering classes indicated no structural differences sufficient to preclude pooling them. Although we show unweighted sample sizes in the tables, the analyses have been performed using weighted data. Thus, for example, the sample of college freshmen in the 1966-68 period represents about 1.8 million young men.

[11]Students enrolled ~~as seniors who one year~~ later were not interviewed and found to be members of the armed forces were classified as successes for two reasons. First, examination of later data for some (i.e., when they were interviewed after being discharged) indicates that they were, indeed, college graduates. Second, common practice of the selective service system was to permit potential draftees to complete their program of study if they were making satisfactory progress.

[12]Among freshmen the zero-order correlations between the SES index, IQ, CURRIC, 2YRCOL, and ENRPT are 0.29, 0.23, -0.20, and -0.15, respectively.

[13]We investigated possible interactions with race by means of the Chow test (Chow, 1960) which tests the equality of regression coefficients when the equations are estimated separately for whites and blacks. The calculated F-ratio under the null hypothesis of equal slope parameters was 1.75; the critical tabular value for F was 2.18 at $\alpha = 0.05$.

[14]It must be borne in mind that working while attending school has a very positive aspect for those who do persist; namely, it reduces the major cost of acquiring higher education (i.e., foregone earnings) and thereby raises their rate of return to investing in schooling. Astin (1975, p. 79) suggests that there may also be positive integrative effects of working while attending college.

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[15] For the sake of strict comparability with Astin's recent study (1975) we re-estimated this model for the universe of entering freshmen who aspired to complete four years of college. The results were virtually identical to those shown in Table 3 and are available upon request.

Table A-1

Means and Standard Deviations of Variables Used in Models of
Successful Persistence in College, by Year of
College Analyzed

| Variable name[a] | Freshmen | | Sophomores | | Juniors | | Seniors | |
|---|---|---|---|---|---|---|---|---|
| | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| $L_{i1}$ | .711 | b | .697 | b | .787 | b | .796 | b |
| $L_{i2}$ | .762 | b | .763 | b | .884 | b | .918 | b |
| SES | 11.6 | 1.7 | 11.8 | 1.7 | 11.9 | 1.6 | 12.1 | 1.6 |
| IQ | 110.9 | 12.9 | 112.0 | 13.0 | 113.4 | 11.7 | 113.8 | 10.9 |
| CURRIC | .70 | b | .75 | b | .74 | b | .77 | b |
| AGE | 17.8 | 1.4 | 18.9 | 1.3 | 19.8 | 1.1 | 20.8 | 1.1 |
| SCLSHP | .16 | b | .14 | b | .17 | b | .14 | b |
| RACE | .95 | b | .96 | b | .97 | b | .97 | b |
| MSP | .05 | b | .07 | b | .11 | b | .15 | b |
| ENRPT | .08 | b | .06 | b | .04 | b | .06 | b |
| EMP35+ | .09 | b | .12 | b | .07 | b | .07 | b |
| EMP21-34 | .08 | b | .08 | b | .11 | b | .12 | b |
| EMP1-20 | .26 | b | .30 | b | .24 | b | .29 | b |
| 2YRCOL | .31 | b | .24 | b | .17 | b | .14 | b |
| Number of sample cases[c] | 547 (545) | | 438 (437) | | 311 (312) | | 244 (246) | |

a  For definitions of variables and units of measurement see text.

b  The standard deviation for a dichotomous variable is $\sqrt{p(1-p)}$,
where p is the proportion of the sample having the requisite
characteristic.  Hence, the standard deviation is computable
from the mean shown in the adjacent column.

c  Although they contain essentially the same respondents the samples
for the one- and two-year analyses are not identical because of
attrition and returns to the sample.  Hence, the first number
shown is the one-year sample and the number in parentheses is the
two-year sample.

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