EFFECTS OF INTERVENING WORK EXPERIENCE ON UNDERGRADUATE PERSISTENCE

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

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The years following high school graduation are often characterized by uncertainty with regard to career and continuing education decisions. This uncertainty often results in false starts and changes in direction that strain family resources and delay the start of the income-generating years. The literature reviewed during this study suggested that a period of meaningful work experience between secondary and post-secondary education might reduce this uncertainty.

Some of the literature reviewed suggested that high school graduates who choose to leave full-time, formal education for a period of time often return later with a greater sense of direction and motivation. This raised a question about the effect on undergraduate persistence of life and work experiences occurring during the period of absence from school. The purpose of the study was to explore the association, if any, between students' work experience (prior to completing a bachelor’s degree) and their academic persistence to degree completion.

Data was extracted from the National Longitudinal Survey of Youth Data (NLSY79), sponsored by the Bureau of Labor Statistics of the U.S. Department of Labor, and managed under contract by the Center for Human Resource Research (CHRR) at The Ohio State University. The data was used to identify several predictor variables, which were analyzed for
their effects on undergraduate persistence using binary logistic regression. The dependent variable was whether or not subjects earned a baccalaureate degree. The predictor variables included: (a) the presence or absence of an intervening work experience occurring between high school and college, (b) the annual income of the subject's family in the year of graduation from high school, (c) the number of dependents the subject had at the time of graduation from college, (d) the number of years required by the subject to attain the bachelor’s degree after enrollment in college, (e) the age of the subject at the time of earning the bachelor’s degree, (f) gender, (g) race, (h) SAT and ACT scores, and (i) whether or not the subject had active duty military experience preceding or coinciding with undergraduate study.

Some of the variables had interesting and unexpected effects. There was a significant difference between the likelihood of persistence of those subjects who had an intervening work experience and those who did not. However, the outcome was opposite that of the original hypothesis in that the likelihood of persistence of those who did not have the intervening work experience was about 12 times greater than that of those who had the work experience.

Another was the military variable, in that subjects who had no active duty military experience preceding or coinciding with undergraduate study were nearly 10 times more likely to persist to the earning of a bachelor’s degree. The single predictor variable that appeared to validate the body of research literature (which suggested that older and returning students enjoy a high degree of academic success) was the variable that referred to the number of years it took
a subject, from the time of first entry into college, to earn a bachelor’s degree. With the addition of each such year, it appeared that subjects were approximately 2.3 times more likely to persist to eventually earn a bachelor’s degree. This suggested that many non-traditional students reach their bachelor degree goals through combinations of entry, departure, and reentry into undergraduate studies, interspersed or combined with periods of full-time and part-time work and study.
Dedicated To

NITA ARLENE DICKENS ANIBLE, 1918 – 1992

FRANCIS WAYNE “FRANK” ANIBLE, 1921 – 2006

For the Gift of Tenacity
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Society expects its educational institutions to equip students with the knowledge, skills, and abilities necessary to become productive members of society. "Everyone wants education to make a difference in the lives of students. Ultimately we hope education will prepare them for the future" (Webb, 1981, p. 113). Preparation for the future ideally includes development of young men and women who are able to make wise decisions with regard to further education, training, and careers. In America, the years following high school graduation are often characterized by uncertainty with regard to those decisions. This uncertainty often results in false starts and changes in direction that strain family resources and delay the start of the income-generating years. The research literature suggested that a period of meaningful work experience between secondary and post-secondary education may have reduced this uncertainty.

Theoretical Framework

Some authors (Smart & Pascarella, 1987) suggested that high school graduates who choose to leave full-time, formal education for a period of time will often return later with a greater sense of direction and motivation. This raised a question about the effect of those life and work experiences during the period of absence from
school on undergraduate persistence. That question was about the probability of returning students completing a baccalaureate degree.

Career development theories suggested that an intervening work experience might be a time of seeking the proper balance between education and work. One such theory was 'life career development', which was introduced in 1973 by Gysbers and Moore. They defined life career development as a person's life-long, self-development through the continuous interplay of the person's roles, circumstances, and events. Their focus was on the total person. They considered careers to be not merely people's occupations, but rather the sum of their entire human experience. "The word career identified and related the roles in which individuals were involved (worker, participant in leisure, learner, family member, and citizen), the settings where they found themselves (home, school, community, and workplace), and the events, planned and unplanned, that occurred over their life-times . . ." (Gysbers, Heppner, & Johnston, 2003, p. 21). This theory suggested that a balance should exist between the roles of worker and learner and between the settings of school and workplace.

Another widely-recognized theory of career development that supported the need for balance between work and education was Donald Super's 'Life-Span, Life-Space Theory'. Super (1990) called his theory "a segmental theory . . . a loosely unified set of theories dealing with specific aspects of career development, taken from developmental, differential, social, personality, and phenomenological psychology and held together by self-concept and learning theory" (p. 199). Super suggested that individuals must attain a clear grasp of their "occupational self-concept" (p. 254) which includes elements of
personal worth, self-sufficiency, and view of the self in the passage of time. He considered exploration and trial to be essential to that process. Intervening work experiences provided a time of exploration and trial. He wrote of "exploration in breadth and then in depth for the crystallization, specification, and implementation of occupational self-concepts, [and] establishment with trial, stabilization, consolidation, and perhaps advancement; . ." (1990, p. 254). Super also believed that career maturity was a necessary element in his concept of career development. He considered exploration to be essential to the career maturation process. Super described career maturity as "a readiness to engage in the developmental tasks appropriate to the age and level at which one finds oneself" (Gysbers, Heppner, & Johnston, 2003, p. 24). He viewed maturity as a goal to be continuously pursued at any given time in a person's life, but not something that was ever actually reached. Over the course of a lifetime, a person would set and strive for a series of goals. These goal pursuits were not necessarily linear and continued throughout life, never reaching a static end. Super's concept of maturity eventually evolved into a concept of career adaptability, which included "the constructs of planfulness (including autonomy, self-esteem, and reliance on a time perspective), exploration, information, decision-making, and reality orientation" (Gysbers et al., p. 24).

Other career development research suggested that undergraduate students lacked comprehension of the realities of the workplace. This deficiency in their understanding may have been related to student persistence toward baccalaureate degree completion. Super (1995) described the application of the Work Importance Study to a group of
first- and second-year students at the University of Florida when he wrote: "The gap between the university and the world of work at this early level is so great as to be almost shocking, although university faculty and staff members often have observed that entry into the labor force plays little part in students' thinking until graduation approaches" (p. 322). Super's observation suggested that college students were insulated from the harsh realities of the world of work. An intervening work experience (between high school and college) might be the dose of reality that bridges the experiential gap between school and work. Such a work experience may inject a measure of relevance into the students' life that reinforces persistence to complete a college degree.

Persons may acquire certain traits and/or attain personal achievements during an intervening work experience between high school and college. Those traits and achievements may be positively correlated with subsequent academic success. Therefore, an intervening work experience may influence the rate of baccalaureate degree completion following that work experience. Work experiences vary widely in scope and intensity and therefore result in different outcomes for different students. Traits and achievements acquired during an intervening work experience might include the following:

1. Returning students may have developed a greater sense of maturity and commitment that helps to maintain focus on academic tasks.
2. Returning students may possess greater self-discipline and time management skills that are valuable in the academic environment.
3. Returning students may experience increased motivation to pursue higher education as a means to achieve a higher standard of
living. This hypothesis is based on the assumption that many returning students will have performed semi-skilled or unskilled jobs during their intervening work experience.

4. Returning students may have a greater depth and breadth of practical experience, which serves as a frame of reference for the synthesis of new with existing knowledge. Returning students may be better able to apply the basic principles learned in their academic studies to practical situations.

5. Returning students may develop financial self-discipline in which they are better able to manage their limited financial resources while pursuing their education.

6. Returning students may possess monetary savings that will reduce their financial pressures and permit greater focus of time and attention on their studies.

Despite suggestions in the literature that an intervening work experience might have influenced persistence to degree completion, it was conceivable that some events occurring during that experience might have a negative effect upon persistence. During an intervening work experience, it is possible that persons may have married and/or become parents. These new life roles and responsibilities may have made it difficult to successfully balance academic expectations and the costs associated with family responsibilities. The potential for alternative outcomes resulting from an intervening work experience underscored the need to test the theory.

Need for the Study

Apling (1991b) asserted that many high school graduates change their career plans and paths; never fulfilling their postsecondary
education goals. This assertion had implications for national educational policy and planning. Haggstrom, Blashke, and Shavelson (1991) suggested that the post-high school period warranted more examination with regard to the college dropout rate and the inadequate supply of qualified, entry-level workers in America. Research into this problem might contribute to improved educational programs and career guidance for high school students, and more successful college recruitment and retention programs, especially for returning students.

Epstein (1984) and Wilson (1990) suggested that older and reentering students may enjoy a higher degree of academic success than students who matriculate from high school directly into college. These authors reported positive correlations between student success and traits acquired during an intervening work experience. Further research was needed to determine if there was a relationship between those traits and undergraduate degree persistence. Information about these relationships might have had implications for educational and career counseling of youth and young adults.

Attainment of a baccalaureate degree within four to six years after high school graduation is but one of many paths leading to becoming a productive member of society. Other alternate paths may include:

1. Enrollment in a two-year institution in a program that leads to an associate of arts (AA) degree, associate of science (AS) degree, or associate of applied sciences (AAS) degree.

2. Enrollment in a public or private vocational or technical school in a program leading to an associate degree, diploma, or certificate.
3. Transferring to a baccalaureate degree-granting institution following completion of a two-year program.

4. Serving in one of the branches of the military.

5. Employment that offers opportunities for formal classroom/laboratory instruction and structured on-the-job training.

6. Employment in a career that involves an apprenticeship program leading to journeyman and master credentials.

7. Any combination of these and/or other alternative paths were possible, including enrollment in a degree-granting institution in a program that culminates in the eventual attainment of a baccalaureate degree sometime following high school graduation. Still other paths, and an infinite combination of paths, were possible. Some paths would likely be taken during the Trial Transition Substage (Ages 18 to 25, Latter Half of the Exploration Stage) in the career development maxicycle (Figure 1) proposed by D.E. Super (1990, p. 214).

One of the purposes of public school education in the United States has been to prepare individuals to become productive members of a democratic society (Cunningham, 2000). Educators should recognize and embrace the freedom of choice represented by these various paths. Freedom of choice accommodates the unique aptitudes, skills, and interests of each individual. Educators should therefore encourage students to examine and consider a wide range of alternative paths and to make informed decisions regarding those alternatives.

Information was needed to determine if there was a difference in the likelihood of baccalaureate degree persistence between those who matriculated directly after high school graduation and those who didn't. That difference, if any existed, might have implications for
Figure 1. D.E. Super’s Career Development Maxicycle (used by permission of John Wiley & Sons, Inc.)
secondary student career guidance and counseling. Implications might also include broadening the spectrum of alternative pathways available to young men and women after they graduate from high school. Additional implications might also include broadening the benchmarks commonly used as measures of success for high school graduates. Direct student matriculation and enrollment in college has been generally viewed as the primary measure of success. However, other benchmarks might include placement in an occupation that does not require a four-year degree, but is nevertheless relevant in its personal fulfillment, economic viability, and contribution to society. Other realistic benchmarks might include elements of citizenship, community involvement, and fostering healthy families.

Statement of the Problem

According to Haggstrom et al. (1991), many people embarked upon the period after high school graduation without a clear sense of direction and changed direction (some frequently) during the years after high school. Evidence of a lack of direction was based on the fact that about half of all college freshmen dropped out before completing a degree. Furthermore, only about one-sixth of the students who entered a four-year college remained in school without interruption until they completed a baccalaureate degree. These observations were by no means confined to the United States. Johnson (1994) observed a widespread Canadian belief that, after a year or two, it is common for undergraduate students to discover that college is not for them. During the first one or two years of college, many students discovered their particular preferences and aptitudes with regard to a future career.
This process of self-discovery, however, may prove costly for some individuals. In most cases individuals are, at least partially, removed from the work force while they attend university [sic], resulting in financial loss. Equally, many individuals leave their homes and communities to attend university, resulting in considerable disruption of their personal lives. One is forced to consider whether university attendance is the most efficient means by which individuals can determine their interests in and suitability for a university education. (Johnson, 1994, p. 337-338)

In the post-World War II era, K-12 educators and counselors emphasized a primary outcome; direct matriculation from high school into college, and the attainment of a baccalaureate degree within four to six years. There are a number of possible explanations for this:

1. Growing materialism in Western culture appeared to perpetuate the belief that self-fulfillment lay in the attainment of wealth and that the passport to wealth was the attainment of a college degree as quickly as possible. This view of success overlooked many other forms of personal, career, and societal fulfillment and the means of attaining them.

2. G.I. Bill education benefits for veterans made it possible for another segment of American society to earn a college degree. The societal effect of these programs over the past 60 years has not been determined. However, an unintended consequence of this program may have been the creation of an assumption that the children of veterans should also attend college, and the sooner the better. It may not have been appropriate to assume that succeeding generations of students would automatically benefit from direct matriculation into college after high school.
3. A powerful imperative in the American culture was that each successive generation should increase its standard of living above that of the preceding generation. This paradigm may not have coincided with the elements of choice and diversity that were also valued in our culture. In fact, this paradigm may have blinded many educators, counselors, and parents to the necessity for each successive generation to freely choose from a range of personal and career development alternatives. An unfortunate outcome was that thousands of young men and women might have conformed to the predominant paradigm, only to discover months or years later that they did not reap the expected educational and career benefits. While all learning experiences were believed to produce some inherent value, the process through which persons came to this realization could exhaust personal and family financial resources and result in missed opportunities.

4. There appeared to be an infusion of strong Asian cultural values into American society in recent decades, including a regard for formal learning as necessary for each successive generation to succeed and to uphold honor in the family. The value attributed to higher education was clearly commendable, but a narrow emphasis on the attainment of undergraduate and graduate degrees potentially overlooked many other viable learning opportunities and pathways to personal and career success.

The research problem to be addressed in this study was to determine if there was a difference in persistence between students who had a meaningful work experience after their graduation from high school but prior to their entry into college, and those who matriculated directly into college. Stated another way: did students
with an intervening work experience have a significantly different probability of graduating from college with a baccalaureate degree than students who matriculated directly from high school into college?

Purpose of the Study

The purpose of this study was to explore the extent to which an intervening work experience (prior to completing a bachelor’s degree) was associated with persistence to degree completion after high school graduation. In order to determine if there was an association between student work experience and college degree persistence, the following research questions were addressed.

Research Questions

1. What proportion of cohort members in a longitudinal study did not have an intervening work experience?

2. What proportion of cohort members in a longitudinal study who did not have an intervening work experience attained a bachelor’s degree?

3. What proportion of cohort members who entered college completed an intervening work experience prior to entering college?

4. What proportion of cohort members who completed an intervening work experience attained a bachelor’s degree?

5. Was the rate of persistence toward college degree completion associated with student involvement in an intervening work experience and/or with other demographic variables?

Hypotheses

A null hypothesis (H₀), was developed to explore whether an intervening work experience was statistically independent of persistence toward baccalaureate degree completion. Expressed in the
context of logistic regression, the method of analysis that was eventually selected for this study, the odds ratio (Exp(B)) for the independent variable (work) equaled 1 where the dependent variable (persist) was concerned. The \( H_0 \) was expressed as:

\[
H_0: \text{Exp}(B)_{\text{work}} = 1
\]

As expressed in the formula, the null hypothesis stated that persistence toward degree completion could not be explained by the occurrence or non-occurrence of an intervening work experience.

An alternate hypothesis was based on the review of literature and suggested that occurrence of the dependent variable (persist) might be predicted from the non-occurrence of the independent variable work (work = 0). In the context of logistic regression, the odds ratio (Exp(B)), when work = 0, was less than 1 where the dependent variable (persist) was concerned. In other words,

\[
H_a: \text{Exp}(B)_{\text{work}} < 1 \text{ when work } = 0
\]

Definitions

The following operational definitions were employed for the purpose of this study:

1. Persistence -- is the proportion of students in a defined population who attained a baccalaureate degree.

2. Meaningful Work Experience -- is a period of employment at least one year in duration and during which at least 1,500 hours were worked, occurring during a one- to two-year period between graduation from high school and enrollment in college.

Assumptions

It was not possible to exert complete control over the employment types and circumstances of persons in the population of interest.
Therefore, stratification of subjects based upon assumptions about relevant work experience was necessary. Meaningful work experience, as operationally defined above, was assumed to have a latent effect on maturation and a person's overall experience. The duration of a work experience less than that outlined in the operational definition was assumed to be insufficient to produce a measurable effect. However, it was also assumed that the effect of work experiences longer than the operational definition were confounded by mortality or by multiple-treatment interference derived from history and maturation effects that were external to the work experience.

It was not possible to quantitatively measure subjective traits such as maturity, commitment, and motivation within the scope of this study. Based upon the literature review, these traits were assumed to have some degree of moderating influence on undergraduate academic success and persistence.

Limitations

The hypothesis was examined utilizing an existing longitudinal database, rather than to undertake an original longitudinal study. To conduct a valid, original study of this magnitude would have required at least eight years. Execution of such a study to explore the hypothesis was not feasible due to resource limitations.

Limitations imposed by the time necessary to conduct a longitudinal study of sufficient duration were controlled to some extent through the use of an existing database created from a longitudinal study with high rates of retention and response. The 1979-2004 National Longitudinal Survey of Youth Data (NLSY79), sponsored by the Bureau of Labor Statistics of the U.S. Department of
Labor, and managed under contract by the Center for Human Resource Research (CHRR) at The Ohio State University, was selected for use in this study.

The NLSY79 contained data that allowed inclusion in the model to control intervening variables and potential threats to validity. Such factors included gender, race/ethnicity, military status, whether respondents had dependents, standardized test scores, and income.

Delimitations

The researcher did not have the ability to control assignment of subjects to control and experimental groups. The inability to randomly select and randomly assign subjects to treatment groups prompted the selection of a study based on logistic regression. The subjects self-selected the treatment, since it was not ethical or possible to assign one group (experimental) of subjects not to go directly to college from high school while directing another group (control) to do so. Instead, logistic regression was used to estimate the probability of the attainment of a baccalaureate degree based on the presence or absence of an intervening work experience as well as on other independent variables.

Necessary delimitations also influenced the decision to adopt a logistic regression study. To narrow the study to the sub-populations of interest, subjects to be analyzed were selected through a stratification process in an attempt to control potentially confounding variables. This process involved selecting subjects for whom there was available data for combinations of variables of primary interest (work experience, income, gender, race, age, military experience, test scores, dependents, years to attain the degree, etc.). The size of
the NLSY79 cohort (12,686) came from such a broad cross-section of the national population that all subjects had a reasonable opportunity to select work or college and a nearly equal opportunity to select any degree-granting institution.

Past academic experiences of students had been shown in several studies to have predictive value with regard to degree persistence in higher education. This intervening variable had the potential to jeopardize internal validity of the study through differential selection of subjects. To control for this threat, the subjects' ACT and SAT scores were incorporated into the regression model as a continuous predictor variable.

Summary

The ambiguity of high school graduates with regard to career and continuing education decisions often placed excessive pressure on student and family resources and delayed the start of successful careers. Educational research literature suggested that a period of meaningful work experience between high school and college might reduce this uncertainty. Some authors cited evidence that graduates who left school for a period of time often returned with greater motivation and clearer goals. This observation prompted further inquiry into the effect of work experiences during the period of absence from school on undergraduate degree persistence.

This explored whether there was any association between student work experience (prior to completion of a bachelor’s degree) and academic persistence. The following proportions of two population subgroups would be compared: (a) the proportion of high school graduates who did not have an intervening work experience after high
school and who then attained a bachelor’s degree, and (b) the proportion of high school graduates who completed an intervening meaningful work experience of one to two years and then attained a bachelor’s degree. The study examined whether the occurrence of an intervening work experience, and other demographic variables, might be predictors of persistence. Data for the study was extracted from the 1979-2004 National Longitudinal Survey of Youth Data (NLSY79), sponsored by the Bureau of Labor Statistics of the U.S. Department of Labor, and managed under contract by the Center for Human Resource Research (CHRR) at The Ohio State University.
CHAPTER 2

REVIEW OF LITERATURE

This chapter will explain the process by which literature was searched for articles pertaining to the attributes of students who left full-time education for a period of time and later returned. Objectives of the search included the determination of: (a) whether evidence existed that this group of students might be different from students who remain in full-time education until they earn a baccalaureate degree, (b) whether one group of students appeared to have greater academic persistence than the other, and (c) whether any studies had been conducted to identify differences in academic persistence between the two groups.

Literature

The literature search was narrowed to a number of major themes which served as advanced organizers. These included academic degree persistence, departing and reentering undergraduate students, and relationships between work and education.

The Educational Resources Information Center (ERIC) database was used as a starting point in a preliminary search for sources of potential value to this issue. A search was undertaken using 18 search strings and varying combinations of two or three of the strings. The search strings included: work experience, higher education, experiential learning, relevance-education, non-traditional-education,
reentry-students, dropouts-research, stopouts, predictor-variables, adult-education, college-graduates, education-work-relationship, work-to-school, academic-persistence, persisters, bachelor’s-programs, and maturity. Visual scanning of titles and abstracts yielded by these search strings and combinations thereof did not at first provide apparent evidence that older and reentry students had commendable records of academic success; however, the combined search string of higher-education and reentry-students produced over 200 references, a number of which appeared most relevant and are cited in this chapter. Additional searches using web-based search engines revealed additional references of potential value.

Research

Structure of Review

Eighteen search strings and various combinations were used to search the ERIC database, yielding over 150 sources pertaining to dropout-research and higher-education. Fewer than 10 sources emerged from the search string comprised of maturity and academic-persistence and higher-education. Over 200 sources relating to higher-education and reentry-students were found. These included journal articles, RAND Reports, Congressional Research Service Reports, College Entrance Examination Board Reports, and papers presented at conferences. Additional inquiries were made with internet search engines, using key words including returning students, persistence, retention, nontraditional students, etc. Most relevant references found in this manner related to college attrition and retention. A review of titles and abstracts was conducted, followed by a selection of sources that appeared to be most relevant.
Emerging Major Issues

Sources judged to have relevance to this study were cataloged into seven major theme areas: (a) maturity and commitment, (b) motivation, (c) early work experience and satisfaction, (d) persistence rates, (e) past academic experience, (f) institutional environment, and (g) nontraditional students. Maturity and commitment, motivation, and early work experience and satisfaction appeared to be by-products of a meaningful work experience that preceded entry or reentry into college. Low persistence rates among students who went directly from high school to college suggested there may be value in conducting research into the persistence rates of students with an intervening work experience.

Besides the seven major theme areas identified above, additional factors with lower rates of incidence in the literature were also noted. These factors included financial needs, family responsibilities, reentering students, student characteristics and demographics (such as age, gender, race, and socioeconomic status), two-year versus four-year colleges, and military experience.

Several studies reported that older students and reentry students (sometimes referred to as “stopouts”) represented rapidly growing proportions of the undergraduate student population in the United States (Epstein, 1984; Smart and Pascarella, 1987; Wilson, 1990). There were few sources that compared the rates of persistence of older students to those of students who matriculated directly from high school to college. Wilson (1990) and Epstein (1984) noted that older students who opted for an intervening work experience might have enjoyed a higher probability of attaining a baccalaureate degree.
Maturity and commitment. Students who stopped out of school for a period of time might have possessed a level of maturity that enhanced their undergraduate educational experience. Epstein (1984) noted that recent literature had not given adequate attention to persons 35 years of age and older working toward undergraduate degrees despite the fact that this group appeared to be growing in number. His descriptive study sought to gather demographic data for, personal characteristics of, and conditions affecting such students. Epstein's study used structured, tape-recorded personal interviews of a randomly selected group of students by three researchers. The interviewers exchanged the taped recordings and wrote independent analyses. The project leader compared the analyses and if significant discrepancies for a given interview could not be resolved, that interview was discarded. Frequencies of variables and relationships between variables were computed. Despite a wide diversity of demographic indicators, the respondents as a whole were reported to be mature, determined to obtain a degree, motivated by a genuine desire for learning, and focused on a specific degree program. "These studies showed dramatically that adults are capable, motivated learners" (Epstein, 1984, p. 3).

Wilson (1990) observed that persons over age 35 who had reentered undergraduate college programs represented the fastest growing portion of reentry students. Literature of recent years had grouped these students with all reentry students over age 24, and thus did not adequately address the characteristics of the older group. Wilson gathered descriptive data in his study of reentry students over age 35 through the use of a survey questionnaire mailed to 218 University of Tennessee (Knoxville) students fitting the target group profile. Data
were collected on demographics, factors influencing the decision to reenter school, level of education attained, employment, problems involved in returning to school, reasons for returning, spousal support, personal view of their decision to return to school, stresses encountered, and family interaction. Responses were categorized and the frequency of the responses were expressed as percentages of the whole. Respondents were asked to rate the severity of problems involved in returning to school using a Likert scale and means and standard deviations were calculated for responses collected from 12 survey questions. Correlations were used to assess the relationship among age, self-esteem, stress, and spousal support. Wilson (1990) reported:

Some portions of the general public and even some educators have assumed that older cohorts of adult students enroll in higher education without serious intent of completing a degree. However, results of this study portray serious intent and effort. (p. 6)

He also concluded, "As highly motivated, serious, and able, they are often among the highest performing students in a course and thus a potential model for others" (p. 15).

Sanford and Naylor (1984) hypothesized that certainty of education plans, which they labeled educational maturity, and race, were independent variables affecting college persistence. They undertook a correlational study in which 3,454 freshmen were surveyed in 1979. "The data from the survey were combined with data from a university's student retention file to create a longitudinal database" (Sanford & Naylor, 1984, p. 3). After four years, correlations were computed between educational maturity based on the initial survey, race, and rates of retention. Using regression analyses, they reported
a negative correlation between educational maturity and retention, but a significant positive association between race and retention. Sanford and Naylor were uncertain of the significance of the analysis, but theorized that because the research was conducted at a college that emphasized a liberal arts curriculum, educationally immature students succeeded more often than educationally mature students whose pragmatic orientation may not have meshed well with the institution's environment. The inexperience of the immature group may have, ironically, contributed to higher rates of retention.

Crook, Healy, and O’Shea (1984) also examined the roles of maturity and student commitment in both working and learning experiences. Their study concluded that “self-esteem influences mature career attitudes and work achievement directly, and college achievement and work achievement indirectly through the mediation of mature career attitudes” (p. 76).

Shields (1994) studied commitment from the perspective of socioeconomic, occupational, and family considerations. He noted:

... the Bean and Metzner (1985) model assigns a central role to the outside environment (finances, hours of employment, outside encouragement, family responsibilities, and opportunity to transfer) in retention. These variables are seen as more important than academic variables in attrition, affecting it directly and indirectly through GPA, intent to leave, and psychological outcomes. Psychological outcomes (utility, satisfaction, goal commitment, and stress) are seen as affecting attrition directly and indirectly through "intent to leave". (p. 14)

In apparent reinforcement of such observations, Elkins, Braxton, and James (2000) analyzed a survey of 411 students at a public four-year college in the context of Tinto's theory of student departure and Van Gennep's stages of separation, transition, and incorporation, giving particular attention to separation. Of those surveyed, 378 remained in
school past the first semester. Elkins and his colleagues concluded that support from various sources external to the students themselves was most significant in the students' decision to remain in school.

Motivation. Smart and Pascarella (1987) observed that although adult entry into higher education was increasing, information was lacking on the reasons why students who previously dropped out of college chose to return. They developed and tested a causal model to explore why adults decided to resume their college education. They examined "multiple measures of (a) adults' initial undergraduate experiences, (b) characteristics of their employing organizations, (c) adults' early career experiences, and (d) their current self-concept" (Smart & Pascarella, 1987, p. 307). Data were collected in an initial survey in 1971 and a follow-up survey in 1980. Their model consisted of five sets of variables and eight structural equations. Coefficients of the equations, indicative of direct effects, were estimated using ordinary least squares regression. They concluded a significant reason for returning to school was the desire to prepare for a more rewarding career. They also noted that students planning to return had commendable educational goals and a relatively high level of commitment to their goals. "Thus college officials are likely to encounter serious students with a strong motivation to improve their career opportunities" (p. 314).

Spanard (1990) reported that not enough was known about what motivated adults to reenter college, and felt this area warranted more attention in light of the fact that America's work force needed more skilled and educated workers. His descriptive study attempted to construct a model depicting key decisions leading adults back into
college. "This longitudinal model is based on substantive reasoning about linkages between the variables and events that sequentially occur in the creation and resolution of the college reentry opportunity for adult learners" (1990, p. 309). A literature review was used to identify the major decisions, the primary alternatives that may have resulted from each decision, and the variables that influenced each decision. Reentry involved a decision whether to work and go to school concurrently, or to become a full-time student and not work. Ultimately, a decision (or decisions) was required as to whether to stay in school or leave again. Spanard concluded that adults who had reached the start of this decision chain model represented a valuable human resource that should be cultivated. Knowledge of the critical paths and variables influencing critical decisions could assist individual institutions, the higher education community, and society at large in helping adults to reach decisions that are personally rewarding and yield benefits for society as a whole. He further noted with regard to reentering students:

... these students' perception of the benefits of a college degree and impact of its attainment on their careers and their personal satisfaction is quite high. When asked if they would do it again, less than 5% of the respondents said they would not, and more than 95% believed that completing the degree provided greater benefits than costs. (p. 311)

Kwong, Mok, and Kwong (1997) studied the interplay between motivation and adult social roles. They observed that social roles affected what adults learn and how they managed their time and other resources necessary to the learning process. They concluded that social roles are integral to the motivation to return to school, and
that continuing education is seen by returning students as necessary to
the fulfillment of the responsibilities of their social roles.

Cubeta, Travers, and Scheckley (2001) used the University of
Maryland's Risk and Promise Profile survey to study personal and social
factors in nontraditional-age (average age: 35) students at two- and
four-year colleges. Dependent variables included GPA, number of
semesters completed, and a comparison of credits earned to credits
attempted. Motivation to succeed was seen as one of the significant
traits in the nontraditional students who were succeeding.

House (2002) surveyed college freshmen's high school experiences,
beliefs, and expectations. The study concluded that high school
motivational attitudes such as proving one could succeed, wanting to
leave home, and wanting to generate more income in the future were
significant predictors of college GPA.

*Early work experience and satisfaction.* The decision to return
to school often appeared to be influenced by an intervening work
experience. Smart and Pascarella (1987) concluded:

... it appears that the intention of men and women to resume
their college education is strongly influenced by their
respective levels of early career attainments (for example,
job status and income) and satisfaction (for example,
intrinsic, extrinsic). It seems reasonable to assume that a
major reason for their return to campus is to acquire the
training and preparation that will enable them to pursue
careers that provide higher levels of reward and satisfaction.
(p. 322)

*Persistence rates.* The prospect for success among older students
suggested a sharp contrast to the documented trend of students who go
directly from high school to college. "For college entrants, progress
toward degree completion was notably sporadic and drawn out. Among the
1980 graduates who enrolled full-time in a four-year college directly
after graduation, only 46 percent had earned bachelor’s degrees through February 1986” (Haggstrom et al., 1991, p. vi). Haggstrom et al. observed there was inadequate information about the educational and vocational activities of persons after leaving high school. The descriptive/correlational study by Haggstrom et al. assembled an extensive database derived from the High School and Beyond Study. This study tracked 26,000 high school students in the classes of 1980 and 1982, following them up in 1982, 1984, and 1986 with additional surveys. Trend projections were attempted using correlations relating to state, gender, and race, and extrapolations based on Census Bureau predictions. Post-high school activities were divided into four main categories: (a) full-time student enrollment, (b) military service, (c) civilian employment, and (d) other, comprised of persons neither enrolled full-time nor employed. Activities were tracked for five years following departure from high school, along with six-month rates of transition between the four categories. Haggstrom et al. concluded that a significant number of these persons did not have a clear sense of direction and made many changes during the first five years. About half of all college students dropped out before completing a degree. Only about one-sixth of all students who entered a four-year college directly after high school remained enrolled without interruption until attaining a degree.

Apling (1991b) observed that many high school graduates embarked on a variety of work and education paths but never attained their preliminary goals. In subsequent years many of them changed paths and some never completed their postsecondary education goals. These facts may have implications for educational policies and planning. Apling
conducted a descriptive/correlational study by extracting data from studies of the high school graduating classes of 1972 and 1980 on file in the National Center for Education Statistics. His study summarized data in terms of paths taken, path changes, educational attainments six years after graduation from high school, and correlations between level of educational attainment and alternative paths, socioeconomic status, and ethnic minority status. Alternative paths included part-time student enrollment and leaving school temporarily and returning later. Frequency of path choices and path changes occurring among 1980 graduates were expressed in percentages of the whole. Frequency of degree attainment by members of gender, ethnic, and socioeconomic status groups were also expressed in percentages. He concluded that Black, Hispanic, and lower socioeconomic status students were less likely to have attained a degree within six years of graduating from high school. Only about 20 percent of students pursuing alternative paths attained degrees within four years. Apling (1991b) reported:

> More than one-half of those high school graduates who began full time at four-year institutions in the fall of 1980 continued as full-time students for four years; the other 45 percent either dropped out of postsecondary education or continued on an alternative path . . . (p. 1)

*Past academic experiences.* Past academic experiences were deemed significant influences on undergraduate persistence by Cubeta et al. (2001), Epstein (1984), House (2002), Smart and Pascarella (1987), Spanard (1990), and Wishart (1990). Wishart (1990) acknowledged studies that attempted to predict academic success for students entering college from high school, but inadequate attention had been given to predictors relevant to students who desired to be reinstated in college after suffering an academic setback. In her correlational
study, the records of 187 Iowa State University students were examined. "The variables were selected on the basis of the literature review and the likelihood that information on the variable would be available to academic standards committees who deal with reinstatement decisions. . . Chi-square analysis was run on each of the variables vs. success, . . ." (Wishart, 1990, p. 19). The study concluded there was a negative relationship between past grade point averages and future academic success of students who left college and later returned.

House (2002) surveyed 1,849 first-time, full-time college students with regard to their high school experiences and beliefs. Dependent variables included GPA at the two- and four-semester milestones and persistence through two full years of college. There appeared to be significant predictive value in having completed high school courses in English, math, physical science, foreign language, and computer science for these students' college GPA at the 2-semester mark. High school senior year time management was also a significant predictor of GPA at both the 2- and 4-semester marks in college.

Institutional environment. Gillespie and Noble (1992) observed that previous studies of persistence had not included several significant factors, including "the relationship between student characteristics and institutional environment, an adequate definition of dropout, [and] a theoretical framework to explain the attrition process . . ." (p. 1). Their correlational study used surveys administered to freshmen at three key points during the freshman year as well as data from the American College Test (ACT) Assessment, the ACT Institutional Data Questionnaire, and the Market Data Retrieval high school files. Student persistence was modeled at the four
critical points during the freshman year, and analyzed using linear and logistic regression. The logistic regression appeared to identify freshmen students at high risk of attrition. Gillespie and Noble concluded that the persistence model was not generalizable across institutions but appeared to have value in helping individual institutions predict students who were likely to drop out, which could be used to develop intervention programs to improve student retention. Lyons (1991) also noted a relationship between persistence and school environment, in the context of how well students attained a sense of integration within their school. Ogletree (1992) examined this relationship as well during his study of students who left Chicago Urban University before graduating. Ogletree used a 54-question survey instrument to assess the students' levels of satisfaction with their school and its services, and their reasons for leaving. Over 90 percent indicated satisfaction with the classroom experience. Over 80 percent indicated satisfaction with tutoring, the library, the bookstore, grading systems, instruction, and campus security. Factors rated lowest in satisfaction were financial aid, faculty, admission, and registration. Reasons for leaving included grades (41 percent), costs (36 percent), family responsibilities (31 percent), lack of financial aid (29 percent), and personal problems (27 percent). The students' frustrations appeared to center on personal difficulties and poor academic performance. Over 85 percent of those surveyed indicated their intention to return to the school in the future.

Kahn and Nauta (2001) studied 400 freshmen at a public university using Social Cognitive Career Theory (SCCT) variables. They used two hierarchical logistic regression analyses to test whether goals,
expectations, and "self-efficacy" were related to retention of students beyond the freshman year. The magnitude of these three factors prior to enrollment in college appeared to have no predictive value, but two of the factors, measured during the second semester of the freshman year, were significant.

Nontraditional students. Apling (1991a), Cubeta et al. (2001), Epstein (1984), Spanard (1990), and Wild and Ebbers (2002) studied nontraditional students and identified characteristics that distinguished them from other students. Nontraditional students included those who pursued their education through a combination of full-time and part-time programs as well as stopouts who started college, at some point left, and later returned.

Apling's (1991a) study was prompted by the fact that drawing a clear picture of levels of nontraditional student dependence on federal student aid programs was complicated by category (e.g. full-time vs. part-time, age, parental status, etc.) overlaps. His descriptive/correlational study extracted data from the 1986 National Postsecondary Student Aid Survey Data (NPSAS). He summarized the data in terms of category overlap, frequency of nontraditional student traits, and levels and trends of dependence on Federal (Title IV) adult student financial aid. Correlation coefficients were computed among factors including single-parent status, income, independent (from parental support) status, and dependence on Title IV aid. Trend analysis was attempted based on these correlations. Apling (1991a) concluded that independent and older students receiving federal aid increased during the 1980s; however, the conclusion was complicated by
the fact that federal legislation had changed the definition of independent in 1986. This literature appeared to underscore the need for a consistent definition of nontraditional students.

Wild and Ebbers (2002) discovered an incongruity between how community colleges defined and measured retention and their actual retention-related practices; namely, that the benchmarks and models these colleges relied on had their roots in observations of traditional students at four-year universities, rather than in those of nontraditional students which represented the norm at two-year colleges. They recommended the development of more relevant measurements and studies of cohort groups and learning communities.

*Significant additional issues.* Additional issues, which suggested the existence of significant intervening variables, emerged during the review of literature. Gender was cited by Galliano (1981), who noted differences in work orientation, between genders, among college students. Race was considered significant in the studies of Cubeta et al. (2001), Apling (1991b), and Haagstrom et al. (1991). Apling (1991b) concluded that Black and Hispanic students were less likely to have attained a degree within six years of graduating from high school. Haagstrom et al. (1991) observed that higher proportions of Asians and Pacific Islanders enrolled in college. Socioeconomic status was cited by Apling (1991b), who noted that fewer students of lower socioeconomic status earned their degrees within six years after high school. Family responsibilities were cited by Spanard (1990), Galliano (1981), and Wilson (1990). Wilson (1990) reported that 75 percent of the respondents' family relationships remained unchanged or improved following reentry to higher education. Financial needs were
cited by Spanard (1990) and Apling (1991a), the latter reporting that older students receiving financial aid had increased during the 1980s. Age was cited by Wilson (1990), who observed that persons over age 35 were the fastest growing portion of undergraduate reentry students. Two-year vs. four-year colleges were found to be a significant factor by Hilton (1982), who noted, "The dropout rate for two-year colleges is approximately twice that of four-year colleges, . . ." (p. 15).

Summary and Conceptual Framework

The research literature reviewed in this chapter suggested that older and reentry students often achieved academic success and completed a bachelor’s degree with greater frequency than more traditional students. This observation indicated that the emphasis in our society on direct matriculation from high school to college may have been overemphasized. Several studies reported a relationship between student academic success and personal traits, such as maturity, commitment, and motivation, that may be strengthened during a break in the person’s academic progression, during which they may have completed an intervening work experience. Other studies also suggested that older students who opted for an intervening work experience may enjoy a higher probability of eventually attaining a baccalaureate degree.

Students in their late teens, who have been away from school for a time, may have developed a level of maturity that influenced their undergraduate educational performance. These students may also have established more realistic educational goals for themselves and may reflect a commitment to attain those goals. Among the more important reasons for returning to school was an apparent desire to prepare for a more satisfying career.
The literature review provided the contextual basis and theoretical foundation for this study. An intervening work experience between graduation from high school and entry into college, and traits acquired during that work experience, might have been associated with future baccalaureate degree attainment.
CHAPTER 3

METHODOLOGY/PROCEDURES

Research Design

Introduction

The literature review revealed that returning students may be more motivated and serious than students who matriculate directly from high school into a baccalaureate degree program. However, the literature did not reveal empirical evidence of the persistence rates of directly-matriculating students and the rates of students who returned to school after an absence. The availability of the NLSY79 database provided an opportunity to examine data regarding baccalaureate degree persistence of these two groups.

This chapter describes a conceptual model of the research design. The chapter also addresses research questions to be answered and variables to be examined, as well as potential threats to validity and possible means of controlling the threats. This chapter also describes the target population and records available in the longitudinal NLSY79 database which comprised the sample.

Conceptual Model

This study attempted to describe the demographic characteristics, and educational and life experiences, of two subgroups of the population of high school graduates, and to compare those populations
in terms of their attainment of a baccalaureate degree. Logistic regression was used to assess the likelihood of attaining a bachelor’s degree.

This design was selected because the subjects were self-selected based on their choice of treatments, since it was not possible to randomly assign some of the subjects not to go directly to college from high school while randomly assigning other subjects to do so. The subjects, by virtue of their choice whether or not to attend college directly after graduation from high school, self-selected their respective treatment group. Therefore, manipulation of the independent variable of primary interest was not possible.

Sorting the NLSY79 database resulted in the identification of two asynchronous subgroups of high school graduates, i.e. those who did not complete an intervening work experience after high school graduation and those who entered college after completing a work experience of one to two years.

The NLSY79 database was analyzed to estimate the odds of each subgroup attaining a baccalaureate degree. The analysis further examined the likelihood that the dependent variable might be explained by the presence or absence of an intervening work experience, by other independent (predictor) variables, and the relative importance of these predictor variables.

Variables

Independent

The independent variable of primary interest was a dichotomous measure of a meaningful work experience occurring between the student's graduation from high school and their enrollment in a degree-granting
institution. A work experience was operationally defined as being for a period of at least one year in duration but no more than two years. The existence of a work experience conforming to the operational definition would result in an independent variable equal to "1" for purposes of the dichotomous measurement. The absence of an intervening work experience, or the existence of a work experience not conforming to the operational definition, would result in an independent variable equal to "0". Extracting this and other data from the NLSY79 was facilitated by the NLS Web Investigator, a search tool developed by the Center for Human Resource Research (CHRR) at The Ohio State University. The work experience data were derived from the NLSY79 Web Investigator Area of Interest titled Key Variables, specifically the survey questions pertaining to number of hours worked since the last interview.

Other independent variables were income, number of dependents, years needed to attain the bachelor’s degree, age, gender, race, ACT and SAT scores, and whether or not the student served on active duty in the armed services before or during undergraduate study. These variables are addressed in more detail below in the section titled Control Factors.

Dependent

The dependent variable in this study was the attainment or non-attainment of a baccalaureate degree. This dichotomous variable equaled "1" if the bachelor’s degree was awarded. It equaled "0" if the degree was not awarded. The bachelor’s degree data were derived
from the NLSY79 Web Investigator Area of Interest titled Degrees and Certificates, specifically the survey questions pertaining to the highest degree ever received.

Research Questions and Hypotheses

Questions

The following research questions were developed to guide this study. Findings for each question are addressed individually in Chapter Four.

1. What proportion of cohort members in the NLSY79 longitudinal study did not have an intervening work experience?
2. What proportion of cohort members in the NLSY79 longitudinal study who did not have an intervening work experience attained a bachelor’s degree?
3. What proportion of cohort members who entered college completed an intervening work experience prior to entering college?
4. What proportion of the cohort members who completed an intervening work experience attained a bachelor’s degree?
5. Was the rate of persistence toward college degree completion associated with student involvement in an intervening work experience and/or with other demographic variables?

Hypotheses

A null hypothesis ($H_0$), was developed to explore whether an intervening work experience was statistically independent of persistence toward baccalaureate degree completion. Expressed in the context of logistic regression, the odds ratio ($\text{Exp}(B)$) for the independent variable (work) equaled 1 where the dependent variable (persist) was concerned. The $H_0$ was specified as:
\[ \text{H}_0: \exp(B)_{\text{work}} = 1 \]

The alternate research hypothesis was based on the review of literature and suggested that occurrence of the dependent variable (\text{persist}) might be predicted from the non-occurrence of the independent variable work (work = 0). In the context of logistic regression, the odds ratio (\exp(B)), when work = 0, was less than 1 where the dependent variable (\text{persist}) was concerned. In other words,

\[ \text{H}_a: \exp(B)_{\text{work}} < 1 \text{ when work = 0} \]

Procedures

The 1979-2004 National Longitudinal Survey of Youth Data (NLSY79) enabled the researcher to extract specific kinds of data. The User Guides and the NLS Web Investigator were available from the Center for Human Resource Research (CHRR) at The Ohio State University.

Extraction of the data necessary to examine the hypotheses took the form of a series of inquiries in the following steps:

1. Identified subjects that had earned at least a baccalaureate degree by 1988. The data for 1988 contained the greatest number of valid responses to the survey question, "What is the highest degree you have ever received?" By 1988, the cohorts' age spread was 23 to 31. Scanning data for the following years, it was clear that most of the cohort who had earned, or would earn, at least a bachelor’s degree, had done so by 1988. Missing data due to non-interview of subjects following 1989 steadily increased, reaching 5,025 non-interview missing data codes by 2004.
2. Identified high school graduates who enrolled in college less than a year after they graduated from high school or who otherwise had not fulfilled the operational criteria of an intervening work experience.

3. Identified high school graduates who did not enroll in college less than a year after they graduated from high school, surveyed at one year and two year intervals, who maintained a meaningful working experience (as operationally defined) in the preceding interval. This stratification was based on an operational definition of a meaningful work experience, taking into account hours and duration, which were available in the NLSY79.

4. Identified subjects, who had an intervening meaningful work experience, who had also enrolled in college within two years of their high school graduation.

5. Identified total family net income for the calendar year of the subjects’ graduation from high school.

6. Identified age of the subject at the time of earning a bachelor’s degree (for those who earned a bachelor’s degree by 1988)

7. Identified gender, race, and SAT and ACT composite scores of the subjects.

8. Identified whether subjects had active duty military experience preceding or during undergraduate studies.

9. Identified how many years, from the time of enrollment in college, it took subjects to earn a bachelor’s degree.

10. Identified the number of dependents subjects reported having in the year in which they earned a bachelor’s degree.
Control Factors

Ten potential intervening variables, threats to validity, and possible controls and/or integration into the model were included in the discussion which follows. Selected variables were treated as predictor variables and incorporated into a logistic regression model.

1. Financial needs may have led to dropping out, stopping out, or resorting to part-time student status and affected persistence regardless of a student’s work experience or lack thereof. This would threaten the study’s internal validity through history and/or differential selection. Family income in the calendar year of graduation from high school, adjusted for inflation, was incorporated into the model as a continuous predictor variable. The income data were derived from the NLSY79 Web Investigator Area of Interest titled Key Variables, specifically the survey question pertaining to total net family income in the past calendar year.

2. The demands of family responsibilities may have also led to dropping out, stopping out, or resorting to part-time student status and affect persistence, threatening internal validity through history and/or maturation. This variable was incorporated into the regression model as a continuous predictor variable, with a value equal to the number of dependents reported at the time of graduation from college. This data was derived from the NLSY79 Web Investigator Area of Interest titled Income, specifically the questions pertinent to whether a subject had any dependents and number of dependents.

3. Characteristics associated with nontraditional students, such as advanced age and maturity, and greater incidence of part-time work experiences of varied quality and relevance, may have been confounding
variables that would compromise the internal validity through history effects. Permitting the participation of nontraditional students who might have had two or more interim work experiences interspersed with college attendance could affect external validity through multiple-treatment interference and thus compromise generalizability of the findings of this study. This factor was controlled in part by one of the terms of the operational definition of the meaningful work experience: no less than one year and no more than two years. The profile of persons who met these work criteria was derived from the NLSY79 Web Investigator Area of Interest titled Key Variables, specifically the question pertaining to number of hours worked since last interview.

4. Attempts to control for the preceding variable, nontraditional student characteristics, might have resulted in a built-in threat to internal validity through mortality. Subjects from the subgroup who had the intervening work experience were eliminated if they had a work experience of less than a one year duration or more than a two year duration. Mortality resulting from the loss of follow-up contact with subjects over the passage of years also presented a challenge, which prompted confining the study to those who had earned a Bachelor’s or higher degree by 1988. Use of the NLSY79 database, which tracked the cohort and had a high retention rate, helped to control for mortality.

5. The maximum duration of the intervening work experience was considered, to control yet another intervening variable, chronological age of the subjects. This could compromise internal validity through maturation. Attitudes associated with experiences and value changes occurring over time and attributable to conditions other than work
experience may have influenced decisions to remain in school. Full-time work experiences of longer duration may have had differential effects upon levels of maturity, self-esteem, and decision-making skills. Therefore, the duration of the work experience, in accordance with the operational definition, was limited to no more than two years to control for the effects of both advancing age and a longer work experience. Determination of persons who met these criteria was derived from the NLSY79 Web Investigator Area of Interest titled School, specifically the questions pertinent to the highest grade completed and the highest grade attended in a given year. It was also determined from the NLSY79 Web Investigator Area of Interest titled Key Variables, specifically the question pertaining to number of hours worked since last interview.

6. Gender was shown to be a significant variable in several studies, related in some cases to family responsibilities and the evolving roles of women. Both might have affected students' decisions with regard to degree persistence. Internal validity would have been compromised through history (assumption of new family roles) and differential selection of subjects (possibly resulting from a gender-based cultural predisposition toward the pursuit of higher education). External validity could also have been compromised. This variable was incorporated into the regression model as a dichotomous predictor variable (i.e. 1 = male, 2 = female). Gender of subjects in the NLSY79 was recorded in the database.

7. Race was considered significant in several studies of degree persistence, with mixed conclusions as to its effect as an intervening variable, possibly due to associated socioeconomic relationships with
academic ability, available financial resources to meet educational costs, and cultural predisposition toward higher education. Race, being a potentially significant intervening variable, could have jeopardized the population validity of the study. This variable was incorporated into the regression model as a categorical predictor variable (1 = Hispanic, 2 = Black, and 3 = White Non-Hispanic). Race of the NLSY79 subjects was derived from the NLSY79 Web Investigator Area of Interest titled Common, specifically the question pertaining to a subject’s racial/ethnic cohort.

8. Socioeconomic status may have been related to secondary factors, such as financial status and attitude toward the value of higher education, that could have been intervening variables. Family income in the calendar year of a subject’s graduation from high school, adjusted for inflation, was incorporated into the model as a continuous predictor variable. Income data were derived from the NLSY79 Web Investigator Area of Interest titled Key Variables, specifically the survey question pertaining to total net family income in the past calendar year.

9. Institutional characteristics and environment were cited in several studies as intervening variables with regard to degree persistence. Examples include satisfaction with the school’s policies and services, and close personal identification with the institution. Such factors may have been threats to internal validity in that they influence decisions to remain in school. This variable also threatened external validity, specifically ecological validity, as the results were not generalizable to all campuses. This could have been controlled by confining the study to a single campus, but even on the
largest of campuses it might have been difficult to find a sufficient population of subjects for which (a) all the intervening variables were controlled, which was then subdivided into (b) a sub-population of subjects who came directly to that institution with no intervening work experience and (c) a sub-population of subjects who came to that institution after a work experience meeting the criteria of this study’s design, and from which (d) two random samples of sufficient size could have been selected. Use of the NLSY79 data, being nationwide and based on a population of over 12,000 subjects in almost all fifty states, was assumed to adequately control this potential threat.

10. Military service, while meeting the criteria for a meaningful work experience (if it were between one and two years in duration), could have been an intervening variable, as it was considered significant in at least one study (Haagstrom et al., 1991). This factor could have threatened internal validity, again through differential selection of subjects. To control for this, active duty military service that occurred before or during a subject’s undergraduate studies was incorporated into the regression model as a dichotomous predictor variable (i.e. 0 = no active duty military service, and 1 = active duty military service). The military status of NLSY79 subjects was derived from the NLSY79 Web Investigator Area of Interest titled Current Population Survey (CPS), specifically the survey question pertaining to activity during most of the survey week. The question and its responses were structured such that a subject on
active duty could not respond and was instructed to skip to the next question. For these subjects, a response code of "-4", which refers to a "Valid Skip", appears.

In this design, the most apparent threat to internal validity was based on the differential selection of subjects because the two groups were already formed. The greatest threat to external validity was selection-treatment interaction, for the same reason. Obviously, it was not possible through direct manipulation to randomly assign subjects, a priori, to a treatment group. This research design attempted to limit these effects by incorporating potentially confounding variables into the regression model as predictor variables.

The possibility still existed, that despite efforts to control threats to validity and incorporate variables into the model, that the groups possessed different traits or sets of values that influenced their decision to matriculate directly into college or to engage in a meaningful work experience for one to two years. These traits, in turn, may conceivably have predisposed the subjects with regard to persistence (selection-maturation interaction). This potential compromise to validity was mitigated by a practical consideration. The choice of whether to work first or go directly to college would never be intrusively applied, regardless of the outcome of this study, even if the alternate hypothesis were supported by the analysis and the outcome were to be widely accepted. At most, guidance counselors, teachers, and parents might encourage students to consider the merits of an interim work experience before embarking upon college studies. Perhaps it is possible that students who possess certain personality traits that may lead to a decision to work first, and enroll in college
later, have a higher probability of success. Such students may feel compelled to enter college directly, in the face of peer pressure or conventional guidance counseling in high schools. These students might subsequently suffer frustration and educational setbacks. If there were empirical evidence that baccalaureate degree persistence was enhanced by an intervening work experience, then students might be counseled to at least consider those latent traits and decide on a work-first, school-later path that might be ultimately more rewarding.

Another threat to external validity related to the specificity of variables. Controls over the intervening variables may have resulted in rather narrowly defined (i.e. homogeneous) subjects in the comparison groups. The only control for this threat was to exercise due care in attempting to generalize results to other populations and postsecondary institutions. The outcome may suggest the need for similar studies that attempt replication with different categories of subjects, on different campuses, in different kinds of postsecondary experiences, and with different operational definitions.

Population and Sample

The most feasible strategy for this study was to use an existing longitudinal database. The 1979-2004 National Longitudinal Survey of Youth Data (NLSY79), sponsored by the Bureau of Labor Statistics of the U.S. Department of Labor, and managed under contract by the Center for Human Resource Research (CHRR) at The Ohio State University, provided such a database. The NLSY79 was a nationally representative sample of 12,686 youth, born between the years 1957 and 1964, and first surveyed in 1979. The respondents were re-surveyed annually from 1980 to 1994, and biennially from 1996 to the present. "The primary purpose of the
NLSY79 is the collection of data on each respondent's labor force experiences, labor market attachment, and investments in education and training" (U.S. Department of Labor, 2001, p. 3). Because the study was sponsored by the Department of Labor, considerable detail was available about the subjects' work experiences, including hours worked during a given period, which allowed for a valid operational definition and measurement of "meaningful" intervening work experiences. Considerable detail was also available with regard to the subjects' educational experiences and which respondents attained degrees and when. Each subject was identified by a unique reference number which was retained by that subject throughout the life of the study.

Subjects in the NLSY79 who graduated from high school were identified first. This comprised the population of interest. The population was then sorted to create three subgroups: (a) those who attained a bachelor's degree or higher, (b) those who went to college but never had an intervening work experience, and (c) those who had an intervening work experience before entering college one to two years after graduation from high school.

Instrumentation

Different sets of survey instruments were used during each year included in the NLSY79 database. One was the Household Interview Form. Each NLSY79 interview gathered information about persons in each subject's household. For NLSY79 subjects, the household data were gathered before the main questionnaire was administered. In many of the years spanned by the study, survey instruments called Household Interview Forms were used. The NLSY79 1978 Household Screener and Interviewer's Reference Manual includes detailed information about the
screening process of households included in 1978 by the National Opinion Research Center (NORC). *NLSY79 Household Interview Forms* were used to count all persons residing in the subject’s household at the time, and to gather data about age, highest grade completed, work experiences of the past year, the relationship of each household member to the subject, and income information during the 1979-86 surveys.

Different versions of the *Household Interview Forms* were used during the 1979-86 interviews, determined by the subjects' places of residence. Version A was used for subjects residing with parents or in-laws and information was collected on income sources. Version B was used if the subject lived in group quarters (i.e. college dormitory or military barracks) or in temporary quarters (i.e. hospital or prison).

In the first eight years of NLSY79, many subjects were younger than 18 and residing with parents and therefore Version A was used. Starting with the 1987 data collection, all subjects were 21 or older and for the most part living away from parents. For these, the household interview forms were combined. Numerous other interviewing aids, questionnaires and supplements were used. These are described in detail in Chapter Three of the NLSY79 User’s Guide (U.S. Department of Labor, 2001).

**Data Collection**

To collect data for the NLSY79, the National Opinion Research Center (NORC) used two procedures to screen a large number of potential subjects. Household screening interviews were used to select the NLSY79 civilian cross-sectional and supplemental subsamples from the general civilian population in order to identify subjects of the correct age and ethnic background. A military sample was identified by a second
screening. Field interviewers went to preselected households to conduct the civilian screening. Department of Defense internal records were used to draw the military sample.

NORC conducted the civilian sample screening interviews in about 75,000 residences and group living facilities. These interviews were carried out in 1,818 sample segments of 202 Primary Sampling Units (PSUs), conducted in most of the fifty states. Screening interviews were structured to obtain information that would be used to earmark subjects for the NLSY79 sample. The civilian screening interviews were carried out within 91.2 percent of the cross-sectional and 91.9 percent of the supplemental residences chosen for screening.

The Cross-Sectional Sample was collected using about 18,000 of the screening interviews, conducted among 918 sample segments in 102 Primary Sampling Units (PSUs). The PSUs had been selected from the NORC Master Probability Sample.

The Supplemental Sample was gathered using about 57,000 screening interviews, conducted among 900 sample segments in a 100-PSU sample. This sample was structured to glean statistically efficient samples of Latino and African American persons, as well as economically disadvantaged persons who were neither Latino nor African American.

Data collection for this study began with identification of the population of students graduating from high school during the years spanned by the NLSY79. The next step involved identification of the subgroup of those in each graduating class who entered college within a year of their high school graduation.

The next phase of data analysis was stratification of the population to control selected intervening variables and selection of
predictor variables for incorporation into the model. The subgroups were examined to determine how many members of each subgroup had earned an undergraduate degree.

Data Analysis

Analysis of the Independent Variable of Primary Interest

1. The students who graduated from high school during the years 1977 to 1984 and did not have an intervening work experience year were identified.

2. The students who graduated from high school during the years 1977 to 1984, completed an intervening work experience prior to college, and then enrolled in college within two years of their graduation from high school were identified.

3. Binary logistic regression was used to determine whether the presence of an intervening work experience, in combination with other independent variables, was a significant predictor variable with regard to the attainment of a bachelor’s degree.

Analysis of the Dependent Variable

1. The proportion of the first group who earned a bachelor’s degree was calculated. This information was obtained by dividing the number of persons in this group who earned a baccalaureate degree by the total number of persons in this group.

2. The proportion of the second group who earned a bachelor’s degree was calculated. This information was obtained by dividing the number of persons in this group who earned a baccalaureate degree by the total number of persons in this group.

The data were analyzed using binary logistic regression to determine whether the likelihood of persistence appeared to be
predicted by the intervening work experience. The null hypothesis was to be rejected (and the alternate hypothesis inferred) if the analysis yielded a significant value (based on an a priori alpha ≤ .05), which would indicate that the likelihood of persistence of the group with an intervening work experience was greater than that of the group without such an experience. The null hypothesis would also have been rejected but it would not have been possible to infer the alternate hypothesis if data analysis yielded a significant difference, but the likelihood of persistence of the control group was greater than that of the experimental group.

Analysis of the intervening work experience as a predictor variable, in combination with other predictor variables, was conducted using a logistic regression model.

Logistic Regression is a regression method used when the dependent variable is dichotomous. Logistic regression is used to predict the likelihood (the odds ratio) of the outcome based on the predictor variables (called covariates in logistic regression). The significance of the logistic regression can be evaluated by the log likelihood test, given as the model chi-square test, evaluated at the p < .05 level, or the Wald statistic. . . . The assumptions of logistic regression do not include linearity between the covariates and dependent variable, normality, nor homogeneity of variance. The assumptions of multicollinearity, linearity of the logits(tested by Box-Tidwell Transformation), and the omission of outliers are critical to logistic regression. (Statistics Solutions, Inc., 2004)

The model, expressed in simplified SPSS syntax and based on Garson (2006a), is as follows:

LOGISTIC REGRESSION /VARIABLES persist WITH work income gender race SAT ACT age yrs to deg, mil, depend
/CATEGORICAL=persist, work, gender, race, mil
/METHOD FSTEP(LR)
Wherein:

persist = the dichotomous categorical dependent variable: whether or not a bachelor’s degree was attained
work = the dichotomous categorical predictor variable of primary interest: whether or not an intervening work experience occurred
income = a continuous predictor variable: the annual income of the student's family in the year of graduation from high school
dependents = a continuous predictor variable: the number of dependents the student reported having in the year in which the student earned a bachelor’s degree
yrstodeg = a continuous predictor variable: the number of years required by the student to attain a bachelor’s degree after enrollment in college
age = a continuous predictor variable: age of the student at the time of earning the bachelor’s degree
gender = a dichotomous categorical predictor variable: male or female
race = a categorical predictor variable using the race categories defined by NLSY79: Hispanic, Black, and White/Non-Hispanic
ACT = a continuous predictor variable: composite ACT score
SAT = a continuous predictor variable: total SAT score
mil = a dichotomous categorical predictor variable: whether or not the student served on active duty in the armed services preceding or coinciding with undergraduate study
METHOD = ENTER(LR) = The method of computation is logistic regression using likelihood ratio criteria for the stepwise addition of variables to the model.

Summary

Logistic regression was selected to assess the likelihood of attaining a bachelor’s degree based on observations of a set of independent (predictor) variables. The dependent variable was established as a dichotomous categorical variable that indicated whether or not a subject in the NLSY79 had earned a degree or not. The categorical predictor variables included the occurrence or non-occurrence of an intervening work experience, gender, race, and the occurrence or non-occurrence of an active duty military experience. The continuous predictor variables included income in the year of graduation from high school, number of dependents reported by the subject in the year of earning the bachelor’s degree, how many years a subject took to earn the degree, the subject’s age at the time of earning the degree, and the subject’s ACT and/or SAT scores. Potential intervening variables were controlled through stratification based on operational definitions of variables or were integrated into the model. Reasonable external validity was assumed by virtue of the fact the cohort of over 12,000 subjects in the NLSY79 had been drawn from nearly all fifty states.
The purpose of this study was to explore the extent to which an intervening work experience prior to completing a bachelor's degree might be a predictor of persistence to degree completion after high school graduation. The original null hypothesis, expressed in the context of logistic regression, was that the odds ratio (Exp(B)) for the independent variable (work) equaled 1 where the dependent variable (persist) was concerned. The $H_0$ was specified as:

$$H_0: \text{Exp(B)}_{\text{work}} = 1$$

A review of literature, upon which the theory was based, suggested that the analysis of data would lead to rejection of the null hypothesis in favor of an alternate hypothesis that occurrence of the dependent variable (persist) could be predicted from the non-occurrence of the independent variable work (work = 0). In the context of logistic regression, the odds ratio (Exp(B)), when work = 0, was less than 1 where the dependent variable (persist) was concerned. In other words,

$$H_a: \text{Exp(B)}_{\text{work}} < 1 \text{ when work = 0}$$

This study was also conducted to examine whether demographic characteristics, and educational and life experiences, might also be
predictors of attainment of a baccalaureate degree. Logistic regression was used to assess the likelihood of attaining a bachelor’s degree.

Logistic regression was selected because the subjects were self-selected based on their choice of treatments, since it was not possible to randomly assign the subjects to go or not to go directly to college from high school. The subjects, by virtue of their choice whether or not to attend college directly after graduation from high school, self-selected their respective treatment group. Therefore, manipulation of the independent variable of primary interest was not possible.

This chapter begins with a summary of data mining activities of the NLSY79 data using NLS Web Investigator, a search tool developed by the Center for Human Resource Research (CHRR) at The Ohio State University. The chapter continues with explanations of the conversions of the raw data into the variables of interest in this study using Microsoft Excel spreadsheet software. Descriptions of each of the variables follow.

**PERSISTENCE Dependent Variable**

According to the operational definition, the dependent variable titled persistence was basically whether or not a subject in the NLSY79 cohort earned a bachelor’s degree. The NLSY79 Survey responses to the question, "What is the name of the highest degree you have ever received?" were coded using one of eight responses as follows: 1 = High School Diploma (or equivalent), 2 = Associate/Junior College (AA), 3 = Bachelor Of Arts Degree (BA), 4 = Bachelor Of Science (BS), 5 = Master's Degree (MA,MBA,MS,MSW), 6 = Doctoral Degree (PhD), 7 = Professional Degree (MD,LLD,DDS), and 8 = Other.
If none of the above responses were reported for a given year, a code for missing data appeared as one of a series of negative numbers as follows: -1 = Refusal, -2 = Don't Know, -3 = Invalid Skip (interviewer or subject error), -4 = Valid Skip (based on the subject's response to the preceding question, this question was irrelevant.), and -5 = Non-Interviewed (subject could not be located, etc.).

The data for 1988 contained the greatest number of valid responses to this question. By 1988, the cohorts' age spread was 23 to

<table>
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<th>n</th>
<th>Code No.</th>
<th>Variable</th>
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</thead>
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<tr>
<td>6,031</td>
<td>1</td>
<td>High School Diploma (or equivalent)</td>
</tr>
<tr>
<td>626</td>
<td>2</td>
<td>Associate/Junior College (AA)</td>
</tr>
<tr>
<td>587</td>
<td>3</td>
<td>Bachelor of Arts Degree (BA)</td>
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<tr>
<td>922</td>
<td>4</td>
<td>Bachelor of Science (BS)</td>
</tr>
<tr>
<td>178</td>
<td>5</td>
<td>Master's Degree (MA,MBA,MS,MSW)</td>
</tr>
<tr>
<td>11</td>
<td>6</td>
<td>Doctoral Degree (PhD)</td>
</tr>
<tr>
<td>49</td>
<td>7</td>
<td>Professional Degree (MD,LLD,DDS)</td>
</tr>
<tr>
<td>160</td>
<td>8</td>
<td>Other</td>
</tr>
<tr>
<td>1</td>
<td>-1</td>
<td>Refusal</td>
</tr>
<tr>
<td>0</td>
<td>-2</td>
<td>Don't Know</td>
</tr>
<tr>
<td>6</td>
<td>-3</td>
<td>Invalid Skip</td>
</tr>
<tr>
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<td>2,221</td>
<td>-5</td>
<td>Non-Interviewed</td>
</tr>
<tr>
<td>12,686</td>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Frequencies of Degree Attainment and Missing Data Codes in 1988 Cohort.
31. Scanning data for the following years, it was clear that most of the cohort who had earned, or would earn, at least a bachelor’s degree, had done so by 1988. The incidence of missing data due to non-interview of subjects after 1989 steadily increased, reaching 5,025 cases by 2004. The frequencies of valid responses and missing data codes in the 1988 survey are presented in Table 1.

Compiling the data enabled the researcher to determine whether or not subjects had received a bachelor’s degree or higher for 8,564 subjects based on valid responses to the question. For another 1,894 subjects, it was determined that they had not received a bachelor’s degree or higher because none of the eight possible responses were relevant to them. Therefore, it was determined one way or the other for a total of 10,458 subjects. Out of these, it was established that 1,747 subjects had earned a bachelor’s degree or higher based on their responses to the question, "What is the name of the highest degree you have ever received?" It was also established that 8,711 subjects had not earned a bachelor’s degree or higher. There were 2,228 subjects in the 1988 cohort that could not be determined whether or not they had earned such a degree, and their cases were eliminated from the valid cohort group. This yielded 10,458 valid cases that provided data comprising the dependent variable. Since the dependent variable in the binary logistic regression model was dichotomous, those who had earned the degree were coded "1" and those who had not earned the degree were coded "0". These data were entered into Microsoft Excel spreadsheets and analyzed using binary logistic regression.
Independent Variables

WORK EXPERIENCE independent variable. According to the operational definition, the work experience independent variable denoted whether or not a subject had taken a year or two off from school between high school and college, and whether they had worked full-time for at least one year during that intervening period. To determine whether or not the subjects had met the criteria for the intervening work experience, it was necessary to mine selected NLSY79 data for the years 1979 through 1985. Subjects entering college in 1985 or later would not have reasonably had sufficient time to fulfill the criteria of at least a two-year break in school including at least one year of full-time work experience and then earn a bachelor’s degree by 1988. The following data were extracted for each of these years (1979 through 1985), using NLS Web Investigator: (a) highest grade completed in a given year, (b) highest grade attended in a given year, and (c) number of hours worked since the preceding interview. This yielded a spreadsheet comprised of 266,406 data fields. The researcher constructed a series of conditional array formulas which imposed the operational definition criteria for each year's data.

Compiling this data, it was determined whether or not an intervening work experience had occurred for 3,020 subjects; 242 had the work experience and 2,778 did not have the work experience. 9,666 lacked data with which to determine either way; one or more of the criteria (highest grade completed, highest grade attended, and/or hours worked) were missing due to interviewer or subject error, non-interview, etc.) The work experience independent variable in the binary logistic regression model was dichotomous; therefore, those who
had the work experience were coded “1” and those who did not were coded “0”. These codes were entered into the master spreadsheet which was used in conjunction with the logistic regression model.

INCOME independent variable. Constructing this variable also involved mining selected NLSY79 data for the years 1979 through 1985. Subjects entering college in 1985 or later would not reasonably have sufficient time to fulfill the criteria of at least a two-year break in school including a one-year full-time intervening work experience and then earn a bachelor’s degree by 1988. The following data were extracted for each of these years, using NLS Web Investigator: (a) household income for the calendar year preceding the survey year, and (b) highest grade completed as of May 1st of the survey year; this meant that in most cases the subject had actually completed high school the preceding calendar year, which coincided with the Household Income year. This process yielded a spreadsheet containing 177,604 data fields. The researcher converted the income records to constant dollars to adjust for inflation. 1984 was selected as the baseline year based on an assumption that many of the 1,747 cohort members who had earned a bachelor’s degree by 1988 would have started college about 1984. All income records were converted to constant 1984 dollars using the NASA Johnson Space Center Cost Estimating and Assessment Center's Consumer Price Index (CPI) Inflation Calculator, which uses the Bureau of Labor Statistics' CPI Index Tables.

The researcher constructed a series of conditional array formulas which imposed the following criteria on each year's data: (a) if the subject reported for the first time a highest grade completed equaling 12 as of May 1st of the survey year, the income variable for that
subject would be the adjusted Household Income for the preceding calendar year, and (b) if the subject completed high school in 1977 or earlier, the income variable for that subject would be a missing data record, as the NLSY79 does not contain household income data for years prior to 1978.

Adjusted household income was determined for 6,632 subjects based on valid responses to survey questions. The adjusted household income was not determined for 6,054 subjects due to interviewer or subject errors, non-interview, or having completed high school in 1977 or earlier. The income variable in the binary logistic regression model was continuous; therefore the valid figures were entered directly into the master spreadsheet for analysis.

AGE independent variable. The NLSY79 User’s Guide (U.S. Department of Labor, 2001) advised that discrepancies between survey subjects' reported ages and reported dates of birth in 1979 prompted a re-survey of subjects' ages in 1981. The 1981 age data were considered to be more reliable. The age independent variable was the age of the subject at the time of earning a bachelor’s degree. The following data were extracted using NLS Web Investigator:

1. Age of subject as of 1981.
2. Highest Degree ("Degree" included high school diploma or equivalent, college degrees, certificates, etc.) ever earned by the subject as of 1988.
3. Year in which the highest degree ever earned as of 1988 had actually been earned by the subject.
4. Highest Grade Completed as of years 1979 through 1988. The extraction of these four data records yielded a series of spreadsheets with a combined total of 164,918 data records.

The researcher constructed conditional array formulas which imposed the following criteria on each year's data:

1. If the subject reported, as of 1988, a highest degree ever earned as being a bachelor’s degree, this was indexed to the year in which the subject reported having actually earned that degree.

2. If the subject reported, as of 1988, a highest degree ever earned as being a master’s degree or higher, data for the years in which those subjects had earned their first bachelor’s degree was not directly available from a survey question. It was necessary to construct that data by determining the year in which those subjects had first reported completing their 16th grade of education. While not a perfect indicator, this was the best feasible approximation of the year of completion of the bachelor’s degree for these subjects.

3. The difference between the year in which the subject had earned a bachelor’s degree and 1981 was calculated; that figure was then added to or subtracted from the subject's age as reported in 1981 to arrive at the subject's age when the bachelor’s degree was earned.

Compiling this data, of the 1,747 subjects who had been established as having earned bachelor’s degrees or higher as of 1988, ages could be determined for 1,717 subjects based on valid responses to survey questions. The ages could not be determined for 30 subjects due to interviewer or subject errors, or non-interview. The age variable in
the binary logistic regression model was continuous; therefore the valid figures were entered directly into a master Excel spreadsheet for analysis.

**GENDER independent variable.** Gender data was extracted from the 1979 survey year data and coded as (a) Male = 1 and (b) Female = 2. The gender breakout was as follows: (a) 6,403 males, and (b) 6,283 females. The gender variable in the logistic regression model was categorical; therefore the codes were entered directly into the master Excel spreadsheet for analysis.

**RACE independent variable.** Race data was extracted from the 1979 survey year data, coded as: 1 = Hispanic, 2 = Black, and 3 = Non-Black, Non-Hispanic (White) = 3. The race breakout was as follows: (a) 2,002 Hispanic, (b) 3,174 Black, and (c) 7,510 Non-Black, Non-Hispanic (White). The race variable in the regression model was categorical; therefore the codes were entered directly into the master Excel spreadsheet for analysis.

**SAT and ACT SCORES independent variables.** The NLSY79 conducted school transcript surveys in 1980 to obtain selected standardized aptitude test scores for members of the cohort. These included 1,124 ACT scores and 948 SAT scores. These were reported as separate Math and Verbal battery scores. The researcher constructed conditional array formulas to average the ACT Math and Verbal Scores to obtain an ACT composite score, and to add the SAT Math and Verbal scores to obtain an SAT composite score. An average of the ACT scores, and a total of the SAT scores, for a single representative score, were the practices of the day in the 1970s and 80s by the publishers of the two tests. The
ACT and SAT variables in the regression model were continuous; therefore the codes were entered, as two discrete variables, directly into the master spreadsheet for analysis.

**MILITARY independent variable.** The NLSY79 User’s Guide (U.S. Department of Labor, 2001) advised that there was no specific survey variable for identifying members of the active duty armed services; however, there was a simple procedure to identify, on a year-to-year basis for 1979 through 1993, which subjects were on active duty as of the date of the survey. The Current Population Survey section of the NLSY79 questionnaire asked for "Activity during most of the survey week." The question and its responses were structured such that a subject on active duty could not respond and was instructed to skip to the next question. For these subjects, a code of "-4", which referred to a "Valid Skip", appeared.

Active duty service often not only preceded, but also coincided with, enrollment in college. The armed services encouraged their members to pursue academic education and provided resources to facilitate undergraduate education, including extension classes conducted in the evening and/or on weekends at military installations. The potential effect of active duty service as a predictor variable in the regression model, given these considerations, could be derived from the active duty period preceding or coinciding with undergraduate study.

The following data were extracted using NLS Web Investigator:

1. Occurrence of the code "-4" (Valid Skip) in response to the question regarding "Activity during most of the survey week" for each subject for each year 1979 through 1988.
2. Highest Grade Completed as of years 1979 through 1988. This data mining process yielded a series of spreadsheets with a combined total of 253,720 data records. The researcher constructed a series of conditional array formulas which imposed the following criteria on each year's data:

a. Subjects that reported being on active duty in any year in which they also reported a highest grade of education completed equal to or less than 15 were considered to have had an active duty experience preceding or coinciding with undergraduate study. The grade 15 threshold was selected because the survey question is actually "What is the highest grade completed as of May 1st of this survey year?" Based on the typical academic year, in the majority of cases, the highest grade completed reported as of May 1st was likely actually completed in the preceding calendar year. If the subject reported being on active duty for the first time in the same year as reporting having completed grade 15, the start of the active duty likely followed completion of grade 16 of education. Although it has been previously stated that the armed services encouraged members to pursue academic education, the exception is the first 4-18 months of active duty, when the new recruit is typically preoccupied with basic military and technical training programs. It is therefore highly unlikely that a new active duty member's training could coincide with completion of grade 16 of education.

b. Subjects that reported being on active duty for as little as only once or twice during the period 1979 through 1988, if it preceded or coincided with undergraduate study, were considered to have had an
active duty experience. Members of the armed services were sometimes
given medical or family hardship discharges following brief periods of
service.

c. Subjects that never reported being on active duty, or
reported being on active duty only in years in which they also reported
a highest grade completed equal to or greater than 16, were considered
not to have had an active duty experience preceding or coinciding with
undergraduate study.

Compiling this data, it could be determined whether or not an
active duty experience had occurred for 10,353 subjects based on valid
responses to survey questions. Therefore, the following could be
determined: (a) 1,817 had active duty military experience, (b) 8,536
did not, and (c) 2,223 lacked data from which it could be determined
either way. The compilation process yielded 10,353 subjects comprising
the military independent variable. The military variable in the binary
logistic regression model was dichotomous and those who had the active
duty experience were coded "1" and those who did not were coded "0".
These data were entered into a master Excel spreadsheet for analysis.

YEARS TO DEGREE independent variable. The years to degree
independent variable was the number of years from the time of starting
college to the time of earning a bachelor’s degree. The following data
were extracted using NLS Web Investigator: (a) Highest Grade Completed
as of years 1979 through 1985, (b) Highest Grade Attended as of years
1979 through 1985, and (c) the calendar years in which subjects earned
a bachelor’s degree. This process of data mining and compilation
produced a series of spreadsheets with a combined total of 190,290 data
records. A series of conditional array formulas imposed the following
criteria on each year's data: (a) subjects that reported a Highest Grade Completed of 12 and a Highest Grade Attended of 13 in the same survey year were considered to have started college in that year, and (b) the difference between the year in which the bachelor's degree was earned and the year in which the subject started college was calculated. This yielded how many years the subject took to attain the degree. The years to degree variable in the binary logistic regression model was continuous; therefore the data were entered directly into the master spreadsheet.

DEPENDENTS independent variable. The dependents independent variable was the number of dependents the subject reported having in the year in which the subject earned a bachelor’s degree. The following data were extracted using NLS Web Investigator: (a) Responses to the questions "Do you have dependents?" (b) "If so, how many?" for the years 1979 through 1988, and (c) the calendar years in which subjects earned a bachelor’s degree. The latter was part of the dataset that had been calculated during the construction of the variable for determining the subject's age at the time of earning the bachelor’s degree. This data mining and conversion process resulted in a spreadsheet with a total of 266,406 data records. It was then necessary to construct a series of Excel conditional array formulas which indexed the number of dependents in a given year to the year in which the subject earned a bachelor’s degree.

Compiling this data, of the 1,747 subjects who had been confirmed as having earned bachelor’s degrees or higher as of 1988, the numbers of dependents they had in the year in which they received the bachelor’s degree could be determined for 1,731 subjects, based on
valid responses to survey questions. The dependents could not be determined for 16 subjects due to refusal to respond, interviewer or subject errors, or non-interview.

The number of dependents reported by subjects in the year the subjects received their bachelor’s degree were as follows: 1,668 subjects with 0 dependents, 42 subjects with 1 dependent, 13 subjects with 2 dependents, 2 subjects with 3 dependents, 1 subject with 4 dependents, 4 subjects with 5 dependents, and 1 subject with 6 dependents. The dependents variable in the logistic regression model was continuous; therefore the figures obtained were entered directly into the master spreadsheet for analysis.

Results by Research Question/Hypothesis

Research Questions

1. What proportion of cohort members did not have an intervening work experience? Of the 3,020 subjects in the NLSY79 cohort within the years studied, for whom it could be determined whether or not they had an intervening work experience; 2,778 (92%) did not have an intervening work experience.

2. What proportion of cohort members who did not have an intervening work experience attained a bachelor’s degree? Of the 2,778 subjects without an intervening work experience, within the years studied, 1,735 (62.5%) subsequently earned a baccalaureate degree by 1988.

3. What proportion of cohort members who entered college, for whom it could be determined whether or not they had an intervening work experience, completed an intervening work experience prior to entering college? Out of 3,020 in the cohort for whom it could be determined...
whether or not they had an intervening work experience, and who entered college within the years studied; 242 (8%) completed an intervening work experience of at least one year between high school graduation and college.

4. What proportion of the high school graduates who completed an intervening work experience attained a bachelor’s degree? Out of 242 subjects who completed the intervening work experience, within the years studied, 12 (5%) subsequently earned a baccalaureate degree.

5. Is the rate of persistence toward college degree completion associated with student involvement in an intervening work experience? Initial results of binary logistic regression analyses indicated the odds of a subject who did not have an intervening work experience meeting the criteria of the operational definition but who persisted to the earning of a bachelor’s degree were approximately 12 times those of a subject who did have the intervening work experience.

Hypotheses

The analysis did not support the null hypothesis in that there was an apparent significant difference between the likelihood of persistence of those subjects who had the intervening work experience and those who did not. However, the outcome was opposite that expressed by the alternate hypothesis in that it appeared that the likelihood of persistence of those who did not have the intervening work experience was significantly greater than that of those who had the work experience.
Analysis Findings

Missing Data

Due to the large amount of missing data in the NLSY79, the SPSS 14.0 Missing Value Analysis (MVA) module was applied (see Table 2). Little's MCAR test resulted in a significance value of < .001. Garson (2006b) suggested that, given this significance value, missing data were not "missing completely at random" (MCAR). Garson advised, "If data are not MCAR, missing values should be imputed" (p. 2). With regard to imputation methods, Garson commented on the Maximum Likelihood Estimation (MLE) which can be executed in SPSS by the Expectation Maximization (EM) algorithm: "MLE makes fewer demands of the data in terms of statistical assumptions and is generally considered superior to imputation by multiple regression. This is now the most common method of imputation" (p. 4).

Univariate Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Missing</th>
<th>No. of Extremes(a)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Count</td>
<td>Percent</td>
</tr>
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<td>25134.27</td>
<td>20750.69</td>
<td>7826</td>
<td>61.7</td>
</tr>
<tr>
<td>sat</td>
<td>948</td>
<td>854.47</td>
<td>226.06</td>
<td>11738</td>
<td>92.5</td>
</tr>
<tr>
<td>act</td>
<td>1124</td>
<td>17.49</td>
<td>6.24</td>
<td>11562</td>
<td>91.1</td>
</tr>
<tr>
<td>age</td>
<td>1717</td>
<td>22.32</td>
<td>1.69</td>
<td>10969</td>
<td>86.5</td>
</tr>
<tr>
<td>yrstdeg</td>
<td>999</td>
<td>4.78</td>
<td>1.19</td>
<td>11687</td>
<td>92.1</td>
</tr>
<tr>
<td>Depend</td>
<td>1709</td>
<td>0.05</td>
<td>0.42</td>
<td>10977</td>
<td>86.5</td>
</tr>
<tr>
<td>persist</td>
<td>10458</td>
<td></td>
<td></td>
<td>2228</td>
<td>17.6</td>
</tr>
<tr>
<td>work</td>
<td>3349</td>
<td></td>
<td></td>
<td>9337</td>
<td>73.6</td>
</tr>
<tr>
<td>gender</td>
<td>12686</td>
<td></td>
<td></td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>race</td>
<td>12686</td>
<td></td>
<td></td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>mil</td>
<td>10353</td>
<td></td>
<td></td>
<td>2333</td>
<td>18.4</td>
</tr>
</tbody>
</table>

* Number of cases outside the range (Mean - 2*SD, Mean + 2*SD).

Continued

Table 2: Missing Value Analysis Using Expectation Maximization.
Table 2 continued

**Tabulated Patterns**

<table>
<thead>
<tr>
<th>Number of Cases</th>
<th>Missing Patterns&lt;sup&gt;(a)&lt;/sup&gt;</th>
<th>Complete if &lt;sup&gt;(b)&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>g  r  p  m  i  w  y  d  a  s  c</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>170</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>320</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>178</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>156</td>
<td>X  X  X</td>
<td>X</td>
</tr>
<tr>
<td>329</td>
<td>X  X  X</td>
<td>X  X</td>
</tr>
<tr>
<td>1064</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X  X</td>
</tr>
<tr>
<td>214</td>
<td>X  X  X</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>X  X  X</td>
<td></td>
</tr>
<tr>
<td>1798</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X  X</td>
</tr>
<tr>
<td>159</td>
<td>X  X  X  X</td>
<td></td>
</tr>
<tr>
<td>322</td>
<td>X  X  X  X  X</td>
<td></td>
</tr>
<tr>
<td>143</td>
<td>X  X  X  X  X  X</td>
<td></td>
</tr>
<tr>
<td>733</td>
<td>X  X  X  X  X  X</td>
<td></td>
</tr>
<tr>
<td>3623</td>
<td>X  X  X  X  X  X</td>
<td></td>
</tr>
<tr>
<td>136</td>
<td>X  X  X  X  X  X</td>
<td></td>
</tr>
<tr>
<td>868</td>
<td>X  X  X  X  X  X</td>
<td></td>
</tr>
<tr>
<td>650</td>
<td>X  X  X  X  X  X  X</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Variables are sorted on missing patterns.
<sup>b</sup> Number of complete cases if variables missing in that pattern (marked with X) are not used.

**EM Means<sup>(a,b)</sup>**

<table>
<thead>
<tr>
<th>income</th>
<th>sat</th>
<th>act</th>
<th>age</th>
<th>yrsto</th>
<th>Depend</th>
</tr>
</thead>
<tbody>
<tr>
<td>25146.40</td>
<td>833.09</td>
<td>17.11</td>
<td>22.39</td>
<td>4.87</td>
<td>0.06</td>
</tr>
</tbody>
</table>

<sup>a</sup> Little's MCAR test: Chi-Square = 842.081, DF = 95, Sig. = .000
<sup>b</sup> The EM algorithm failed to converge in 25 iterations.
Income, SAT and ACT scores, age at time of earning the bachelor’s degree, and years required to earn the degree were entered into the MVA module as the quantitative (continuous or scale) variables. Persistence that culminated in the earning of the degree, the presence or absence of the intervening work experience, gender, race, and active duty military experience preceding and/or coinciding with undergraduate studies were entered as the categorical variables. The Estimation Maximization (EM) algorithm was chosen, which assumed a normal distribution. Executing the algorithm produced a data file in which missing quantitative data were imputed.

**Logistic Regression With SAT and ACT Scores**

The file containing the imputed data was analyzed using SPSS 14.0 binary logistic regression, with persistence as the dependent variable, and the independent (predictor) variables entered as covariates. The results are presented in Table 3. The Omnibus Tests of Model

### Omnibus Tests of Model Coefficients

<table>
<thead>
<tr>
<th>Step</th>
<th>Chi-square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>663.250</td>
<td>11</td>
<td>.000</td>
</tr>
<tr>
<td>Block</td>
<td>663.250</td>
<td>11</td>
<td>.000</td>
</tr>
<tr>
<td>Model</td>
<td>663.250</td>
<td>11</td>
<td>.000</td>
</tr>
</tbody>
</table>

### Model Summary

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2866.036&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.212</td>
<td>0.295</td>
</tr>
</tbody>
</table>

<sup>a</sup> Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Continued

Table 3: Results of Binary Logistic Regression.
Table 3 continued

**Classification Table**

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>persist</td>
<td>0</td>
</tr>
<tr>
<td>Step 1</td>
<td>persist</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Overall Percentage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. The cut value is .500

**Variables in the Equation**

<table>
<thead>
<tr>
<th>Step</th>
<th>Variable(s) entered on step 1: work, income, gender, race, sat, act, mil, age, yrstodeg, Depend.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>work(1)</td>
</tr>
<tr>
<td></td>
<td>income</td>
</tr>
<tr>
<td></td>
<td>gender(1)</td>
</tr>
<tr>
<td></td>
<td>race</td>
</tr>
<tr>
<td></td>
<td>race(1)</td>
</tr>
<tr>
<td></td>
<td>race(2)</td>
</tr>
<tr>
<td></td>
<td>sat</td>
</tr>
<tr>
<td></td>
<td>act</td>
</tr>
<tr>
<td></td>
<td>mil(1)</td>
</tr>
<tr>
<td></td>
<td>age</td>
</tr>
<tr>
<td></td>
<td>yrstodeg</td>
</tr>
<tr>
<td></td>
<td>Depend</td>
</tr>
<tr>
<td></td>
<td>Constant</td>
</tr>
</tbody>
</table>

Coefficients returned significance values of < .001, suggesting the model was statistically significant based on an a priori alpha of ≤.05. The Classification Table in Block 1: Method=Enter (stepwise
addition of variables to the model), indicated the model correctly predicted 91.5 percent of the subjects who did not persist to earn a bachelor’s degree, and correctly predicted 52.8 percent of those who did persist to earn a bachelor’s degree.

The model was also evaluated for its Proportional Reduction in Error (PRE), in which the errors without the model, minus the errors with the model, are divided by the errors without the model. The Block 0 iteration of a null set of the model (in which a constant is used and no predictor variables are used) was run and indicated 918 prediction errors. The Classification Table in Block 1 (with the model) indicated 592 prediction errors (433 + 159 incorrect predictions). \( \frac{918 - 592}{918} = .355 \) for a 35.5% PRE.

Categorical predictor variables. The Odds Ratios (Exp(B)) column from the Variables in the Equation chart, suggested the following with regard to the categorical predictor variables:

1. The odds of subjects who did not have an intervening work experience persisting to earn a bachelor’s degree were 11.698 times greater than subjects who had the intervening work experience.

2. The odds of a female persisting and earning the degree were 1.158 times greater than that of a male.

3. The odds of a Black subject persisting and earning the degree were approximately 0.542 times that of a non-Black, non-Hispanic (White) subject (reduced likelihood).

4. The odds of a Hispanic subject persisting and earning the degree were approximately 0.324 times that of a non-Black, non-Hispanic (White) subject (reduced likelihood).
5. The odds of a subject who had not had active duty military experience preceding and/or coinciding with undergraduate studies persisting and earning the degree were 9.996 times greater than subjects who had active duty military experience.

Continuous predictor variables. Odds Ratios (Exp(B)) presented in the Variables in the Equation chart suggested the following with regard to the quantitative (continuous) predictor variables:

1. For each dollar increase in family income in the year in which the subject graduated from high school, the odds of that subject persisting and subsequently earning a bachelor’s degree appeared to neither increase nor decrease, in light of the odds ratio of 1.000.

2. For each point increase in a subject's SAT score, the odds of that subject persisting and subsequently earning a bachelor’s degree appeared to increase by a factor of only 1.001.

3. For each point increase in a subject's ACT score, the odds of that subject persisting and subsequently earning a bachelor’s degree appeared to increase by a factor of only 1.081.

4. For each one year increase in the age of subject at the time of earning the bachelor’s degree, the odds of that subject persisting and earning the degree appeared to decrease (the odds ratio was 0.372).

5. For each one year increase in the number of years it took a subject to earn the degree, the odds of that subject persisting and earning the degree appeared to increase by a factor of 2.326.

6. For each increase of one dependent in the number of dependents a subject had at the time of earning the degree, the odds of that subject persisting and earning the degree appeared to decrease (the odds ratio was 0.318).
Logistic Regression Without SAT and ACT Scores

In the first binary logistic regression analysis, ACT and SAT scores were not revealed to be statistically significant predictors of persistence toward completion of a bachelor’s degree. These variables were also questionable in that relatively few scores (2,072) were reported for the NLSY79 cohort. The analysis was repeated with the deletion of these variables, with the results appearing in Table 8. The results are summarized as follows:

The Omnibus Tests of Model Coefficients returned significance values of < .001, suggesting the model was statistically significant based on an a priori alpha of ≤ .05. The Classification Table in Block 1: Method=Enter, indicated the model correctly predicted 91.4 percent of those subjects who did not persist to the earning of a bachelor’s degree, and correctly predicted 52.0 percent of those who did persist to the earning of a degree.

**Omnibus Tests of Model Coefficients**

<table>
<thead>
<tr>
<th>Step</th>
<th>Chi-square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>596.047</td>
<td>9</td>
<td>.000</td>
</tr>
<tr>
<td>Block</td>
<td>596.047</td>
<td>9</td>
<td>.000</td>
</tr>
<tr>
<td>Model</td>
<td>596.047</td>
<td>9</td>
<td>.000</td>
</tr>
</tbody>
</table>

**Model Summary**

<table>
<thead>
<tr>
<th>Step</th>
<th>-2 Log likelihood</th>
<th>Cox &amp; Snell R Square</th>
<th>Nagelkerke R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2933.238&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.193</td>
<td>0.268</td>
</tr>
</tbody>
</table>

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Continued

Table 4: Results of Binary Logistic Regression, With SAT/ACT Variables Removed from the Independent Variable Pool.
Table 4 continued

Classification Table

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted</th>
<th>Percentage Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>persist</td>
<td>0</td>
</tr>
<tr>
<td>Step 1</td>
<td>persist</td>
<td>0</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>Overall Percentage</td>
<td></td>
</tr>
</tbody>
</table>

a. The cut value is .500

Variables in the Equation

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<th>Step 1</th>
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<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
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<td>0.353</td>
<td>50.494</td>
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<td>.000</td>
<td>12.274</td>
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<tr>
<td>income</td>
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<td>0.000</td>
<td>31.271</td>
<td>1</td>
<td>.000</td>
<td>1.000</td>
</tr>
<tr>
<td>gender(1)</td>
<td>0.209</td>
<td>0.091</td>
<td>5.250</td>
<td>1</td>
<td>.022</td>
<td>1.232</td>
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<td>race</td>
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<td></td>
<td>97.613</td>
<td>2</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>race(1)</td>
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<td>0.148</td>
<td>68.113</td>
<td>1</td>
<td>.000</td>
<td>0.295</td>
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<td>race(2)</td>
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<td>0.113</td>
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<td>.000</td>
<td>0.454</td>
</tr>
<tr>
<td>mil(1)</td>
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<td>.000</td>
<td>9.851</td>
</tr>
<tr>
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<td>0.136</td>
<td>68.468</td>
<td>1</td>
<td>.000</td>
<td>0.325</td>
</tr>
<tr>
<td>yrstodeg</td>
<td>0.865</td>
<td>0.154</td>
<td>31.462</td>
<td>1</td>
<td>.000</td>
<td>2.375</td>
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<td>Depend</td>
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<td>0.447</td>
<td>10.934</td>
<td>1</td>
<td>.001</td>
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<td>Constant</td>
<td>15.443</td>
<td>2.458</td>
<td>39.481</td>
<td>1</td>
<td>.000</td>
<td>5088981</td>
</tr>
</tbody>
</table>

a. Variable(s) entered on step 1: work, income, gender, race, mil, age, yrstodeg, Depend.

Categorical predictor variables. The Odds Ratios (Exp(B)) reported in the Variables in the Equation chart, suggested the following with regard to the categorical predictor variables:
1. The odds of a subject who did not have an intervening work experience persisting to earning a bachelor’s degree was 12.274 times that of subjects who did have an intervening work experience.

2. The odds of females persisting and earning the degree was only 1.232 times that of males.

3. The odds of Black subjects persisting and earning the degree was 0.454 times that of non-Black, non-Hispanic (White) subjects (reduced likelihood).

4. The odds of Hispanic subjects persisting and earning the degree was 0.295 times that of non-Black, non-Hispanic (White) subjects (reduced likelihood).

5. The odds of subjects who did not have active duty military experience preceding and/or coinciding with undergraduate studies was 9.851 times that of subjects who had military experience.

Continuous predictor variables. Odds ratios suggested the following with regard to the quantitative (continuous) predictor variables:

1. For each dollar increase in family income in the year in which the subject graduated from high school, the odds of that subject persisting to the earning of a bachelor’s degree appeared to neither increase nor decrease, in light of the odds ratio of 1.000.

2. For each one year increase in the age of subject at the time of earning the bachelor’s degree, the odds of that subject persisting earn the degree decreased (the odds ratio was 0.325).

3. For each one year increase in the number of years it took a subject to earn the degree, the odds of that subject persisting and earning the degree appeared to increase by a factor of 2.375.
4. For each increase of one dependent in the number of dependents a subject had at the time of earning the degree, the odds of that subject persisting and earning the degree appeared to decrease (the odds ratio was 0.228).

Major Findings

Findings with regard to the independent variables indicated three had the greatest predictive values. The odds of subjects who did not have an intervening work experience persisting and earning a bachelor’s degree was approximately 12 times greater than subjects who had work experience. Subjects who had no active duty military experience preceding or coinciding with undergraduate study were nearly 10 times more likely to persist and earn a bachelor’s degree. For each one year increase in the number of years it took subjects to earn a bachelor’s degree, subjects were approximately 2.3 times more likely to persist and earn a bachelor’s degree.

Considered again from the perspective of the original research questions, the major findings also included the following:

1. Of the 3,020 subjects in the NLSY79 cohort within the years studied, for whom it could be determined whether or not they had an intervening work experience; 2,778 (92%) did not have an intervening work experience.

2. Of the 2,778 subjects without an intervening work experience, within the years studied, 1,735 (62.5%) subsequently earned a baccalaureate degree by 1988.

3. Out of 3,020 in the cohort, for whom it could be determined whether they had an intervening work experience, and who entered
college within the years studied; 242 (8%) completed an intervening
work experience of at least one year between high school graduation and
college.

4. Out of the 242 subjects who completed the intervening work
experience, within the years studied, 12 (5%) subsequently earned a
baccalaureate degree.

5. The odds of a subject who did not have an intervening work
experience meeting the criteria of the operational definition but who
persisted to the earning of a bachelor’s degree were approximately 12
times those of a subject who did have the intervening work experience.

There are a number of possible explanations and implications for
these findings. These are discussed in Chapter Five.
Chapter 5

Summary

General Overview

This study gathered and processed data from the National Longitudinal Study of Youth 1979 (NLSY79), a U.S. Department of Labor study that tracked the educational, occupational, and social progress of 12,686 persons, aged 14 to 21 in 1979, from 1979 to the present. This study used the NLSY79 data to examine nine variables for their potential predictive value regarding persistence toward earning a baccalaureate degree. The body of literature suggested that students who were more mature than mainstream undergraduate students, and students who had left school but returned later, enjoyed greater academic success than their more traditional counterparts. It was hypothesized that their achievement might be associated with a one- to two-year hiatus from academic studies, occurring between high school and college; during which subjects worked full time in one or both of those years.

Binary logistic regression analyses were conducted to assess the predictive value of an intervening work experience, in combination with factors of income, gender, race, presence or absence of military experience, age, number of years to attain the degree, and number of dependents. Of these variables, only work experience, military, and number of years to degree appeared to have significant predictive
effects. The results of this study refute the original hypothesis; indeed, subjects who had an intervening work experience were characterized by greatly increased odds of not persisting to the earning of a bachelor’s degree. Of all the variables examined, only one, (the number of years it took a subject to earn the degree starting from the time of initial entry into college) appeared to have predictive value that coincided with the literature.

Major Findings
As mentioned in the preceding chapter, analysis of the NLSY79 data did not support the original null hypothesis, in which an intervening work experience was statistically independent of persistence toward baccalaureate degree completion, i.e., the odds ratio (Exp(B)) for the independent variable (work) would have equaled 1 where the dependent variable (persist) was concerned. The $H_0$ had been:

$$H_0: \text{Exp}(B)_{\text{work}} = 1$$

However, the outcome was opposite that of the original alternate hypothesis, in which occurrence of the dependent variable (persist) would have been predicted from the non-occurrence of the independent variable work (work = 0). The odds ratio (Exp(B)), when work = 0, would have been less than 1 where the dependent variable (persist) was concerned. In other words,

$$H_a: \text{Exp}(B)_{\text{work}} < 1 \text{ when work} = 0$$

The opposite was observed in that the persistence of those who did not have the intervening work experience was significantly greater than that of those who had the work experience. Binary logistic regression
analysis indicated the odds that subjects who did not have work experience would persist to earn a bachelor’s degree was approximately 12 times that of subjects who did have work experience.

The logistic regression analysis also yielded a corollary result with regard to subjects who had active duty military experience preceding, or coinciding with, their studies leading to a baccalaureate degree. The odds that subjects who did not have active duty military experience would persist to earn a bachelor’s degree was nearly 10 times that of subjects who had military experience.

There was one predictor variable, among all those examined, that appeared to corroborate the prior research literature (which suggested that older and returning students enjoy a high degree of academic success): the variable reflecting the number of years it took a subject, from the time of first entry into college to earn a bachelor’s degree. With each additional year, it appeared that subjects were approximately 2.3 times more likely to persist to earn a bachelor’s degree.

Discussion

The purpose of this study was to determine the effect of an intervening work experience on the likelihood of high school graduates’ persistence toward completion of a bachelor’s degree. The findings of this study revealed that subjects who did not have an intervening work experience were nearly 12 times more likely to persist to earn a bachelor’s degree than those who had work experience. A number of plausible explanations are possible.

Some subjects in the NLSY79 data set may have experienced economic success during the intervening work experience to the extent
that they did not consider it necessary to return to school and pursue a bachelor’s degree in order to improve their careers or quality of life. The period examined in this study witnessed the rise of service sector employment, small- to medium-sized businesses, and the demand for technological skills. Some subjects may have attained associate degrees or certificates at two-year institutions and/or acquired marketable skills through on-the-job training or apprenticeship programs. They may have subsequently found placement in careers or entrepreneurial opportunities that were economically and intellectually rewarding, negating the perceived need for a baccalaureate degree.

On the other hand, other subjects may have had limited economic success during the intervening work experience, which may have made the price of further formal education appear to be unattainable. These subjects may have struggled through a series of semi-skilled occupations which generated just enough income to support themselves. They may have been unaware of financial aid programs or found the application process too daunting. Their work schedules and physical fatigue resulting from the physical nature of their jobs may have discouraged them from pursuing undergraduate studies, even on a part-time basis.

Acquiring dependents during the period of work experience may have convinced some subjects that returning to academic pursuits was no longer feasible. The demands of supporting and caring for dependents may have made it too difficult to enroll in classes or even apply for admission into a baccalaureate program. Subjects who married prior to
completing the requirements for a bachelor’s degree may have decided it was more practical for one spouse to continue progress toward a degree while the other cared for their children.

The dependents variable, treated as a continuous variable, did not prove to be a significant predictor of persistence, in that the relative number of dependents in the year in which the subject earned a bachelor’s degree did not appear to have a significant effect. What was not taken into account by this variable was how many subjects, upon acquiring as few as one dependent, may have been discouraged from even enrolling in a baccalaureate degree program. Also not revealed in the mere head count of dependents was the nature of the dependency. Responsibility for a dependent child conceivably involves a number of factors that could mitigate against completing a degree program. A dependent adult (i.e., a spouse) could have the opposite effect in that one spouse might generate income, freeing the other spouse to focus on making progress toward earning a degree. The dependents variable, treated as a categorical rather than a continuous variable, would likely have had a more credible effect. Of 1,731 subjects who earned a bachelor’s degree by 1988, and for whom the number of dependents could be determined, 1,668 had no dependents, while only 63 had one or more dependents.

Any generalization of the occurrence or non-occurrence of an intervening work experience as a predictor of persistence toward earning a bachelor’s degree must be approached with caution. Of the 242 subjects in the NLSY79 cohort for whom the occurrence of work experience could be confirmed, only 12 earned a baccalaureate degree by 1988. The increasing rate of missing data in the years following 1988
imposed a limitation on an accurate determination of how many of the remaining 230 earned the degree later. The years to degree variable suggested that with each year beyond 1988, the likelihood that these 230 earned their degree increased by a factor of approximately 2.3.

Generalization of work experience as a predictor of persistence is also complicated by the intervening variable of income within the year(s) of the work experience itself. The income variable in this study, based on total net family income of the subjects in the year of graduation from high school, was not in itself a significant predictor variable. Available resources did not permit the researcher to analyze the income levels, and changes in income, occurring during the work experience. Subjects might have responded to changes in income in different ways. Those who earned more income during the work experience might have been encouraged to use their additional disposable income to pay tuition and fees. Other subjects might have concluded that their economic success argued against the value of a bachelor’s degree. Subjects who suffered economic setbacks might have viewed formal education as being beyond their reach. Others may have viewed education as a means to improve their economic situation, and aggressively sought out financial aid programs. All these factors may have had greater influence on persistence than other experiential traits acquired during the work experience itself.

The military predictor variable had an unexpected apparent effect, in that subjects who had no active duty military experience preceding or coinciding with undergraduate study were nearly 10 times more likely to persist toward earning a bachelor’s degree. It was assumed that discipline and maturation associated with military
experience would translate into greater motivation to set and attain worthy goals for higher education. However, this assumption was not supported by the analysis. A number of explanations for this outcome are possible.

Some subjects who had military experience may have decided to remain on active duty and pursue a career as a noncommissioned officer (NCO), which does not immediately require earning a bachelor’s degree. Conscientious junior NCOs can enjoy satisfying leadership opportunities and a genuine sense of purpose, along with reasonable levels of compensation and benefits. Career NCOs eventually find it advantageous to their advancement to embark upon part-time study leading to a bachelor’s degree, but this may not be perceived as necessary until their mid-twenties to mid-thirties.

Other subjects may have acquired marketable technical skills while on active military duty and successfully transferred these skills into civilian technological careers, thus perceiving less need to pursue a bachelor’s degree to ensure career advancement. As mentioned earlier, this study spanned a time period in which technological skills were in demand, particularly in the electronic and information technology fields, and especially in the armed services which had taken a leading role in research, development, testing, and application.

The outcomes regarding work experience and military experience were notably parallel. Neither were predictors of persistence to earn a baccalaureate degree. The work experience variable, based only on number of hours worked within a one- to two-year time frame, represented a wide diversity of occupations and lifestyles. The military variable, while also occupational in nature, represented a
more narrowly defined set of occupations and a lifestyle distinct from
the mainstream of society. If the body of literature is valid, the
traits that bolster persistence, acquired by older students as they
mature, do not appear to stem from occupational experiences.

As previously noted, the only variable that appeared to confirm
more mature students enjoy greater persistence rates, was the number of
years needed to complete baccalaureate degree requirements. For each
additional year, the likelihood the subject would earn the degree
appeared to increase by a factor of approximately 2.3. This suggested
that many non-traditional students reached their bachelor’s degree
goals through combinations of entry, departure, and reentry into
undergraduate studies, interspersed or combined with periods of full-
time and part-time work and study.

Taken in the context of the study’s original research questions,
some of the outcomes appeared to undermine the preponderance of
literature with regard to older and returning students. Other outcomes
appeared to underscore the observations of the literature. Of those
for whom the available data confirmed whether or not they had an
intervening work experience, 92% had not. Most of these apparently
went straight from high school to college. Others may have sat out a
year or two, but never worked more than part time during their hiatus
from formal education. This does not appear to fit the profile of more
mature, returning students. Of those without an intervening work
experience, 62.5% earned a baccalaureate degree by 1988 -- a
respectable record for students typically about 22 to 24 years old, and
who did not work full time during a break in school, if they took a
break at all. Conversely, of those for whom the occurrence or non-
occurrence of an intervening work experience could be confirmed, only eight per cent completed an intervening work experience; and of that group, a mere five per cent earned a bachelor’s degree by 1988. This was not a particularly noteworthy accomplishment for a group likely to be 24 years old or older and who had worked at least one whole year full time during a break in school, i.e., more mature, returning students.

The years to degree variable alone seemed to validate the body of literature. For each successive year it took cohort members to reach their bachelor’s degree, the likelihood they would do so, and not give up, increased significantly. During their extended nontraditional journey to their goal, they apparently acquired and reinforced the traits described in the literature.

Conclusions

The literature review suggested that students who require more than a traditional four-year period to earn a bachelor’s degree, enjoy a higher rate of success in attaining their educational goal. The analysis suggested that increased odds of degree attainment was not associated with factors such as age, military experience, or number of dependents. Factors that might have predisposed students toward eventual degree attainment, such as income, gender, and race, did not reveal particularly strong or unexpected associations, either. It is quite possible that a maturation effect occurs with each passing year between the start and completion of the undergraduate degree coursework. How this translates into increased motivation to reach the goal remains unclear and may warrant further research.
As previously discussed, a multitude of socioeconomic factors influence decisions to enroll in college, then influence decisions to leave, stay, or return to school. Issues of income, dependents, and the nature of dependency all play a role. More difficult to measure are attributes of tenacity and motivation that impel some students to overcome formidable obstacles and attain their goal of a bachelor’s degree.

Students who require six, eight, or even more years to earn a bachelor’s degree are clearly not pursuing a full-time course of study during that entire span of years. It is reasonable to assume they are making progress through a series of starts, stops, and re-starts, or through successive periods, or combinations of periods, of part-time and full-time school and work. The factors that keep them on course may be more qualitative than quantitative. Perhaps maturation and motivation have progressive self-reinforcing effects. It is a virtual axiom that the busiest persons seem able to accomplish the most --it is almost as though they have tapped into an endless reservoir of energy. Somehow, year after year, they earn a living, raise children, support worthy causes in their community, and still make dogged progress toward earning a degree. How they accomplish this may not be measurable in mere terms of how many years they were out of school, how many hours they worked, age, number of dependents, etc.

Maturation may bring long-range personal, social, and economic goals into clearer focus, together with the connection between these and educational goals. Years of work in unrewarding occupations, in an effort to generate sufficient income to stay in school or to return to school, may crystallize the image of the baccalaureate degree as a
means to embark upon more fulfilling careers. These students may also perceive a growing sense of their self-investment, both in terms of time and money, in the educational process. As their investment grows, the determination to complete a bachelor’s degree may also increase.

Implications

From its inception, this study was viewed as having potential implications for career, guidance, and academic counseling practice at the secondary and post-secondary levels. The outcome of the study, although unexpected, still has potential implications for such counselors. There is no justification for counselors, teachers, and parents to encourage high school students to stay out of school for a year or two and work full-time during at least one of those years, as though this course of action is a formula for success. There is also no clear imperative to enter one of the armed services primarily as a means to take advantage of military and veteran financial aid programs for students, despite the fact such programs have considerable benefits.

If any implication for counseling high school and college students can be drawn from this study, it is perhaps that students whose undergraduate studies are delayed or interrupted temporarily, or whose progress must at times be on a part-time basis, should not lose sight of their goal. Students may take encouragement from the fact that, once they embark upon undergraduate study, maintaining involvement each passing year appears to increase the likelihood they will ultimately reach their goal. Despite alternating interruptions
and resumptions, despite the potential frustration that may result from slow progress, the important thing is to keep on coming back and trying.

Implications for student services at post-secondary institutions include the need for flexibility of programs and services. Non-traditional students do not follow tidy and predictable routes in their attainment of educational goals. Older and returning students who attempt to juggle the demands of career, family, and learning, need windows of entry, exit, re-entry, and financial aid that can accommodate a circuitous path to success while preserving academic integrity and quality.

Recommendations

One benchmark of success for post-secondary institutions is increasing the graduation rate. For any counseling department, the most timely and perhaps most satisfying symbols of success in the near term are those students who enter college and depart four or five years later with their bachelor’s degree in hand. Although not as numerous or immediately gratifying, the successes of returning and part-time students also deserve attention, and perhaps even an increased proportion of resources and support. College counselors should consider investing in information management systems that will continue contact with departed non-graduating students, in an effort to maintain connections and let them know the door is always open. This contact may make the difference between a departed student being a temporary "stopout" rather than a "dropout."
Counseling departments might also consider the design and implementation of systems that signal when part-time students appear to be faltering in their progress. Timely intervention in the form of academic or financial counseling could prevent a part-time student from becoming a dropout. Such students, although not representing frequent or highly visible returns on the institutional investment, have the potential to provide some of the most poignant success stories, which can be valuable aids to an institution’s retention programs. Those who doggedly persist through six, eight, or ten or more years to reach their goal may prove to be the strongest role models for struggling students, as well as visible and vociferous supporters of the baccalaureate institution.

Suggestions for Further Research

Future researchers should consider conducting similar studies using the U.S. Department of Labor’s newer National Longitudinal Study of Youth 1997 (NLSY97), or the U.S. Department of Education’s National Educational Longitudinal Study of 1988 (NELS88). Additional research using the NLSY79 could be expanded to assess the effect of other variables that might have predictive value with regard to degree persistence, such as recurrence and duration of periods of part-time study and part-time work. Other areas worthy of examination might be determining what point in their undergraduate progress some students become economically independent from their parents, the effect of their income level, changes in income, and type of occupation during their pursuit of a bachelor’s degree.

Potential may exist for a modified study of the effects of intervening work experience, perhaps based on a broader operational
definition. An analysis of the aggregate of all work experiences, full-time and part-time, preceding or coinciding with undergraduate studies, might reveal significant predictive effects.

Other factors that should be examined for their potential effects on persistence are differences between two- and four-year colleges. At least one source in this study’s literature review cited a significant difference in the dropout rates between the two types of colleges. Differences in traits of students who earned a bachelor’s degree by attending a four-year institution, and those who earned a bachelor’s degree by first attending a two-year institution, then transferring to a four-year school, represent a potential intervening variable. This could affect internal validity due to history, as well as external validity due to multiple treatment interference occurring when students transferred from two-year to four-year schools.

Another area to examine might be the profiles of students who earn bachelor’s degrees through a combination of formal institutional study and non-traditional sources of academic credit. Examples of non-traditional credit include the College Level Examination Program (CLEP), the Defense and Non-Traditional Education Services (DANTES), and articulation programs that award academic credit for industrial, technical, and military training and certifications.

Future research into factors that might have an effect on the success of older and returning students might take a more qualitative direction, in an attempt to explore the more subjective factors that have not been included in quantitative, longitudinal studies. Such research could have implications for the retention and recruiting programs of post-secondary institutions.
LIST OF REFERENCES


